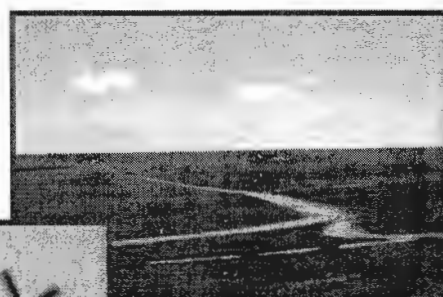
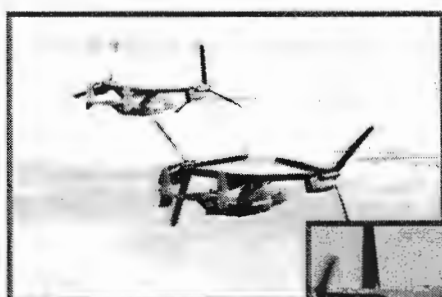




**AFSOC Assets Beddown at
Cannon Air Force Base,
New Mexico
Environmental Impact Statement**



July 2007

AFSOC Assets Beddown at Cannon AFB, New Mexico, EIS

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of potential environmental consequences. The organization of this Final Environmental Impact Statement, or Final EIS, is shown below:

Executive Summary

Chapter 1.0 Purpose and Need for Proposed Beddown of AFSOC Assets at Cannon and Melrose AFB

- 1.1 Background
- 1.2 Purpose and Need of Proposed Action

Chapter 2.0 Description of Proposed Action and Alternatives

- 2.1 Elements Affecting Cannon AFB
- 2.2 Elements Affecting Melrose AFB
- 2.3 Elements Affecting Airspace
- 2.4 Identification of Alternatives
- 2.5 Environmental Impact Analysis Process
- 2.6 Regulatory Compliance
- 2.7 Environmental Comparison of Alternatives

Chapter 3.0 Cannon Air Force Base Affected Environment and Environmental Consequences

- 3.1 Airspace Management and Air Traffic Control
- 3.2 Noise
- 3.3 Safety
- 3.4 Air Quality
- 3.5 Physical Resources
- 3.6 Biological Resources
- 3.7 Cultural Resources
- 3.8 Land Use and Transportation
- 3.9 Socioeconomics
- 3.10 Environmental Justice

Chapter 4.0 Melrose Air Force Range Affected Environment and Environmental Consequences

- 4.1 - 4.10 Same Subjects as Chapter 3.0 including Range Use in Section 4.8

Chapter 5.0 Training Airspace Affected Environment and Environmental Consequences

- 5.1 - 5.10 Same Subjects as Chapter 4.0 including Recreation in Section 5.8

Chapter 6.0 Cumulative Effects and Other Environmental Considerations

Chapter 7.0 Comments and Responses

- 7.1 Comment Receipt and Review
- 7.2 Locating Your Comments and Responses
- 7.3 Comments
- 7.4 Responses

Chapter 8.0 References

Chapter 9.0 List of Preparers

Appendices

Acronyms and Abbreviations can be found on the inside back cover.

How to Use This Document

This Final EIS is prepared to help the reader understand the environmental consequences of the Proposed Action to beddown Air Force Special Operations Command (AFSOC) assets at Cannon AFB. Please review Chapter 1.0 and 2.0 to learn the purpose and details of the proposed beddown.

Chapter 3.0 explains the affected environment and environmental consequences of the alternative construction and renovation to accomplish the beddown at Cannon AFB. The No Action Alternative is also addressed.

Chapter 4.0 explains the affected environment and environmental consequences of two live fire alternatives at Melrose AFB.

Chapter 5.0 explains the affected environment and environmental consequences of aircraft training within the airspace.

Chapters 6.0 and 8.0 discuss cumulative and short and long term effects, contain references, list preparers, and provide a glossary.

Chapter 7.0 contains comments on the Draft EIS from federal, state, and local agencies, and the general public.

In addition to the main text, a series of appendices describe chaff and flares, public involvement, regulations, airspace operations, noise analysis, and provide guidelines for range management.

The box to the left summarizes the Final EIS contents.

Cover Sheet

ENVIRONMENTAL IMPACT STATEMENT FOR AFSOC ASSETS BEDDOWN AT CANNON AFB, NEW MEXICO

- a. *Responsible Agency:* United States Air Force
- b. *Cooperating Agency:* None
- c. *Proposals and Actions:* This Final Environmental Impact Statement (EIS) analyzes a proposal to beddown, or locate, Air Force Special Operations Command (AFSOC) assets at Cannon Air Force Base (AFB) and Melrose Air Force Range (AFR) and to train these assets primarily in airspace scheduled by Cannon AFB. The Secretary of Defense designated the AFSOC mission to Cannon AFB pursuant to his duties under the recommendations of the Base Realignment and Closure Commission. The proposal assigns approximately 108 AFSOC aircraft to Cannon AFB, although 25 to 33 percent could be deployed at any given time. The 27th Fighter Wing 60 F-16 jets currently assigned to Cannon AFB would be replaced by AFSOC turboprop aircraft (C-130s with varying missions, CV-22s, Predator Unmanned Aerial Systems, and additional aircraft). The current flight operations at Cannon AFB would be reduced approximately 40 percent. The West Flightline Alternative would involve military construction (MILCON) and operations and maintenance (O&M) costs totaling \$840 million across the six-year Future Years Defense Program (FYDP). The preferred East and West Airfield Alternative would involve MILCON and O&M costs of \$965 million across the FYDP. However, of these amounts, only a portion would be unique to the AFSOC assets beddown at Cannon AFB. The majority of this money is already programmed for operations regardless of basing. Resources of this magnitude are going to be required regardless of where the AFSOC growth is based. The Proposed Action would include new equipment and personnel increases from 4,147 to 5,360 plus an estimated 320 contract personnel between 2005 and 2011. This would be comparable to personnel levels during the Cannon AFB F-111 mission through 1994. Training would occur within the 60,010 acre Melrose AFR using the preferred two live-fire target areas. A Three-Target Alternative is also evaluated. Live-fire targets would involve high-explosive (HE) and incendiary munitions from 30 up to 105 millimeter (mm) from AC-130 gunships. An estimated \$30 million of MILCON projects on the range would relocate facilities, improve fire management, and build new target areas. An expanded small arms range for personnel training would be constructed at the existing small arms range. Landing zones (LZs) for aircraft and helicopters and approximately 50-acre drop zones (DZs) would be located on the range. Military training airspace would have an annual average of 40 percent of flights occurring during environmental night (between 10 p.m. and 7 a.m.). Military Training Route (MTR) training flights would normally be from 4 to 5 hours long with aircraft between 100 and 1,000 feet above ground level (AGL). Night flights on most MTRs could increase from effectively none to 1,000 or more per year. Overall, AFSOC would use less defensive chaff and flares. AFSOC proposes to utilize area lakes for water training and to identify additional off-range locations for LZ/DZ training. The No Action Alternative means that Cannon AFB would become an AFSOC installation with no beddown of AFSOC assets.
- d. *Inquiries:* For further information on this Final EIS, contact Mr. Carl Hoffman, AFSOC Assets Beddown EIS Project Manager, 427 Cody Avenue, Suite 303, Hurlburt Field, FL 32544-5434. Telephone inquiries may be made to Denise Boyd, HQ AFSOC Public Affairs at (850) 884-5515. The Final EIS may be found at <http://www2.afsoc.af.mil/fonsi>. A Record of Decision (ROD) will be issued no earlier than 30 days following the publication of the Final EIS.
- e. *Designation:* Final Environmental Impact Statement
- f. *Abstract:* This Final EIS has been prepared in accordance with the National Environmental Policy Act. Public and agency scoping resulted in the analysis of the following environmental resources: airspace management and air traffic control, noise, safety, air quality, physical (including hazardous materials and waste), biological, cultural, land use, ranching, transportation, and recreation, socioeconomics and environmental justice. Cannon AFB economic activity would increase in Curry and Roosevelt counties. Noise, safety, and other resources around and on the base would not be impacted. An airspace transit area to permit UAS transit from Cannon AFB to Melrose AFR could inconvenience, but not significantly impact, some general aviation. Melrose AFR training would increase targets, exposed soils, munitions debris, noise, and safety requirements on the range. Munitions noise could impact some residences on the periphery of the range. Expansion of the Exclusive-Use area on the range would impact lessees who use range buffer areas for grazing and agriculture. Natural biological or cultural resources would not be significantly impacted by the change in training. Airspace Military Operations Area (MOA) and MTR training activity would increase. Noise levels on MTRs and under MOAs would noticeably increase and would be expected to result in some increased annoyance. Use of water areas for training would increase activity and noise. Water training would need to be scheduled to mitigate impacts on biological species or recreationalists. Cumulative federal and non-federal actions would not be expected to result in significant impacts.

**AFSOC Assets Beddown at
Cannon Air Force Base,
New Mexico
Environmental Impact Statement**

July 2007

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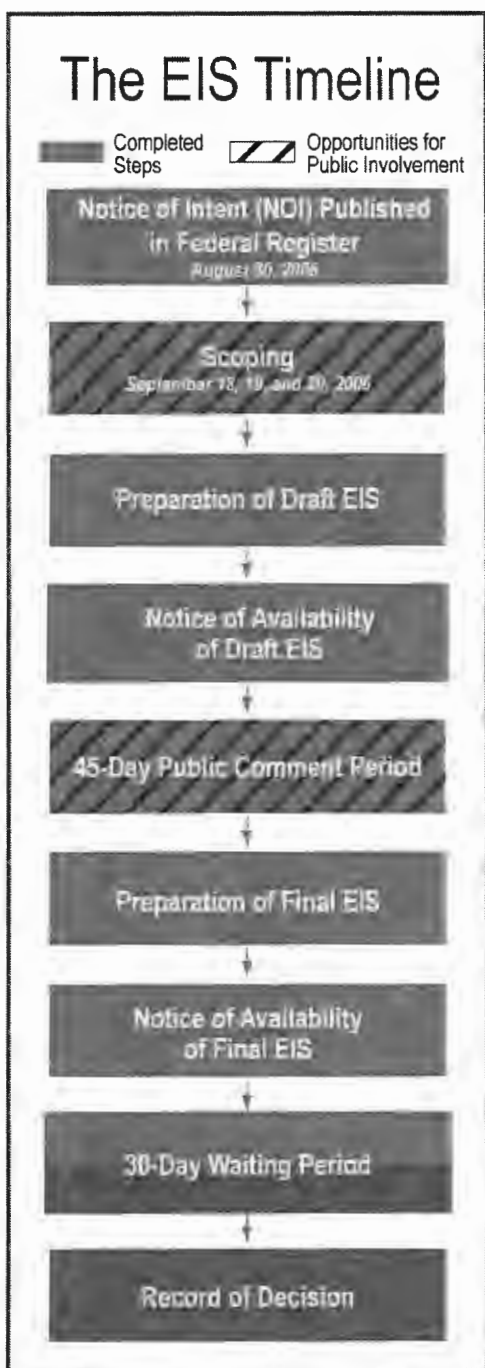
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ENVIRONMENTAL IMPACT ANALYSIS PROCESS . .

An Environmental Impact Statement (EIS) provides a full and fair discussion of a project's potential environmental consequences. This EIS considers alternative facilities at Cannon Air Force Base (AFB) and alternative targets at Melrose Air Force Range (AFR). The No Action Alternative means that AFSOC assets would not be located at Cannon AFB. Preparation of an EIS involves several steps.



1. *Announce that an EIS will be prepared.* A Notice of Intent was published in the *Federal Register*.
2. *Conduct scoping.* The Air Force initiated the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), submitted letters to local, state, tribal and federal agencies informing them of the Air Force's intent to prepare this EIS, and conducted public scoping meetings.
3. *Prepare and Distribute Draft EIS.* The Draft EIS was distributed to agencies, regional libraries, and members of the public who requested copies to ensure the widest dissemination possible.
4. *Public/Agency Review.* The 45-day review period began when the Notice of Availability (NOA) for this Draft EIS was filed in the *Federal Register*. Public hearings provided direct feedback to the Air Force. Comments were accepted throughout the public comment period.
5. *Prepare Final EIS.* The Final EIS includes all written comments, verbal testimony, and Air Force responses. An NOA was published in the *Federal Register* to announce availability of the Final EIS. The NOA begins a 30-day waiting period.
6. *Issue Record of Decision.* The Record of Decision (ROD) may be signed after the 30-day waiting period. The ROD identifies which action has been selected by the Air Force decisionmaker and what mitigation or other measures would be carried out to reduce, where appropriate, adverse impacts to the environment.

EXECUTIVE SUMMARY

The Secretary of Defense (SECDEF) designated the Air Force Special Operations Command (AFSOC) mission to Cannon Air Force Base (AFB) pursuant to his duties under the recommendations of the Base Realignment and Closure (BRAC) Commission approved by Congress and the President (Department of Defense [DoD] 2005). This Environmental Impact Statement (EIS) analyzes the potential environmental consequences of a proposal to beddown, or locate, AFSOC assets at Cannon AFB and Melrose Air Force Range (AFR), New Mexico, and to train these assets in special use airspace and Military Training Routes (MTRs) currently coordinated by the 27th Fighter Wing (27 FW) and to be scheduled by AFSOC personnel at Cannon AFB.

This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations. This EIS incorporates public and agency comments on the Draft EIS and identifies a preferred base and range alternative. This Final EIS with public and agency comments on the Draft EIS will be considered in decision making on the AFSOC proposal.

PURPOSE AND NEED

The proposed beddown of AFSOC assets at Cannon AFB would implement the SECDEF's designation by determining how to beddown AFSOC assets at Cannon AFB. Cannon AFB, Melrose AFR, and operations airspace provide locations to base AFSOC assets and to train to meet expanding mission requirements. These requirements include the types of terrain, aircraft, operating conditions, and targets currently and projected to be part of AFSOC operations. AFSOC provides United States Air Force (Air Force) Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. Training for Cannon AFB assets would involve all phases of the operational use of personnel, equipment, and munitions, including weapons and tactics test and evaluation. Operational training includes forward presence and engagement, information operations, precision employment and strike, and SOF mobility.

AFSOC needs facilities and training opportunities beyond those available at Hurlburt Field, Florida, to accommodate additional growth through 2013. Force structure increases and additional training requirements establish a need for Cannon AFB and Melrose AFR for the following reasons:

- a. Quality of flying training in the southeast United States (U.S.) is not representative of on-going real-world deployments that support the War on Terrorism.
- b. Increased competition for Eglin range time with the addition of the new F-35 Joint Strike Fighter and other BRAC actions would limit AFSOC training.
- c. A one-base Major Command (MAJCOM) at Hurlburt Field makes it vulnerable to a catastrophic event (i.e., Hurricane Andrew or Katrina).

AFSOC requires additional facilities and training opportunities. The Proposed Action implements the SECDEF designation of AFSOC as the new mission for Cannon AFB and resolves AFSOC needs. The final BRAC report (2005) from the BRAC Commission to the President recommended Cannon AFB remain open until at least 31 December 2009. In the interim, the SECDEF was to seek other missions for assignment to Cannon AFB.

Missions for Cannon AFB were sought and evaluated consistent with the recommendations of the BRAC Commission. As a result of this search, AFSOC was designated as the new mission for Cannon AFB and Melrose AFR.

PROPOSED ACTION AND ALTERNATIVES

The beddown proposal transfers approximately 108 AFSOC Primary Aircraft Inventory (PAI) to Cannon AFB over a period of approximately 6 years. Approximately 25 to 33 percent of the aircraft could be deployed off-station at any given time. Under BRAC, Air Combat Command (ACC) would deactivate the 27 FW at Cannon AFB and relocate the 60 F-16 PAI currently assigned to Cannon AFB.

AFSOC mission aircraft would be C-130 aircraft with varying mission requirements, CV-22 tilt-rotor aircraft, Predator Unmanned Aerial Systems (UAS), and miscellaneous additional aircraft. The AFSOC aircraft assets are turboprop aircraft, as compared to the F-16 jet aircraft.

Two alternatives are assessed for facilities at Cannon AFB: the West Flightline Alternative and the East and West Airfield Alternative. Under the West Flightline Alternative, construction and renovation would occur at Cannon AFB between 2008 and 2013 of approximately \$310 million worth of military construction (MILCON) projects plus \$530 million worth of operations and maintenance (O&M). However, of these amounts, only a portion would be unique to the AFSOC assets beddown at Cannon AFB. The majority of this money is already programmed for operations regardless of basing. Resources of this magnitude are going to be required regardless of where the AFSOC growth is based. These projects would occur within approximately 342 previously disturbed acres on the north side of the base.

The preferred alternative is the East and West Airfield alternative. Under the East and West Airfield Alternative, construction and renovation would occur at Cannon AFB between 2008 and 2013 of approximately \$435 million worth of MILCON projects plus \$530 million worth of O&M. Again, of these amounts, only a portion would be unique to the AFSOC assets beddown at Cannon AFB. The majority of this money is already programmed for operations regardless of basing. Any additional MILCON needed to support the Preferred Alternative will be pursued through future programming. Resources of this magnitude are going to be required regardless of where the AFSOC growth is based. Approximately 284 acres on the south side of the base (unimproved disturbed grasslands) would additionally be disturbed for facility construction.

Flight operations by AFSOC aircraft at Cannon AFB would be approximately 60 percent of the current approach/departure and closed pattern operations experienced during 27 FW training.

Mission personnel assigned to Cannon AFB and contractor personnel could increase from 4,467 personnel to 5,680 between Fiscal Year (FY) 2005 and FY 2011. A dip in personnel could occur in FY 2007 to 3,186 personnel assigned. Personnel assignments would be determined by annual federal budget appropriations. Ultimately the assigned AFSOC personnel are projected to be approximately the number of assigned personnel during the F-111 mission through 1994.

AFSOC training would generally occur within the 60,010 acres that constitute Melrose AFR. Responsibilities and procedures for the maintenance, operation, and use of Melrose AFR as defined in Air Force Instruction (AFI) 13-212, Volume 1, ACC Supplement 1, Cannon AFB Addendum A ("Cannon Addendum") would be replaced with a new supplement to reflect AFSOC's new role as range manager, subsequent to transfer of the range from ACC. The AFSOC Cannon Local Range Supplement will be developed to reflect the more substantive

range changes that are the subject of this EIS, subsequent to issuance of the Air Force's Record of Decision (ROD).

Two alternatives are assessed for the 60,010-acre Melrose AFR: a Two-Target and a Three-Target Alternative. The preferred alternative is the Two-Target Alternative. Under the Two-Target Alternative, two new live-fire target complexes would be established. The Three-Target Alternative would create three new live-fire target areas. Either alternative would involve live munitions from 30 up to 105 millimeter (mm) high-explosive (HE) and incendiary munitions from AC-130 gunships. The use of these munitions within Melrose AFR would affect management of the range and grazing allotments. Melrose AFR is currently divided into Exclusive-Use, Restricted Leasing for agriculture, and Unrestricted Leasing for agricultural categories. The Exclusive-Use area contains current targets available for military training by F-16, other aircraft, and AFSOC SOF training. Exclusive-Use areas would be expanded for safety around live-fire targets. An estimated \$30 million of MILCON projects on the range would include new fire management capabilities, construction of new targets, and other improvements. An aircraft and helicopter prepared landing zone (LZ)/drop zone (DZ) affecting approximately 50 acres could be located on the range away from live-fire targets. Vertical landing aircraft such as the CV-22 could also land at unprepared locations on the range. The current small arms range would be enhanced to support SOF and Army National Guard.

Cannon AFB schedules the restricted airspace supporting Melrose AFR, Military Operations Areas (MOAs), and MTRs. AFSOC aircraft missions require an annual average of 40 percent of their flights to occur during "environmental night" (10:00 p.m. to 7:00 a.m.). The majority of the airspace currently has relatively few night training flights. Night flights on some MTRs could increase from effectively none to 1,000 or more per year. MTR training flights would normally be from 4 to 5 hours with aircraft between 100 and 1,000 feet above ground level (AGL) and usually at 250 feet AGL or higher. Air refueling locations would be coordinated with FAA as the existing aerial refueling (AR) track (AR-602) is at too high an altitude for some AFSOC aircraft.

Defensive chaff and flares would be used by AFSOC aircraft during training. The current chaff use is 48,617 bundles released by aircraft per year, and the current flare use is 32,230 bundles per year. AFSOC training is projected to reduce chaff and flare use to 36,000 chaff bundles and 24,000 flares released by aircraft annually. The distribution of chaff and flare use would change, with an estimated four times the current number of chaff bundles and flares used in restricted airspace over Melrose AFR and a proportionate decrease in chaff and flare use within the MOAs. M-206 or equivalent flares would be used in the assessed MOAs above 2,000 feet AGL and would be used above 5,000 feet AGL when the National Fire Danger Rating System indicates high fire conditions or above.

AFSOC proposes establishing a transit area between Cannon AFB and the restricted airspace associated with Melrose AFR. The Predator UAS is only authorized to fly in the National Airspace System under a Certificate of Waiver or Authorization (COA) issued by the Federal Aviation Administration (FAA). Compliance with the COA is mandatory and would be expected to establish an equivalent level of safety to the "see and avoid" requirements of FAR 91.113.

SOF missions include infiltration, exfiltration, re-supply, and refueling. Training activities could include additional LZs, DZs, and water training locations for infiltration and amphibious training outside of Cannon AFB or Melrose AFR. Operational and safety consideration require

that LZ, DZ, or water training be located in an area free from obstructions, be within a one to two-hour drive from Cannon AFB, avoid populated, noise-sensitive, or residential areas, and be located in a relatively flat area away from city lights. Identification of LZ, DZ, or water training locations would occur with agencies and/or property owners and involve evaluation of cultural, natural, hazardous, and other site environmental resources. All applicable environmental analyses and permitting would be followed in LZ, DZ, or water training site selection. This analysis would be completed once developmental CV-22 operational capabilities and requirements for LZs/DZs are determined. Some types of training, such as open water training or mountaineering, would be conducted while personnel are on assignment to existing training locations.

The No Action Alternative included in this EIS addresses the conversion of Cannon AFB with a SECDEF mission designation to AFSOC, but no action to transfer AFSOC assets to Cannon AFB. For the purposes of this analysis, No Action would result in no movement of AFSOC assets to Cannon AFB and AFSOC would maintain and operate the properties. With regards to Melrose AFR, no Cannon AFB assets would train at the range. New Mexico Air National Guard (NMANG) and transient aircraft would continue to use the airspace and Melrose AFR. No action would reduce personnel levels to approximately 150 between 2007 and 2009. These 150 personnel would support base infrastructure and range operations. Flight operations would consist of transient aircraft.

ENVIRONMENTAL CONSEQUENCES

AIRSPACE MANAGEMENT AND AIR TRAFFIC CONTROL

Base. Other than adjustments made to reflect the transition from supersonic F-16 fighters to turboprop fixed-wing aircraft, airspace management and air traffic control procedures in the vicinity of Cannon AFB would not change with the beddown of AFSOC assets under either the West Flightline Alternative or East and West Airfield Alternative. Airfield operations would be reduced by approximately 40 percent annually.

Range. Management of Melrose AFR would be performed by AFSOC personnel at Cannon AFB. Other than adjustments made to reflect the transition from supersonic F-16 fighters to turboprop fixed-wing aircraft, airspace use and management would remain unchanged from current conditions. An LZ/DZ at Melrose AFR would be scheduled consistent with other Melrose AFR training activities. A 2-mile wide UAS transit area between Cannon AFB and Melrose AFR, parallel to and south of Highway 60 for a distance of about 20 miles, with an operating altitude between 10,000 and 16,000 feet above mean sea level (MSL), would permit the normal flow of civil aviation parallel to the proposed UAS transit area and traffic perpendicular to the transit area at an altitude above or below that proposed for UAS transit. A COA for this transit area would not be expected to significantly affect general aviation, but specific north-south flights may elect to avoid airspace potentially occupied by a UAS.

Airspace. Increased annual sortie operations in the MOAs would not be expected to affect airspace management. AFSOC training would involve a substantial increase in use of the MTRs including sorties of fixed-wing turboprop aircraft. Four- to five-hour training missions would fly between 100 and 1,000 feet AGL and usually at 250 feet AGL and higher. During night missions, these altitudes on MTRs would be below altitudes used by general aviation. During daylight missions, low-altitude general aviation aircraft such as agricultural aircraft could be encountered at training altitudes. The C-130 and CV-22 aircraft have a pilot and co-pilot that support see-and-avoid procedures during daylight and night operations. LZ, DZ, and water

training could involve landing at locations not currently used by aircraft. Coordination with FAA would be initiated as part of the identification of LZ, DZ, or water training. AR tracks would be coordinated with FAA when CV-22 operational capabilities are determined.

NOISE

Base. Noise levels in the vicinity of Cannon AFB would generally be reduced in nearly all areas when compared with current conditions. The reduction in noise is primarily due to the quieter AFSOC aircraft and fewer operations when compared to current jet aircraft. The exception is one area to the northeast of Cannon AFB which would be exposed to additional 65 decibel (dB) noise contours. Short-term construction noise may also be anticipated. Base noise would be essentially the same under the West Flightline Alternative or the preferred East and West Airfield Alternative.

Range. Under the preferred Two-Target Alternative, noise would increase on Melrose AFR and on properties proximate to the range. Aircraft noise from AC-130 aircraft orbiting at an altitude of approximately 6,000 to 11,000 feet AGL, in combination with noise levels from existing NMANG and transient aircraft training, would increase noise levels under Restricted Airspace and the Taiban MOA to an annual Day-Night Average Sound Level (L_{dn}) 55 to 58 dB noise level. This increase in noise from the existing L_{dn} 44 to 51 dB could be noticed and be annoying to or impact residents under the Restricted Airspace or the Taiban MOA. Impulse noise from AFSOC munitions use during training on Melrose AFR is projected to create a C-weighted Day-Night Average Sound Level (CDNL) 62 C-weighted decibel (dBC) contour primarily over the range. The 62 dBC (comparable to L_{dn} 65) contour is used as a contour for addressing the potential for significant impacts. No ranches are within the 62 dBC contour. Experience with HE munitions at Eglin AFB demonstrated that persons within approximately 6 miles of the targets could experience an impulse sound comparable to strong knocking on a door and feel a vibration comparable to distant thunder. Impulse noise would not be expected to cause damage to a structure or its contents, but when heard and felt, especially during night hours, such noise could cause annoyance to residents and be perceived by residents as a significant impact. Domestic or wild animals in areas subject to aircraft operations or impulse noise would be expected to avoid the specific impact area and habituate to noise levels. Penned cattle approximately 3 or more miles from the impact areas would not likely be affected by noise or vibration from HE rounds beyond those distances. Under the Three-Target Alternative, live munitions use would occur at three locations. Aircraft noise and impulse noise would affect a greater area as target usage would be spread out over three targets instead of two. Target construction noise would not be expected to extend beyond the boundaries of the 60,010-acre range under either the Two-Target or Three-Target Alternative. The proposed expanded small arms range would increase noise from various size weapons up to 50 caliber machine guns. This noise would be less than the noise from munitions usage on live-fire targets, but could still result in annoyance to residents in the periphery of the range.

Airspace. Average noise levels in Pecos (Day-Night Average Sound Level [L_{dn}] 45), Mt. Dora (L_{dn} 36), and Taiban (L_{dn} 55) MOAs would increase, however they would generally not be above L_{dn} 55 dB. MTRs would have substantially greater aircraft activity than at present, especially at night. Applying the night penalty of L_{dn} 10 dB to flights between 10:00 p.m. and 7:00 a.m. results in certain MTR segments having increased noise levels from ambient and No Action conditions in the L_{dn} 25 to 36 dB range to average noise levels in the 49 dB range. Some of the MTRs with combined routing or bi-directional routing could experience an average of four overflights per environmental night (between 10:00 p.m. and 7:00 a.m.). Although many of the

MTRs are up to 20 miles wide, and the training aircraft could be flying anywhere along the route, some segments of some routes will experience substantial changes from ambient conditions. This noise would not be at sustained levels that could damage human health, but the noise could result in annoyance and noise complaints from residents under the MTRs. AFSOC would coordinate with representatives of national forests and grasslands to address noise complaints from the public. LZ, DZ, and water training locations would be subjected to increased noise from C-130, CV-22, other aircraft, or group activities. LZ and DZ locations would be identified to avoid, to the extent possible, noise impacts upon local residents. The four water locations available for the four projected monthly training events could experience C-130, CV-22, and night training activity. Training could produce sufficient noise to be perceived as an intrusion and annoyance to residents and recreationalists.

SAFETY

Base. C-130 aircraft have an excellent safety record of less than one Class A accident per 100,000 flight hours. The current F-16 Class A accident rate is 3.6 per 100,000 flight hours. CV-22 aircraft are a new complex system. Class A mishap rates have not yet been calculated for CV-22 aircraft because they have not yet accumulated 100,000 flight hours. Normally the mishap rate for new aircraft is higher until the aircraft becomes operationally mature. The combined safety effect of the C-130 and CV-22 base operations plus other aircraft assigned to Cannon AFB is expected to be comparable to the F-16 safety at Cannon AFB. Airfields have safety zones at the ends of runways. Construction of new buildings or facilities would not take place in safety zones and would be consistent with the Base General Plan and safety procedures. Ground safety, aircraft safety, and bird aircraft strikes for either the West Flightline Alternative or East and West Airfield Alternative are not expected to be measurably different from baseline conditions. Under either alternative, base safety procedures would be developed to address changing munitions needs for Melrose AFR training.

Range. Melrose AFR live-fire and use of HE munitions training would increase the Exclusive-Use Areas where non-participating personnel and ranching operations would not be permitted. The 60,010-acre range currently has 8,800 acres of Exclusive-Use Area. Under the Preferred Two-Target Alternative, there would be an estimated 10,600 Exclusive-Use acres and under the Three-Target Alternative, there would be 12,700 Exclusive-Use acres. The Exclusive-Use acreage would come from current restricted and/or unrestricted grazing areas. The existing Melrose Range Management Plan would be updated to address the use and management of live ammunition and the range residue associated with this change in use. AFSOC has proposed adoption of continued and expanded fire management practices, including grading of firebreaks, clearing of vegetation around targets, and aggressive reduction of weedy plants. This would improve fire management on Melrose AFR. Training of SOF and other personnel on the expanded small arms range would include use of small arms, live explosives, and flares. This training on Melrose AFR would not be conducted in areas where unexploded ordnance (UXO) was known to be present. Aircraft flares used over the range would be treated as other munitions. Ground safety for the Two-Target and Three-Target Alternatives would be comparable, except an additional target area would require aggressive fire management.

Airspace. Within the MOAs and the MTRs, national forests, national monuments, and state parks would be avoided by 2,000 feet AGL. AFSOC would coordinate with representatives of national forests and grasslands to address noise complaints from the public. Aircraft safety is not expected to be measurably different from baseline conditions. Bird-aircraft strikes of small night-migrating songbirds could increase with the MTR low-level flights. Aircraft safety within

the training airspace would be enhanced by the improved situational awareness of the two-pilot C-130 and CV-22 aircraft. No safety consequences from continued and reduced chaff and flare use are anticipated in the MOAs. LZ, DZ, and water training would include safety procedures to protect nonparticipating personnel and vehicles.

AIR QUALITY

Base. The air quality region that includes Cannon AFB is in attainment for all pollutants. Emissions associated with construction under the West Flightline Alternative or East and West Airfield Alternative would increase ambient air pollutant concentrations on a localized and short-term basis. These emissions would not result in any significant air quality impacts. Operational emissions from the West Flightline Alternative or East and West Airfield Alternative would be expected to decrease with new facilities and the different types of aircraft. Operational emissions would not produce any significant air quality impacts.

Range. Air emissions under the aircraft and munitions use of the Two-Target Alternative or Three-Target Alternative combined with soils disturbance for targets and fire management would increase particulates, but not be expected to exceed any emission significance thresholds. No significant air quality impacts are projected in or around Melrose AFR. Chaff and flare residue would not be expected to change air quality conditions.

Airspace. Air pollutant emissions associated with the AFSOC training would not have an effect upon ambient air conditions within the MOAs or MTRs.

PHYSICAL RESOURCES (INCLUDING HAZARDOUS MATERIALS AND WASTE)

Base. The generally flat terrain at Cannon AFB would support construction with relatively little cut and fill. Any effects upon soils would be localized and would not result in any significant impacts to water resources or other resources. Any stormwater runoff associated with additional impervious surface area would be addressed through management practices. All hazardous materials and construction debris generated by the construction projects would be handled, stored, and disposed of in accordance with federal, state, and local regulations. Facility demolition would generate solid wastes that would be deposited at the Cannon AFB Recycling Center or the Clovis Regional Landfill. The base Environmental Restoration Program (ERP) office would request a waiver from the state to construct on or near six ERP sites under the West Flightline Alternative or East and West Airfield Alternative.

Range. The potential impacts to physical resources, primarily soil and water, would be from residual munitions materials or from chaff and flare materials falling to the ground. There are no current live munitions used at Melrose AFR except the white phosphorus rocket and defensive flares. AFSOC training would reduce the total use of training chaff and flares when compared with 27 FW usage. The distribution of chaff and flare use would change. The amount of chaff or flare materials proposed for use over Melrose AFR would quadruple when compared with current conditions. Chaff rapidly breaks down to the common elements of silica and aluminum. Any fire in the arid east New Mexico environment has the potential to detrimentally affect soils, vegetation, and other resources. Improved fire management procedures would aid in protecting Melrose AFR and off-range resources from fire caused by munitions or other sources. Non-irrigated soils representative of those on the range are highly susceptible to erosion due to persistent winds of the plains. Exposed soils associated with targets or other range activities such as fire breaks could result in increased wind erosion.

Live-fire training would increase chemicals from munitions, lead, and other heavy metals and potentially affect soil and water chemistry on the range. Expanded explosive ordnance disposal (EOD) range clearance would be required in accordance with AFI 13-212. HE munitions use on the range could add approximately 250 acres (Two-Target) or 750 acres (Three-Target) requiring EOD clearance. Up to an additional 3,200 acres would have increasing lead munitions from the small arms range. Hazardous materials and chemical residues resulting from HE munitions would be managed through the Cannon AFB hazardous materials management program. Live-fire training would impact soils with HE chemical residues. Migration of HE residues into ground or surface waters is not expected due to the depth to groundwater under Melrose AFR. Enhanced fire management programs would apply to all target areas to reduce the potential for munitions-caused impacts.

Airspace. Overflight activities would not cause disturbances to the ground. LZ and DZ construction would occur on permitted or leased land in accordance with Best Management Practices (BMPs). Water training activities would occur within the four existing lakes as coordinated with lake management agencies. Water training and LZs supporting water training could increase the amount of fuel and other products near reservoirs. Procedures would be included in water training to ensure that no fuel spills or debris was deposited in the water bodies. Chaff and flare use would decrease in the airspace except under the restricted airspace. No significant impacts to physical resources are expected.

BIOLOGICAL RESOURCES

Base. The West Flightline Alternative or East and West Airfield Alternative would be constructed on existing disturbed areas within Cannon AFB boundaries. No wetlands or other jurisdictional water bodies fall within the construction footprints of the West Flightline Alternative or East and West Airfield Alternative. Any construction disturbance would be minor and have no significant impact on species distribution or abundance.

Range. Operations would involve a mix of aircraft and ground-based activities over and on Melrose AFR. Changes associated with aircraft operations under the Two-Target Alternative or Three-Target Alternative would be related to lower overflights, landings, and takeoffs of C-130 and CV-22 aircraft on the range LZs, DZs, and live-firing exercises. These activities would exceed the current conditions. Target reconstruction, reconfiguration, and cleanup would create an increase in visual and noise disturbance caused by humans, with a minor impact on wildlife species occupying the adjacent habitat. No target areas would be located near surface water areas or seasonally active drainages on Melrose AFR. Direct mortality of individual organisms would be less than significant after development of the new target complexes. Target areas would be avoided by large nocturnally active species such as pronghorn and mule deer. The degree of habitat disturbance and the residual chemicals and materials from munitions use have the potential to impact wildlife within the area. Disturbance-related behavioral and ecological changes in wildlife could include changes in home range and abandonment of habitats. These changes will vary with wildlife species group and wildlife species. Physiological stress changes would be difficult to quantify.

Long-term effects of aircraft and ground training activities would include localized species loss, species displacement, and a modification of ecological community structure at Melrose AFR. Recent monitoring at Melrose AFR revealed the presence of lesser prairie-chickens (federal candidate, New Mexico state sensitive). Surveys are being conducted and a candidate species plan will be prepared. No other federal or state listed endangered, threatened, or candidate

species identified for Curry or Roosevelt counties have been observed at Melrose AFR. No critical habitat is present on the range. Aircraft and SOF training associated with the Two-Target Alternative or Three-Target Alternative is not expected to have an impact upon threatened or endangered species. The increased chaff and flare use over Melrose AFR would not be expected to impact biological systems. There would be no significant adverse effects of the military readiness activities described in this EIS on any population of resident or migratory birds.

Airspace. AFSOC aircraft produce less noise and fly at slower speeds, with a slower onset of the noise than jet aircraft currently operating in the airspace or on the MTRs. AFSOC aircraft would spend more time training at lower altitudes in MTRs than at current conditions. Although the total number of bird-aircraft strike hazard (BASH) incidents is not expected to be great and would not approach a measurable effect on bird populations, the number is expected to increase from that of 27 FW safety experience. Wildlife respond more to noise from helicopters than fixed-wing aircraft. This response is attributed to the noise of rotors, coupled with the response to the visual aspect of the helicopters. The CV-22 tiltrotor, when flying in the aircraft mode, does not produce the same noise signature as a helicopter. CV-22 training in support of LZ, DZ, or water activities, however, would be conducted in the helicopter mode. Increased night use could disturb nocturnal species. Water training would occur on existing lakes that are part of the migratory flyway and over-wintering areas for Bald Eagles. Water training would be expected to disturb water fowl similar to a disturbance from fast moving boats and result in wildlife nesting at less disturbed parts of the lake. The reduced use of chaff and flares within the MOAs, combined with the overall lack of effect of chaff or flare residual materials on species, would result in no significant impacts from chaff or flares on biological resources. Based on proposed training activities and projected species behavior, training overflights may affect, but are not likely to adversely affect, sensitive species including wintering Bald Eagles, Mexican spotted owls, or lesser prairie-chickens.

CULTURAL RESOURCES

Base. Cannon AFB inventoried structures date from World War II and the Cold War era. Five World War II era buildings may be eligible for the National Register of Historic Places (NRHP). None of the buildings proposed to be directly affected by construction under the West Flightline Alternative or East and West Airfield Alternative is eligible for the NRHP. Previously unknown or unrecorded resources could be present under ground, and in the unlikely event that such unrecorded or unevaluated cultural resources are encountered during construction, Cannon AFB would manage these resources in accordance with the Cannon AFB Cultural Resources Management Plan (CRMP).

Range. No NRHP-eligible buildings are located on Melrose AFR. Sixty of the 240 archaeological sites within the 60,010-acre range -are eligible for the NRHP. Impacts to all NRHP-eligible archaeological resources within the Exclusive-Use area have been mitigated. Prior to construction of the targets, an archaeological review would be conducted to identify any archaeological sites within areas selected for target construction under the Two-Target Alternative or Three-Target Alternative.

Airspace. The proposed UAS corridor would not affect cultural resources. LZ, DZ, or water locations for training would be surveyed for cultural or paleontological resources prior to agreements for their use. Training activities on MTRs would not be expected to impact historical or cultural resources. State parks associated with lakes identified for water training

have documented cultural and paleontological resources. Use of existing boat ramps and already disturbed recreational beaches could avoid impacting such resources.

LAND USE, RANCHING, TRANSPORTATION, AND RECREATION

Base. Under the West Flightline Alternative, on-base land uses would be consistent with the Cannon AFB Base General Plan. Under the preferred East and West Airfield Alternative, additional areas would be designated for flightline uses on the south side of the base. Highway access to this area would be by a new perimeter road on the base. An emergency access gate would be constructed on the south side of the base. Existing or projected land uses would be consistent with Cannon AFB development goals. 65 dB noise contours would be generally reduced and would not be expected to change the underlying use of the land. Under either alternative, additional traffic volumes may be expected but would be accommodated under the existing road structure. The projected traffic increase would continue to be met by existing roadways.

Range. Under the preferred Two-Target Alternative, modification to the existing Melrose AFR land use designations would occur. The Exclusive-Use area would increase in size to include the area where UXO could occur. Land use on Melrose AFR currently consists of approximately 8,800 acres of Exclusive-Use area, 18,710 acres of Restricted Leased Grazing, and 32,500 acres of Unrestricted Leased Grazing. Under the preferred Two-Target Alternative, the Exclusive-Use area would increase in size to an estimated 10,600 acres and the Restricted Leased Land would be reduced to 18,600 acres. The Unrestricted Leased Lands would decrease to 30,810 acres. Under the Three-Target Alternative, the Exclusive-Use impact area would increase in size to 12,700 acres, Restricted Leased Land would be reduced to 23,300 acres, and Unrestricted Leased Lands would decrease to 24,010 acres. New impulse noise and vibration effects would be heard and felt off the range. These effects would not be expected to change general land use patterns, land ownership, or land management, although individuals living within 6 miles of new range targets could be annoyed. Chaff would not be expected to cause a significant impact on land resources or land uses. Improved fire management would reduce the risk to property owners from fires on Melrose AFR.

Airspace. Land under Cannon AFB-scheduled airspace is predominantly agricultural, especially rangeland. Population density reflects the intensity of agricultural use. There are 11.8 persons per square mile under the Bronco MOA, 1.0 under the Mt. Dora MOA, and 0.7 under the Pecos MOA. Population densities under the MTRs are between those of the Pecos and Mt. Dora MOAs. Land is primarily private, with some state and federal parcels and land uses. The proposed training would not be expected to affect land access or place restrictions on any property outside of the Melrose AFR. Such economic activities as the building of wind farms, radio or cellular phone transmission towers, or similar structures would be required to meet FAA standards and would be identified as avoidance areas for training AFSOC aircraft. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. Recreational hunting currently occurs in areas under MOAs with low-level overflight to 500 feet. Additional noise in MTRs could result in increased annoyance, although the noise is not at the level that would damage human health. Training LZ and DZ sites would be selected to avoid noise effects on nearby land uses. The limited number of reservoirs for water training would mean that water training could affect recreational and other lands along the banks of reservoirs. This noise could result in increased annoyance, although the noise would not be at a level that would damage human health. Coordination with reservoir land use managers will be

initiated by AFSOC. Amendments to park management plans would be anticipated to permit low-altitude overflights, CV-22 landings, and other water training activities. Neither chaff nor flares would be used in conjunction with water training. The three to four pieces of residual plastic or aluminum-coated material from each flare and the plastic pieces and chaff particles from each chaff bundle used in assessed training airspace would not result in impacts to range cattle or other native or non-native species. Fuel loss during in-flight refueling missions would be minimal, estimated to be one gallon per refueling exercise, and would normally vaporize before reaching the ground. Fuel would not be jettisoned by AFSOC aircraft except in an emergency situation. AFSOC training activities within the airspace could result in annoyance to individuals who experience noise, vibration, low-level night overflights, or find pieces of chaff or flare residual materials. None of these events would be expected to significantly affect overall land use or land ownership within the area.

SOCIOECONOMICS

Base. The AFSOC beddown would change economic activity, especially in Curry and Roosevelt counties. AFSOC personnel and expenditures for facility construction and operation and maintenance would result in a one-year dip in employment followed by rapid growth to a peak of 13,533 direct, indirect, and induced jobs in 2011 and a long-term direct, indirect, and induced employment of 8,724 jobs by 2014. These personnel numbers are based upon Congressional budget authorizations and would be comparable to those experienced during the F-111 mission at Cannon AFB through 1994. Although initial housing demand could be met with available housing vacancies, the expected housing demand could be over 5,000 units between 2008 and 2014. In addition, there would be an estimated replacement project of over 1,000 existing older military housing with private housing during the period of the AFSOC beddown. An estimated 2,253 additional students would need educational facilities and personnel, primarily within Clovis and Portales school districts. Population, employment, housing, and education needs would be essentially the same under the West Flightline Alternative or East and West Airfield Alternative. Under the Preferred East and West Airfield Alternative, additional construction would be required to extend utilities and add additional facilities. This construction could somewhat increase the magnitude or duration of direct and secondary employment, but would not be expected to substantially change the projected long-term economic effects.

The No Action Alternative would mean that Cannon AFB would become an AFSOC installation, but no beddown of AFSOC assets would occur at Cannon AFB in accordance with the BRAC 2005 recommendation. After 2006, the loss of an estimated 6,800 direct, secondary, and induced jobs in Curry and Roosevelt counties could increase the unemployment rate from 4.3 percent to 12.3 percent. Relocation of military families to base housing would depress the housing market and reduce the value of the existing housing stock. Schools would face a decline in enrollment and budgets would pressure districts to reduce the number of schools with increased commute distances for the remaining students.

Range. Under the Two-Target Alternative, live-fire training would affect the grazing and agriculture on portions of the range. The Exclusive-Use area would increase and Restricted Leased Grazing Lands and Unrestricted Leased Grazing Lands would be changed. The approximately 2.8 sections of rangeland removed from Restricted or Unrestricted grazing leases to become Exclusive-Use area could reduce stock grazing on Melrose AFR by approximately 45 Animal Units (AUs) (a cow plus a calf). Such a reduction would not significantly affect regional cattle operations, although it could detrimentally affect ranching or agricultural operations of

the affected lessees. Under the Three-Target Alternative, 6.1 sections of the rangeland removed from Restricted or Unrestricted grazing leases to become Exclusive-Use areas could reduce stock grazing by approximately 98 AUs. Such a reduction would also not significantly affect regional cattle operations, although it could detrimentally affect ranching operations of the affected lessees. Portions of two of the leases are developed in irrigated crop land, one lease being designated as organically grown. The preferred Two-Target Alternative without 25 mm munitions would not be expected to affect irrigated crop land on the range.

Residents within 6 miles of the Melrose AFR target impact areas would be subject to increased impulse noise from munitions and increased night overflight by training AFSOC aircraft. These training activities do not result in any residences within noise levels in excess of 62 dBC (comparable to L_{dn} 65 dB), which is the noise contour used as a basis for addressing the potential for significant impacts. Residents on the periphery of Melrose AFR who would be outside the 62 dBC contour could be annoyed by the increased impulse noise and vibration from cannons and other munitions. Ranching functions would not be expected to be affected as cattle become habituated to training activities. The exception could be during a round-up within 3 miles of a live-fire target, where especially sudden night firing could startle penned animals.

Airspace. Changes in MOA or MTR use would not affect the regional agricultural economy or general aviation. AFSOC training aircraft fly generally lower and at slower speeds than F-16 fighters. During night missions, training aircraft would be below general aviation altitudes. During daylight missions, C-130 and CV-22 pilots and co-pilots would increase the number of eyes available to support see-and-avoid procedures for UAS. Multi-hour aircraft refueling patterns would be identified for civil aviation. The width of the MTRs, AFSOC's goal to avoid populated areas, and avoidance of airfields would reduce the risk for AFSOC aircraft and general aviation interaction. Oil and gas development, as well as wind energy development, would not be affected by overflights from AFSOC aircraft. Existing or new wind turbines under MOAs or MTRs would be mapped and avoided by AFSOC aircraft. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. No significant socioeconomic impacts are expected to airspace use.

The increased MTR and Pecos, Mt. Dora, and Taiban MOA noise levels could be expected to increase human annoyance. Concern was expressed at public meetings that increased noise may negatively affect livestock, as well as people. Five cases of loss or injury to penned livestock under the Pecos MOA have been attributed to low-flying jet aircraft between 1994 and 2005. Cattle are also sensitive to helicopters because ranchers frequently use helicopters to herd cattle. Although AFSOC aircraft are quieter and slower than the existing F-16 jets, low-level overflights on MTRs could still startle individual penned livestock. AFSOC training would not be expected to impair overall wild animal populations, and wildlife and livestock have demonstrated habituation to regular noises from military training. Despite habituation, low-altitude overflights could result in short-term negative impacts to wildlife or livestock that could include increased heart rate, flight, or potential injury. The Air Force has an established procedure for damage claims that begins by contacting Cannon AFB Public Affairs.

The complex nature of property evaluation factors makes any estimate of the potential effects of changes in airspace use on land values highly speculative. Other economic factors such as business activity, employment, interest rates, and land scarcity or availability are much more likely to affect property values than an increase in MTR use. Ranching operations,

communities, and private airports all exist and function under the existing Pecos 500-foot AGL airspace and under existing low-level MTRs. Noise associated with increased low-altitude training, particularly night training, could be viewed as a significant impact by residents under the MTRs or near reservoirs used for water training. Ranching operations, wind energy operations, oil and gas exploration and production, and other economic pursuits are not expected to experience any negative effects as a result of AFSOC training.

ENVIRONMENTAL JUSTICE

Base. Changes in noise levels with the West Flightline Alternative or East and West Airfield Alternative are not expected to disproportionately affect minority or low-income populations north of the base. Regional economic stimulation associated with the AFSOC beddown would be expected to benefit all residents within the regional economy. Some classroom crowding could exist in advance of growth in school capacity.

The No Action Alternative could result in a substantial economic downturn in Curry County and to a lesser extent in Roosevelt County. During times of economic downturn, minority and low-income populations may be disproportionately affected due to greater competition for jobs. Children may be impacted by the loss of family income and a reduction in basic services associated with a declining economic area.

Range. No permanent residents are on the 60,010-acre Melrose AFR. Residents under the restricted airspace associated with Melrose AFR or in areas immediately adjacent to the range under the Taiban MOA are representative of the minority, low-income, and youth in adjacent counties. No disproportionate impacts are expected to minority or low-income populations and no impacts are expected to children.

Airspace. No disproportionately high or adverse impacts to minority or low-income populations are expected and there would be no expected impacts to children.

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1.0 PURPOSE AND NEED FOR PROPOSED BEDDOWN OF AFSOC ASSETS AT CANNON AFB AND MELROSE AFR

The Base Realignment and Closure (BRAC) Commission received and considered a May 2005 recommendation from the Secretary of Defense (SECDEF) to close Cannon Air Force Base (AFB). Subsequently, a final report (September 2005) from the Commission to the President recommended Cannon AFB remain open as an enclave until at least 31 December 2009 and that the 27th Fighter Wing (27 FW) be disestablished. In the interim, the SECDEF was to seek other missions for assignment to Cannon AFB. As a result of this search, the Air Force Special Operations Command (AFSOC) was designated as the new mission for Cannon AFB. AFSOC is conducting this environmental analysis to identify and evaluate the potential environmental consequences of bedding down AFSOC assets.

The SECDEF designated the AFSOC mission to Cannon AFB pursuant to his duties under the recommendations of the BRAC Commission, approved by Congress and the President (Department of Defense [DoD] 2005).

To carry out the SECDEF mission designation, the United States Air Force (Air Force) proposes to transfer aircraft and personnel from Hurlburt Field, Florida, and/or other existing operational locations, to Cannon AFB. Potential AFSOC assets to be transferred include aircraft, personnel, weapons systems, and equipment. This action would involve construction and modifications to facilities at Cannon AFB and Melrose Air Force Range (AFR) through Fiscal Year (FY) 2013. AFSOC also proposes to begin utilizing the 60,010-acre Melrose AFR, existing military training airspace, existing Military Training Routes (MTRs), and other locations for personnel training. Scheduling authority for Special Use Airspace and MTRs currently coordinated by the 27 FW would be transferred to an AFSOC Special Operations Wing (SOW) at Cannon AFB.



This Environmental Impact Statement (EIS) addresses alternative ways to implement the AFSOC mission designation under the BRAC recommendation. The purpose of this action is to implement the SECDEF's designation by determining how to beddown AFSOC assets at Cannon AFB. Training would include use of airspace scheduled by Cannon AFB, including restricted airspace associated with Melrose AFR, MTRs, and the Pecos Military Operations Areas (MOAs), the Mt. Dora MOA, the Taiban MOA, and the Bronco MOA. Alternatives identify different ways to beddown the assets at Cannon AFB and to train on Melrose AFR. The No Action Alternative included in this EIS addresses the conversion of Cannon AFB with a SECDEF mission designation to AFSOC, but no action to beddown AFSOC assets to Cannon AFB. For the purposes of this analysis, No Action would result in no movement of AFSOC assets to Cannon AFB and AFSOC would maintain and operate the properties. With regards to Melrose AFR, no Cannon AFB assets would train at the range. New Mexico Air National Guard (NMANG) and transient aircraft would continue to use the airspace and Melrose AFR. No action would reduce personnel levels to approximately 150 between 2007 and 2009. These 150 personnel would support base infrastructure and range operations. Flight operations would consist of transient aircraft.

1.1 BACKGROUND

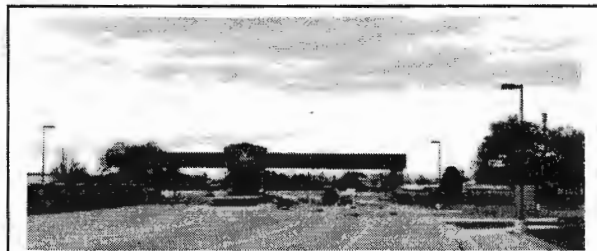
1.1.1 CURRENT MISSION AT CANNON AFB AND MELROSE AFR

Cannon AFB is located in eastern New Mexico approximately 7 miles west of the city of Clovis. The base comprises approximately 3,500 acres and administers Melrose AFR, which is located approximately 37 miles west of Cannon AFB (Figure 1.1-1). Cannon AFB-scheduled military training airspace is depicted on Figure 1.1-2.

Cannon AFB has trained aircrews with an air-to-ground mission since 1943. Initially, the 16th Bombardment Operational Wing trained crews of the B-17, B-24, and B-29 heavy bombers. Inactivated in 1947, the base was reactivated in 1951 as a Tactical Air Command (TAC) base with the 140th Fighter-Bomber Wing, flying F-86 Sabrejets. By 1959, the base's 27th Tactical Fighter Wing had been established and was flying F-100 supersonic jet fighters. Ten years later, the 27th was re-equipped with the supersonic F-111E, and in 1971 with the supersonic F-111D. The F-111s trained at high speeds and low altitudes using Cannon AFB-scheduled MTRs, both Instrument Routes (IRs) and Visual Routes (VRs) (see Figure 1.1-2).

In 1995, all F-111 aircraft were replaced by supersonic F-16s with a combined air-to-air and air-to-ground role. The F-16s normally trained at higher altitudes than the F-111s. Cannon AFB has also historically hosted cooperative programs designed to standardize flight training among allied nations. For example, until 2004, the 428th Fighter Squadron was a combined United States Air Force/Republic of Singapore Air Force F-16 squadron that was established at Cannon AFB as part of this cooperative program.

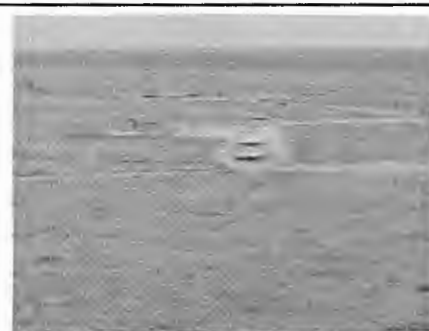
Melrose AFR consists of two principal activities: a Bombing and Gunnery Range and an Electronic Combat (EC) Range. Cannon AFB provides a fire department at Melrose AFR and Cannon-based Explosive Ordnance Disposal (EOD) personnel provide decontamination support. Melrose is a Class "A" range operated through 27th Operations Support Squadron (27 OSS/OSR) elements in the Weapons and Training Flight of the 27 OSS. F-16 pilots have used the range to demonstrate proficiency in a variety of missions and tactics including, but not limited to, Basic Surface Attack, Tactical Weapons Delivery, Suppression of Enemy Air Defenses (SEAD), Destruction of Enemy Air Defense (DEAD), and Combat Search and Rescue (CSAR).



CANNON AFB IS PROPOSED FOR THE BEDDOWN OF AFSOC PERSONNEL AND AIRCRAFT



F-16 AIRCRAFT HAVE BEEN BASED AT CANNON AFB FROM 1995 THROUGH 2007.



THE 60,010-ACRE MELROSE AFR CURRENTLY HAS 8,800 ACRES DESIGNATED FOR TARGETS AND RANGE SUPPORT.

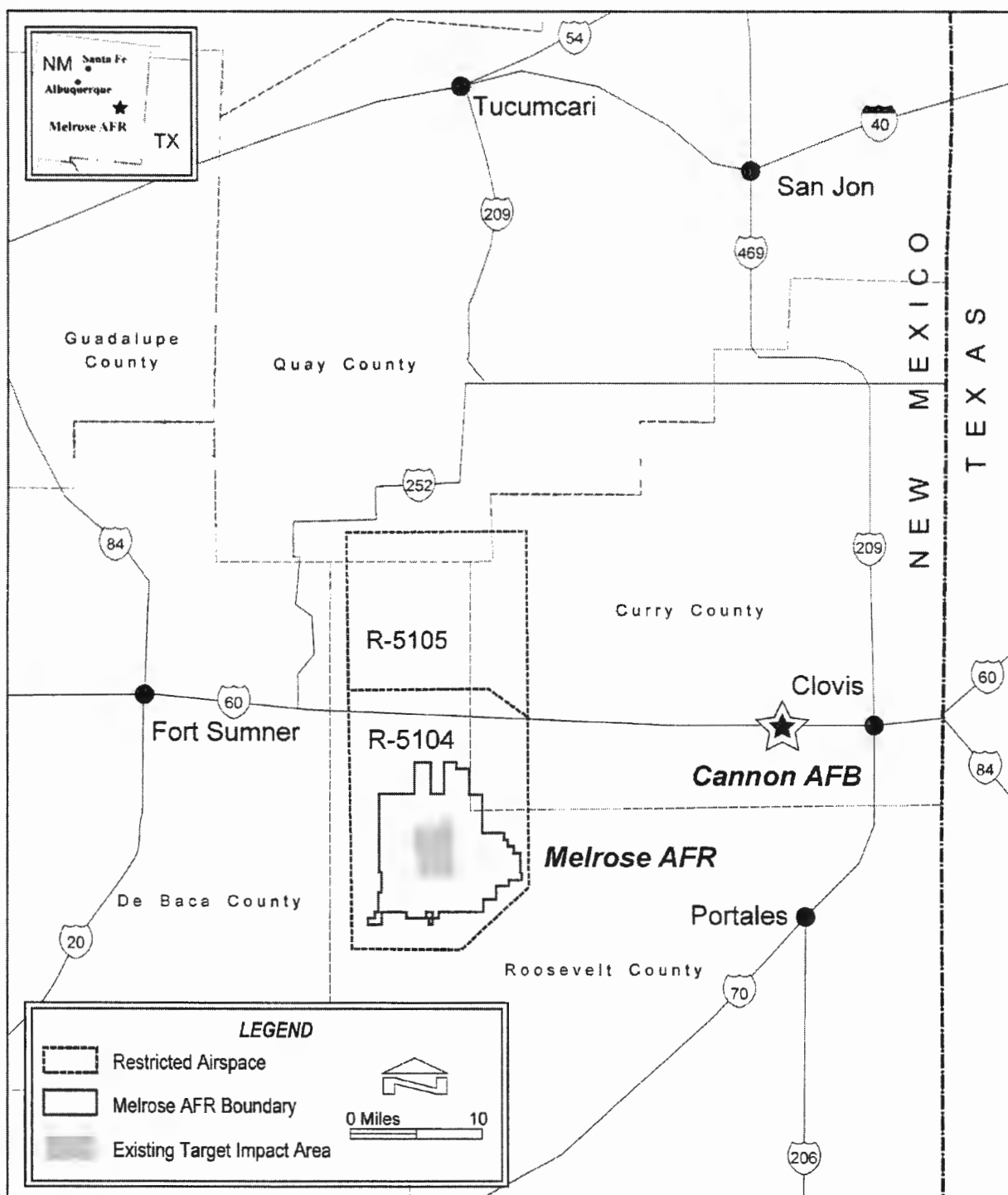


FIGURE 1.1-1. LOCATION OF CANNON AFB AND MELROSE AFR

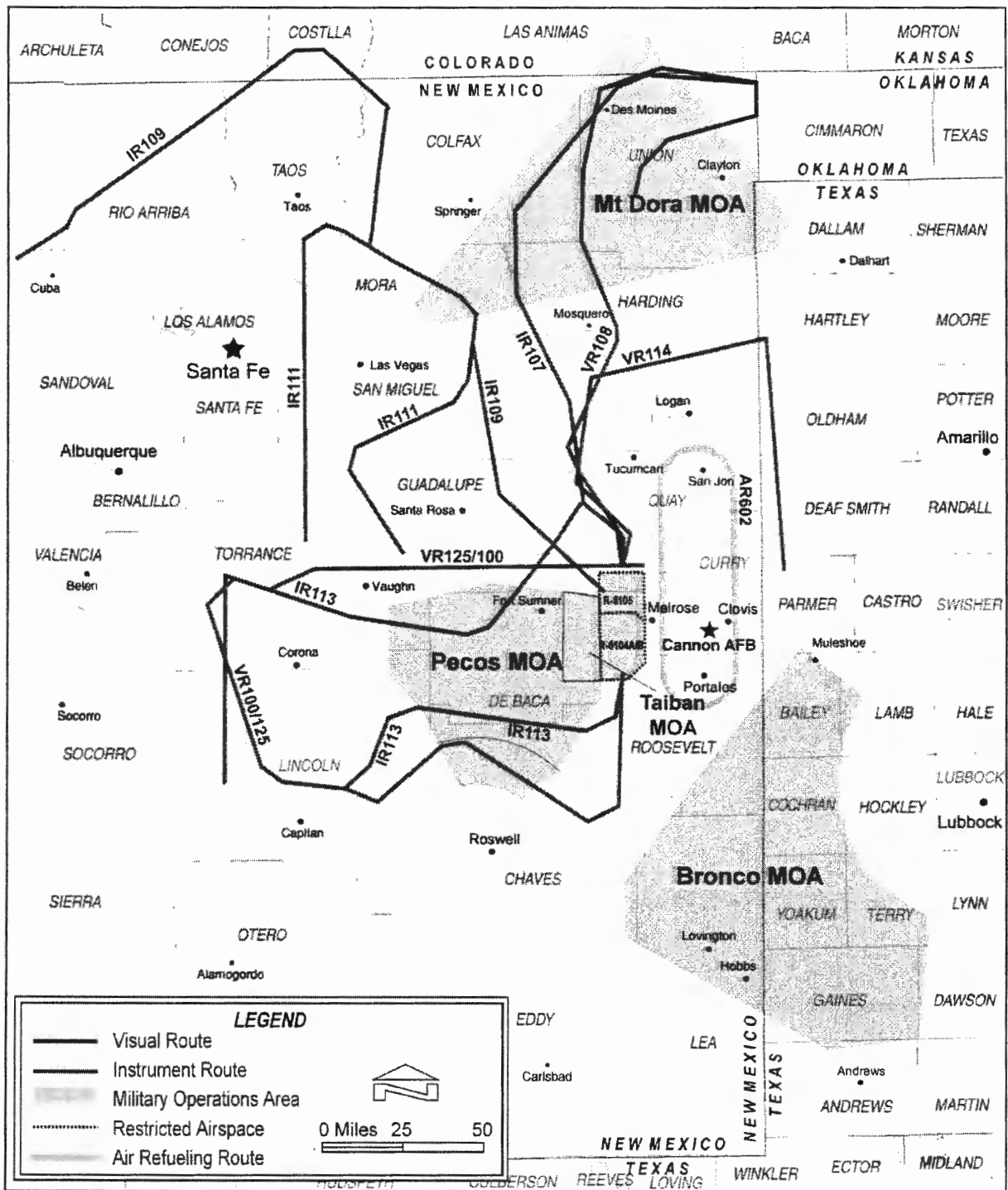


FIGURE 1.1-2. EXISTING MILITARY TRAINING AIRSPACE SCHEDULED BY CANNON AFB, NEW MEXICO

1.1.2 MISSION OF AFSOC

AFSOC provides Air Force Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. AFSOC's core tasks have been grouped into four mission areas: forward presence and engagement, information operations, precision employment and strike, and SOF mobility.

AFSOC was established May 22, 1990, with headquarters at Hurlburt Field, Florida. AFSOC is a Major Command (MAJCOM) and the Air Force component of United States Special Operations Command (USSOCOM), a unified command located at MacDill AFB, Florida. AFSOC is responsible to USSOCOM for the readiness of Air Force SOF for worldwide deployment. AFSOC is composed of highly trained, rapidly deployable airmen who are equipped with highly specialized aircraft. These forces provide global ability to conduct special operations missions ranging from precision application of firepower, to infiltration, exfiltration, resupply, and refueling of SOF operational elements.

AFSOC's unique capabilities include airborne radio and television broadcast for psychological operations, as well as combat aviation advisors to provide other governments military expertise for their internal development. The command's special tactics squadrons combine combat control, special operations weather, and pararescuemen to ensure air power is integrated and operable with special operations and conventional forces.

The 1st Special Operations Wing (1 SOW), at Hurlburt Field, is the Air Force's only active-duty SOW and maintains world-wide response responsibility.



AFSOC TRAINS WITH A VARIETY OF TURBOPROP AIRCRAFT, INCLUDING THE AC-130 PICTURED ABOVE.

AFSOC anticipates additional growth from now through FY 2014. Force structure increases and additional training requirements require new base and range facilities. AFSOC needs another base for the following reasons:

- a. Quality of flying training in southeast United States (U.S.) is not representative of on-going real-world deployments that support the War on Terrorism.
- b. Increased competition for Eglin range time with the addition of new F-35 Joint Strike Fighter and other BRAC actions would limit AFSOC training.
- c. Locating a MAJCOM at a single base -- Hurlburt Field -- makes it vulnerable to a catastrophic event (i.e., Hurricane Andrew or Katrina).

1.2 PURPOSE AND NEED OF PROPOSED ACTION

The Proposed Action meets the SECDEF designation of AFSOC as the new mission for Cannon AFB and resolves many of AFSOC's needs. The final BRAC report (2005) from the BRAC Commission to the President recommended Cannon AFB remain open until at least 31 December 2009. In the interim, the SECDEF was to seek other missions for assignment to Cannon AFB. Missions for Cannon AFB were sought and evaluated consistent with the recommendations of the BRAC Commission. As a result of this search, AFSOC was designated as the new mission for Cannon AFB. AFSOC would benefit from additional facilities and training opportunities. The SECDEF designation of AFSOC assets to Cannon AFB addresses the 2005 BRAC Commission's recommendation and effectively utilizes an existing base, and in addition nearby Melrose AFR provides training for AFSOC assets.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is to establish Air Force Special Operations Command (AFSOC) assets at Cannon Air Force Base (AFB). This chapter describes two alternative facility layouts for areas of Cannon AFB. This chapter also describes two alternative target array locations at Melrose Air Force Range (AFR) and proposed AFSOC training activities. The No Action Alternative, which would not beddown AFSOC assets at Cannon AFB at this time, is also discussed.

THE AIR FORCE PREFERRED ALTERNATIVE IS THE EAST AND WEST AIRFIELD ALTERNATIVE AT CANNON AFB COMBINED WITH THE TWO-TARGET ALTERNATIVE AT MELROSE AFR AND PROJECTED TRAINING IN CANNON AFB-MANAGED AIRSPACE.

Beddown of AFSOC assets at Cannon AFB is proposed to take place over a period of approximately 6 years beginning in Fiscal Year (FY) 2008. It would involve construction of facilities to support the aircraft and training personnel needed to operate and maintain the aircraft and associated facilities.

AFSOC needs a dedicated installation, range facilities, and training airspace for special operations forces (SOF) to achieve and maintain skills. Cannon AFB has unused capacity with the disestablishment of the 27th Fighter Wing (27 FW). Melrose AFR provides proximal capabilities for the various SOF training needs. New Mexico military training airspace is anticipated to meet AFSOC training needs with a proposed Federal Aviation Administration (FAA) Certificate of Waiver or Authorization (COA) to allow unmanned aerial system (UAS) transit below 18,000 feet above mean sea level (MSL) between Cannon AFB airspace with Melrose AFR airspace.

The proposed beddown of AFSOC assets would involve several activities at Cannon AFB, Melrose AFR, and in the associated training airspace. This chapter presents proposed activities at Cannon AFB, use of Melrose AFR, training use of Special Use Airspace (SUA) and Military Training Routes (MTRs), and other training associated with the AFSOC beddown. The No Action Alternative is described in conformance with the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1502.14(d) and 32 CFR Part 989). Alternatives considered but not carried forward for detailed analysis are discussed in Section 2.4.2.

2.1 ELEMENTS AFFECTING CANNON AFB

2.1.1 PROPOSED BEDDOWN AIRCRAFT

The beddown proposal transfers AFSOC Primary Aircraft Inventory (PAI) and Backup Aircraft Inventory (BAI) aircraft to Cannon AFB (Table 2.1-1). The number of aircraft to be transferred is estimated to be 108. Approximately 25 to 33 percent of the aircraft would be deployed at locations other than Cannon AFB at any given time. Currently, 60 F-16 PAI aircraft are assigned to the 27 FW at Cannon AFB. Pursuant to the requirements of the recommendations of the Base Realignment and Closure (BRAC) Commission, Air Combat Command (ACC) will deactivate the 27 FW and relocate the aircraft. Air National Guard F-16s, transient active-duty F-16s, and other aircraft

PRIMARY AIRCRAFT INVENTORY (PAI) ARE AIRCRAFT ASSIGNED FOR OPERATIONAL MISSIONS. BACKUP AIRCRAFT INVENTORY (BAI) ARE AIRCRAFT AVAILABLE TO BACK UP OPERATIONAL REQUIREMENTS WHEN A PAI AIRCRAFT IS UNAVAILABLE FOR A MISSION.

would continue to use Melrose AFR for training. An annual estimate of 200 F-16 airfield operations (i.e., a landing or takeoff) at Cannon AFB are projected to continue in support of F-16 training after an AFSOC beddown.

Aircraft proposed for normal training in Cannon AFB-managed airspace and their training missions are described below.

TABLE 2.1-1. PROPOSED AIRCRAFT TO BE TRANSFERRED UNDER THE PROPOSED ACTION

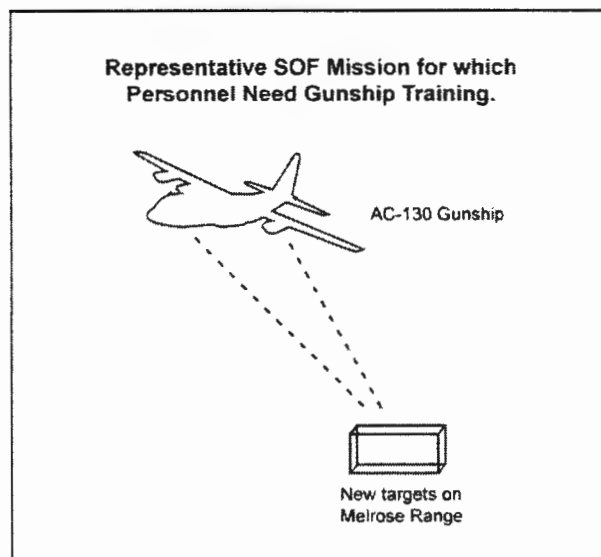
<i>Aircraft Type</i>	<i>Number¹</i>	<i>Fiscal Year²</i>
AC-130H	8	2009/10
MC-130H	8	2008/9
MC-130P	10	2008/9
MC-130W	12	2008
C-130E ³	2	2008/9
CV-22 ⁴	22	2010
C-47 Type Aircraft ⁵	2	TBD
UH-1 Huey Helicopters ⁵	2	TBD
Non-Standard Aircraft (NSA) ⁶	18	2008
Unmanned Aerial System (UAS) ⁷ (some assembled)	24	2008

- Notes:
1. Includes PAI, BAI, and training aircraft.
 2. Projected beddown year; actual schedule is governed by Congressional budgeting.
 3. Used for lower cost transport or training.
 4. The first squadron of 13 due in 2010; remainder anticipated in 2014.
 5. Alternative types of aircraft could be used for special operations use
 6. NSA would arrive around the year 2008.
NSA could be a mix of small to medium size single- or multi-turboprop-engined aircraft.
 7. The squadron would move its temporary home at Creech AFB, Nevada to Cannon AFB. Most of this unit's 24 aircraft would remain deployed in support of global commitments.

AC-130 GUNSHIPS

The four-engine turboprop AC-130H gunship's primary missions are close air support, air interdiction, and force protection. Missions in close air support are troops in contact, convoy escort, and urban operations. Air interdiction missions are conducted against preplanned targets or targets of opportunity. Force protection missions include air base defense and facilities defense.

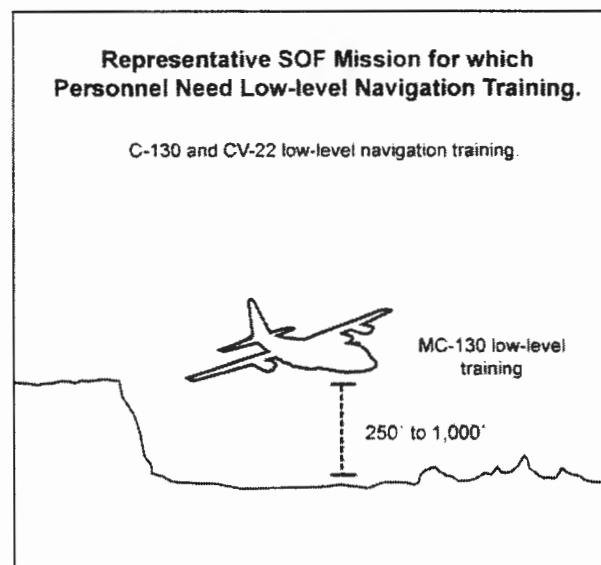
These heavily armed aircraft incorporate side-firing weapons integrated with sophisticated sensor, navigation, and fire control systems to provide surgical firepower or area saturation during extended loiter periods, at night and in adverse weather. The sensor suite consists of a television sensor, infrared sensor, and radar. These sensors allow the gunship to visually or electronically identify friendly ground forces and targets any place, any time. The AC-130U employs synthetic aperture strike radar for long-range target detection and identification. The gunship's navigational devices include inertial navigation systems and global positioning system (GPS). The AC-130U employs the latest technologies, can attack two targets simultaneously, and has twice the munitions capacity of the AC-130H. Gunships must train for daylight and, especially, after dark missions. For noise management purposes, "environmental night" occurs from 10:00 p.m. to 7:00 a.m. During an average year, 25 percent of Melrose AFR training would occur during environmental night.



MC-130H

The MC-130H Combat Talon II provides infiltration, exfiltration, and resupply of SOF and equipment in hostile or denied territory. Secondary missions include psychological operations and helicopter air refueling.

The MC-130H features terrain-following and terrain-avoidance radars capable of operations as low as 250 feet above ground level (AGL) in adverse weather conditions. Structural changes to a basic C-130 include the addition of an in-flight refueling receptacle and strengthening of the tail to allow high-speed/low-signature airdrop. Their navigation suite includes dual ring-laser gyros, mission computers, and integrated GPS. They can locate, and either land or airdrop, on small, unmarked zones with pinpoint accuracy day or night.



To mitigate potential impacts during environmental night, low-level night flights would begin as early after dark as possible (6:00 p.m. to 9:00 p.m., depending on the season) and last for four to five hours. This mitigation action would reduce the estimated annual after-dark training to an average of 40 percent during environmental night.

An extensive electronic warfare suite enables the aircrew to detect and avoid potential threats. If engaged, the system protects the aircraft from both radar and infrared-guided threats, and includes the deployment of defensive chaff and flares. The MC-130H is equipped with aerial refueling (AR) pods to provide in-flight refueling of SOF and Combat Search and Rescue (CSAR) helicopters.

MC-130P AND MC-130W

The Combat Shadow and Combat Knife fly clandestine or low visibility, single- or multi-ship low-level missions intruding politically sensitive or hostile territory to provide air refueling for special operations aircraft. The MC-130P/W primarily fly missions during darkness to reduce probability of visual acquisition and intercept by airborne threats.

Secondary mission capabilities may include airdrop of leaflets, small special operations teams, bundles and combat rubber raiding craft, as well as night vision goggle (NVG) use, takeoff and landing procedures, and in-flight refueling as a receiver. No leaflet-drop training would occur in Cannon-scheduled airspace.

The MC-130P/W features improved navigation, communication, threat detection, and countermeasures systems. Both aircraft have a fully-integrated inertial navigation and GPS, and NVG compatible interior and exterior lighting. They also have forward looking infrared, radar and missile warning receivers, chaff and flare dispensers, NVG compatible heads-up display, satellite and data-burst communications, as well as in-flight refueling capability as a receiver.

MC-130P/W aircraft can fly in the day against a low threat. The crews fly night low-level, air refueling and formation operations using NVGs. To enhance the probability of mission success and survivability near populated areas, employment tactics include blacked-out flights with no external lighting and no communications to avoid radar and weapons detection. The proportion of training flights during environmental night would be comparable to those of the MC-130H training.

C-130E

The C-130E is similar to other C-130 variants and is used for activity such as material or personnel transport or for some training that does not require a higher cost mission aircraft. C-130E flights are used in training and/or transport and do not add to the flight operations.

NON-STANDARD AIRCRAFT

The Non-Standard Aircraft (NSA) are light cargo single or dual turboprop engine utility aircraft that provide intra-theater support for special operations forces.



MC-130P AIRCRAFT DEPLOY DROGUES TO REFUEL ROTARY WING OR TILT-ROTOR AIRCRAFT.

C-47 TYPE AIRCRAFT AND HELICOPTERS

The 6th Special Operations Squadron (6 SOS) operates fixed and rotary-wing aircraft that are common mobility platforms used by partner nations. Aircraft currently used are similar to the C-47 and BT-67. As with the C-47, UH-1 Huey helicopters are common airlift and gunship platforms in the countries where AFSOC personnel operate. Two UH-1 Hueys are proposed for beddown at Cannon AFB. Personnel using UH-1 helicopters can support theater combatant commanders in search and rescue, low-level operations, and to assess, train, advise, and assist foreign forces. The proportion of environmental night flights would be comparable to the MC-130H training.

CV-22

The CV-22 Osprey is a tiltrotor twin-engine aircraft that combines the vertical takeoff, hover, and vertical landing qualities of a helicopter with the long-range, fuel efficiency, and speed characteristics of a turboprop aircraft. The Osprey adds new capability and fills a long-standing United States Special Operations Command (USSOCOM) requirement to conduct long-range infiltration, exfiltration, and resupply missions during night operations.

The CV-22 can take off vertically and, once airborne, the nacelles (engine and prop-rotor group) on each wing can rotate into a forward position. The cover of this Environmental Impact Statement (EIS) shows two CV-22 aircraft with engines in a forward position. This versatile, self-deployable aircraft offers increased speed and range over other rotary-wing aircraft, and can perform missions that normally would require both fixed-wing and rotary-wing aircraft. The Osprey can cruise at 220 knots indicated airspeed (KIAS). The proportion of training during environmental night is comparable to that of the MC-130H training.

The CV-22 has an advanced electronic warfare suite, a multi-mode radar that permits flight at very low altitude in zero visibility, a retractable AR probe, and four crew positions in the cockpit. The CV-22 will also be equipped with defensive weapons.

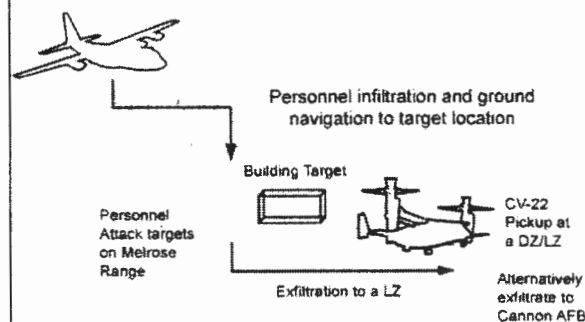
PREDATOR

The MQ-1 Predator is a UAS. As a single-engine, medium-altitude, long-endurance, remotely piloted aircraft, the Predator's primary mission is interdiction and conducting armed reconnaissance against critical, perishable targets. When the Predator is not actively pursuing its primary mission, it acts as the Joint Forces Air Component Commander-owned theater asset for reconnaissance, surveillance, and target acquisition in support of the Joint Forces commander.

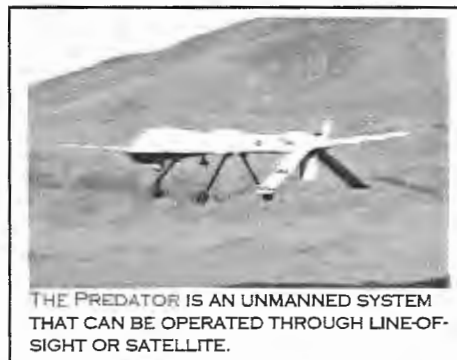
A fully operational Predator system consists of four aircraft (with sensors), a ground control station (GCS), a Predator Primary Satellite Link (PPSL), and approximately 55 personnel for deployed 24-hour operations.

Representative SOF Mission for which Personnel Need Training in Infiltration and Attack.

C-130 infiltration of SOF personnel and equipment at remote landing zone (LZ).



The basic crew for the Predator is one pilot, one sensor operator, and a mission coordinator. They fly the aircraft from inside the GCS via a C-Band line-of-sight data link or a Ku-Band satellite data link for beyond line-of-sight flight. The aircraft is equipped with a color nose camera (generally used by the pilot for flight control), a day variable-aperture television camera, a variable-aperture infrared camera (for low light/night), and a synthetic aperture radar (SAR) for looking through smoke, clouds, or haze. The cameras produce full motion video while the SAR produces still frame radar images. The Predator MQ-1 can be armed with air-to-ground weapons. Predators are not proposed to be flown from Cannon AFB with live munitions or to train on Melrose AFR with live munitions. Training with live munitions would be conducted on ranges where such training is authorized.



The system is composed of four major components that can be deployed for worldwide operations. The GCS is transportable in a C-130 (or larger) transport aircraft. The Predator can operate on a 5,000 feet by 75 feet (1,524 meters by 23 meters), hard surface runway with clear line-of-sight. The ground data terminal antenna provides line-of-sight communications for takeoff and landing. The PPSL provides over-the-horizon communications for the aircraft.

An alternate method of MQ-1 Predator employment, Remote Split Operations, employs a smaller version of the GCS called the Launch and Recovery GCS (LRGCS). The LRGCS conducts takeoff and landing operations at the forward deployed location while the Continental United States (U.S.)-based GCS conducts the mission via extended communications links. If PPSL communication is lost, the Predator is designed to orbit in a circle and climb to an altitude from which direct GCS contact can be reestablished. For communication and safety, the Predator includes an ARC-210 radio, an APX-100 IFF/SIF with Mode 4, an upgraded turbo-charged engine and glycol-weeping "wet wings" for ice mitigation. The latest upgrade includes fuel injection, longer wings, dual alternators, and other improvements.

2.1.2 PROJECTED AIRCRAFT OPERATIONS AT CANNON AFB

The Special Operations Wing (SOW) could employ a variety of aircraft, weapons systems, and equipment from their current locations at Hurlburt Field, Florida, and worldwide. AFSOC mission aircraft are all propeller-driven with one to four engines. The nature and potential locations of future AFSOC operations could include training with miscellaneous other aircraft for special missions. Proposed airfield operations associated with the AFSOC beddown are presented in Table 2.1-2.

BASE AND AIRSPACE USE IS DESCRIBED IN THIS ENVIRONMENTAL IMPACT STATEMENT (EIS) USING THESE TERMS:

- SORTIE: AN AIRCRAFT LEAVING AND RETURNING TO THE BASE.
- OPERATION: ONE LANDING OR TAKEOFF ACTION. THUS, ONE SORTIE THAT CONSISTS OF A TAKEOFF (1), TWO TOUCH AND GO APPROACHES TO THE AIRFIELD (2) (3), AND ONE LANDING (4) WOULD RESULT IN FOUR OPERATIONS.
- SORTIE-OPERATION: THE USE OF A DEFINED AIRSPACE UNIT BY ONE AIRCRAFT. THIS MEANS THAT A SORTIE THAT FLIES IN ONE OF THE MELROSE AFR AIRSPACES, THE TAIBAN MILITARY OPERATIONS AREA (MOA) AND THE PECOS LOW MOA, WOULD RESULT IN THREE SORTIE-OPERATIONS.

TABLE 2.1-2. CURRENT AND PROPOSED ANNUAL AIRFIELD OPERATIONS¹

<i>Aircraft²</i>	CURRENT CONDITION ²		PROPOSED ACTION ³	
	<i>A/D</i>	<i>CP⁴</i>	<i>A/D</i>	<i>CP⁴</i>
AC-130H/U	0	0	4,452	2,968
MC-130H	0	0	3,944	3,944
MC-130P	0	0	3,944	3,944
MC-130W	0	0	3,944	3,944
CV-22	0	0	5,000	5,000
C-47	0	0	912	1,824
UH-1	0	0	600	1,200
Predator UAS	0	0	360	360
NSA (Non-Standard Aircraft) FY 2009	0	0	3,648	3,648
F-16 (Cannon AFB-based)	33,549	14,139	0	0
Other Transient Aircraft	660	0	660	0
Total	34,209	14,139	27,664	28,032

- Notes: 1. Proposed Action Based on PAI.
 2. FY 2005 data.
 3. Thirty-five percent of average sorties between 10:00 p.m. and 7:00 a.m.
 4. Closed Patterns counted as one event.
A/D = Approaches and Departures
CP = Closed Patterns

2.1.3 FACILITIES

AFSOC proposes to use Cannon AFB facilities and equipment to the extent possible for AFSOC assets. Because Cannon AFB has been home to jet fighter aircraft for the past 55 years (see Section 1.1.1), extensive construction and renovation will be required to support the larger turboprop aircraft used by AFSOC. Base Master Plans would be updated to reflect AFSOC requirements. This section describes two alternatives to meet facilities and equipment requirements for the AFSOC beddown. These two alternatives are the West Flightline Alternative and the East and West Airfield Alternative.

2.1.3.1 WEST FLIGHTLINE ALTERNATIVE

Under the West Flightline Alternative, most new facilities to house and maintain the AFSOC aircraft would be constructed in the existing mission support area. Figure 2.1-1 presents the West Flightline Alternative. This alternative would include the construction and renovation projects presented in Table 2.1-3 to be implemented between FY 2008 and 2013. The estimated annual expenditures for AFSOC construction, renovation, and operations and maintenance (O&M) costs in FY 2007 dollars is projected in Table 2.1-4. Table 2.1-4 also includes military construction (MILCON) projects scheduled for Cannon AFB in addition to AFSOC specific projects.



**FIGURE 2.1-1. WEST FLIGHTLINE FACILITY DEVELOPMENT
AT CANNON AFB, NEW MEXICO**

TABLE 2.1-3. PROPOSED FACILITIES FOR WEST FLIGHTLINE ALTERNATIVE

FY	Project #	Title	Scope (square feet)
2008	CZQZ073006	Add/ Alter Hangar 109 for C-130	22,185
2008	CZQZ 063015	SOF Flight Simulator Facility	15,070
2009	CZQZ2063010	SOF Aircraft Maintenance Hangar	38,298
2010	CZQZ063002	Consolidated Communications Facility	51,850
2011	CZQZ063019	C-130 Fuel Cell Hangar & Corrosion Control Hangar	Fuel Cell - 31,000 Corrosion Control - 59,000
2011	CZQZ063027	SOF CV-22 Simulator Facility	15,070
2011	CZQZ063052	SOF Construct UAV Squadron Operations/Ground Control Stations	43,690
2011	CZQZ063028	SOF Construct MC-130 Squadron Operations	26,996
2011	CZQZ063026	SOF Alter Building 198 for Talon II (MC-130H)	26,017
2011	CZQZ063021	SOF C-130 2-Bay Hangar/ Aircraft Maintenance Unit (AMU)	65,004
2011	CZQZ063029	SOF Construct Special Tactics Squadron (STS) Squadron Operations	62,990
2011	CZQZ073005	Dormitory (96 rooms)	34,100
2011	CZQZ093002	Child Development Center	17,007
2011	CZQZ063023	SOF CV-22 Squadron Operations Facility	26,006
2011	CZQZ063022	SOF Construct Taxiway Shoulders for C-130s	753,480
2011	CZQZ063027	SOF Construct Simulator Facility	15,070
2011	CZQZ133001	Add/ Alter Waste Water Treatment Plant	5,382
2011	CZQZ063053	SOF Add/ Alter Hangar for UAV AMU	43,895
2012	CZQZ123001	96-Person Dormitory	34,100
2012	CZQZ063024	SOF CV-22 Taxiway Expansion	75,003
2012	CZQZ043001	Library Education Center	38,643
2012	CZQZ063033	SOF Construct Tiltrotor Maintenance Squadron Operations Facility	16,996
2012	CZQZ063032	SOF Construct Mission Readiness Supply Storage Facility	49,998
2012	CZQZ063034	SOF Construct Addition CV-22 Squadron Operations	13,593
2012	CZQZ063035	SOF Construct CV-22 AMU Addition	5,005
2013	CZQZ063030	SOF Construct C-130 Hangar/ AMU	31,991
2013	CZQZ053003	Add/ Alter Fitness Center	58,180
2013	CZQZ063051	SOF Construct MC-130 Parking Apron	1,540,016
2013	CZQZ063049	SOF MC-130 2-bay Hangar/ AMU	65,004
2013	CZQZ063050	SOF MC-130 Squadron Operations	35,004
2014	CZQZ073015	SOF Hot Cargo Pad/Relocate Combat Arms Training and Maintenance Range	344,448
2014	PXLY073001	SOF Landing Strip at Melrose AFR	1,237,860
2014	PXLY073002	SOF Relocate Current Melrose AFR Compound	50,052
2014	CZQZ073019	SOF Mobility Aerial Delivery Facility	50,052

Many of the costs presented in Table 2.1-4 are associated with the planned growth of AFSOC units in response to operational requirements. MILCON and O&M resources of this magnitude would be required to support AFSOC operations wherever they would be located. The six-year Future Years Defense Program (FYDP) represents costs previously programmed for AFSOC and costs required to support Cannon AFB base operating support under either ACC or AFSOC. Table 2.4-1 aggregates the realignment of programmed costs for planned AFSOC growth at various locations, the base operating costs at Cannon AFB, and projected AFSOC beddown costs at Cannon AFB.

TABLE 2.1-4. WEST FLIGHTLINE PROJECTED ANNUAL CONSTRUCTION, RENOVATION, AND O&M EXPENDITURES FOR AFSOC BEDDOWN (\$ MILLION)¹

<i>Fiscal Year</i>	<i>AFSOC Mission Construction/Renovation¹</i>	<i>AFSOC Mission O&M² (Request)</i>	<i>Cannon Other</i>	<i>Additional Utilities</i>
2008	9	146	0	1
2009	9	92	0	3
2010	15	73	20	5
2011	163	70	34	0
2012	41	77	30	0
2013	73	72	12	0

Notes: 1. FY 2007 dollars.

2. Program Year subject to Congressional Authorization. Any unfunded requirements would roll over to the next year.

The West Flightline Alternative construction would occur within approximately 342 acres of previously disturbed area. Affected acres represent the area covered by the construction footprints of the proposed facilities from Table 2.1-3 plus the surrounding lands where construction-related clearing and grading would occur. No construction is expected outside the existing property limits of the base. The West Flightline Alternative would include operations or maintenance to support the AFSOC mission. Table 2.1-4 shows O&M FY 2008 through FY 2013 estimated costs to support the relocation of personnel and aircraft at Cannon AFB to meet AFSOC requirements. O&M construction would take place within or adjacent to existing facilities. As beddown of AFSOC facilities progressed over time (see Table 2.1-1), some temporary facilities, including temporary hangars, a temporary wash rack and runoff capture, modular units, and other temporary facilities would be in place on previously disturbed areas of Cannon AFB until military construction programs for the facilities were complete.



2.1.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

The East and West Airfield Alternative is the preferred alternative for Cannon AFB. This alternative would renovate and construct facilities on the north side of the runway and construct new facilities for large aircraft south side of the runway. Figure 2.1-2 depicts project locations for the East and West Airfield Alternative.

The East and West Airfield Alternative would involve approximately 284 acres of additional unimproved disturbed grassland. Infrastructure upgrades, such as connecting new facilities to water and power systems, would also count in the affected area. Affected acres represent the area covered by the construction footprints of the proposed facilities from Table 2.1-5 plus the surrounding lands where construction-related clearing and grading would occur. No construction is expected outside the existing property limits of the base. Table 2.1-6 presents estimated annual costs by year. As noted in Section 2.1.3.1, annual construction is dependent upon Congressional appropriations.

East and West Airfield Alternative O&M construction would be essentially the same as those for the West Flightline Alternative. Table 2.1-6 includes FY 2007 estimated O&M dollars to support the relocation of aircraft, personnel, and equipment to meet beddown requirements. As with the West Flightline Alternative, temporary facilities would be in place while permanent facilities were constructed.

2.1.4 EQUIPMENT

Under either the West Flightline or the East and West Airfield Alternative, AFSOC would require approximately 141 vehicles above the 27 FW's current 492 vehicles, for a total of 633 vehicles. The proposed additional vehicles would consist of the same type and design of vehicles currently at Cannon AFB and Melrose AFB. However, the United States Air Force (Air Force)-wide directive for utilization of low speed vehicles (LSV) across all commands may effect the overall fleet composition. The proposed 30 percent conversion of selective fleet vehicles to LSVs by FY 2007 may effect approximately 19 vehicle authorizations.

2.1.5 MISSION PERSONNEL

Military personnel assignments would be the same under either the West Flightline or the East and West Airfield Alternative. AFSOC personnel would train to perform a variety of missions. AFSOC proposes to transfer a number of personnel to Cannon AFB. Most personnel currently assigned to the 27th Medical Group and 27th Mission Support Group will remain at Cannon AFB and transfer to AFSOC. The Cannon AFB population would begin to increase starting FY 2008. Most of the population growth will occur during the FY 2008 to FY 2010 period. The projected change in manpower authorizations and support personnel is shown in Table 2.1-7. No Action is also presented in the table.

Cannon AFB personnel assignments with the AFSOC beddown would be approximately the same personnel numbers as those which existed with the F-111 missions in the mid-1990s.

AFSOC ASSETS BEDDOWN AT CANNON AFB, NEW MEXICO EIS

**TABLE 2.1-5. PROPOSED FACILITIES FOR
EAST AND WEST AIRFIELD ALTERNATIVE
(PAGE 1 OF 2)**

<i>FY</i>	<i>Project #</i>	<i>Title</i>	<i>Scope (square feet)</i>
2008	CZQZ073006	Add/Alter Hangar C-130 Hangar	22,185
2008	CZQZ063015	SOF Flight Simulator Facility	15,070
2009	CZQZ063010	SOF Aircraft Maintenance Hangar	38,298
2010	CZQZ063002	Consolidated Communications Facility	51,850
2010	CZQZ063037	SOF Squadron Operations and Maintenance Facilities	43,000
2011	CZQZ063019	SOF C-130 Fuel Cell and Corrosion Control Hangars	Fuel Cell – 31,000 Corrosion Control – 59,000
2011	CZQZ063027	SOF CV-22 Simulator Facility	15,070
2011	CZQZ063052	SOF UAV Squadron Operations/Ground Control Stations	43,690
2011	CZQZ063028	SOF MC-130 Squadron Operations Facility	26,996
2011	CZQZ063026	SOF Add/Alter Building 198 for Talon II Squadron Operations	26,017
2011	CZQZ063021	SOF C-130 2-Bay Hangar/ Aircraft Maintenance Unit (AMU)	65,004
2011	CZQZ063029	SOF Special Tactics Squadron (STS) Squadron Operations	62,990
2011	CZQZ073005	Dormitory (96 rooms)	34,100
2011	CZQZ093002	Child Development Center	17,007
2011	CZQZ063023	SOF CV-22 Squadron Operations Facility	26,006
2011	CZQZ063022	SOF Taxiway Shoulders for C-130s	753,480
2011	CZQZ133001	Add/Alter Wastewater Treatment Plant (WWTP)	5,382
2011	CZQZ063053	SOF UAV Hangar/ AMU Facility	43,895
2011	CZQZ073026	SOF Fuselage Trainer Facility	13,993
2012	CZQZ123001	96-Person Dormitory	34,100
2012	CZQZ063024	SOF CV-22 Taxiway Expansion	75,003
2012	CZQZ043001	Library Education Center	38,643
2012	CZQZ063033	SOF Tiltrotor Maintenance Squadron Operations Facility	16,996
2012	CZQZ063032	SOF Mission Readiness Supply Storage Facility	49,998
2012	CZQZ063034	SOF Add/Alter CV-22 Squadron Operations	13,993
2012	CZQZ063035	SOF CV-22 AMU Addition	5,005
2013	CZQZ063030	SOF C-130 Hangar/ AMU	32,000
2013	CZQZ053003	Add/Alter Fitness Center	58,180
2013	CZQZ063051	SOF MC-130 Parking Apron	1,540,016
2013	CZQZ063049	SOF MC-130 2-Bay Hangar/ AMU	65,004
2013	CZQZ063050	SOF MC-130 Squadron Operations	35,004

**TABLE 2.1-5. PROPOSED FACILITIES FOR
EAST AND WEST AIRFIELD ALTERNATIVE
(PAGE 2 OF 2)**

<i>FY</i>	<i>Project #</i>	<i>Title</i>	<i>Scope (square feet)</i>
2010	CZQZ073010	SOF Add/ Alter Simulator Facility for CV-22	15,070
2012	CZQZ073011	SOF Add/ Alter Simulator Facility for MC-130	15,070
2014	CZQZ073012	SOF Add/ Alter Simulator Facility for MC-130	15,070
2014	CZQZ073014	SOF AC-130 Squadron Operations Facility	32,000
2014	CZQZ073015	SOF Hot Cargo Pad and Relocate Combat Arms Training and Maintenance	344,448
2014	CZQZ073016	SOF MC-130 Parking Apron	1,539,252
2014	PXLY073001	SOF Landing Strip - Melrose AFR	1,237,860
2014	PXLY073002	SOF Relocate Melrose AFR Compound	50,052
2014	CZQZ073017	SOF MC-130 Squadron Operations Facility	26,996
2014	CZQZ073018	SOF C-130 Wash Rack/Hangar	25,026
2014	CZQZ073019	SOF Mobility Aerial Delivery Facility	50,052
2014	CZQZ073020	SOF Forward Area Rearm/Refuel Point Facility	26,996
2014	CZQZ073021	SOF Aviation Maintenance Facility	16,996
2014	CZQZ073022	SOF Resurface Roads	197,000
2014	CZQZ073023	Satellite Dining Facility	30,010
2014	CZQZ073024	Satellite Fitness Facility	30,010
2014	CZQZ073025	Satellite Fire Station	25,026
2016	CZQZ073013	SOF Add/Alter Simulator Facility for Non- Standard Aircraft	15,070

TABLE 2.1-6. EAST AND WEST AIRFIELD PROJECTED ANNUAL CONSTRUCTION, RENOVATION, AND O&M EXPENDITURES FOR AFSOC BEDDOWN (\$ MILLION)

<i>Fiscal Year</i>	<i>AFSOC Mission Construction/Renovation¹</i>	<i>AFSOC Mission O&M² (Request)</i>	<i>Cannon Other</i>	<i>Additional Utilities</i>
2008	9	146	0	1
2009	9	92	0	3
2010	40	73	20	5
2011	213	70	34	0
2012	66	77	30	0
2013	98	72	12	0

1. Program Year subject to Congressional Authorization.
2. Any unfunded requirements would roll over to the next year.

TABLE 2.1-7. CURRENT AND PROPOSED PERSONNEL AUTHORIZATIONS¹

	<i>No Action</i>	<i>FY 2006</i>	<i>FY 2007</i>	<i>FY 2008²</i>	<i>FY 2009²</i>	<i>FY 2010²</i>
Officer	11	275	190	439	702	755
Enlisted	105	3,142	2,171	2,743	4,020	4,185
Civilian	34	730	505	407	417	420
Contractor	0	320	320	320	320	320
Cumulative Total	150	4,467	3,186	3,909	5,459	5,680

- Note: 1. CV-22, NSA, Foreign Internal Defense (FID) missions are future growth and should be in place by FY 2010.
 2. These numbers apply to both action alternatives.

The timing of personnel change was noted as a concern during public scoping meetings. The estimated timing of the drawdown of the 27 FW would be from January 2007 through March 2008. The build-up of AFSOC personnel is proposed to be approximately 25 percent of the AFSOC mission and AFSOC Base Operating Support per year from October 2007 through October 2011. Annual construction and personnel build-up are subject to Congressional appropriations.

2.1.6 NO ACTION ALTERNATIVE AT CANNON AFB

Section 1502.14(d) of the CEQ National Environmental Policy Act (NEPA) regulations requires an EIS to include analysis of a no action alternative. No Action for this EIS means that Cannon AFB becomes an AFSOC installation but no beddown of AFSOC assets would occur at Cannon AFB at this time. Analysis of the No Action Alternative provides a benchmark and enables decision-makers to compare the magnitude of the environmental effects of the proposal.

No Action personnel numbers are identified in Table 2.1-7. The MILCON, other Cannon MILCON, or the O&M expenditures associated with the AFSOC beddown in Tables 2.1-4 and 2.1-6 would not occur under No Action.

2.2 ELEMENTS AFFECTING MELROSE AFR

Melrose AFR is primarily an air-to-ground and electronic combat training range with diverse target arrays for training Air Force personnel. The range also includes a small arms range, as well as laser targeting capabilities for training ground forces, and has been used to train operations of small UAS.

Two alternatives are under consideration at Melrose AFR, the Two-Target Alternative and the Three-Target Alternative. Both alternatives would include gunships and other live fire directed at specific targets on Melrose AFR. Melrose AFR does not currently support live-fire munitions. This action would change the type of munitions permitted on the range allowing aircrews to train more effectively. The live-fire targets and training would affect existing grazing leases. A No Action Alternative is also evaluated that does not include training from AFSOC assets at Cannon AFB.

AFSOC training would generally occur within the 60,010 acres that constitute Melrose AFR. Responsibilities and procedures for the maintenance, operation, and use of Melrose AFR as defined in Air Force Instruction (AFI) 13-212, Volume 1, ACC Supplement 1, Cannon AFB Addendum A ("Cannon Addendum") would be replaced with a new supplement to reflect AFSOC's new role as range manager, subsequent to transfer of the range from ACC. The AFSOC Cannon Local Range Supplement will be developed to reflect the more substantive range changes that are the subject of this EIS, subsequent to issuance of the Air Force's Record of Decision (ROD).

Melrose AFR is comprised of 60,010 acres divided into three main areas: Exclusive Air Force Use, Restricted Leased, and Unrestricted Leased Land. Figure 2.2-1 presents a portion of Melrose AFR.

The leased area is both farm and ranch land of short grass prairie. Portions of two leases have been developed in irrigated agriculture.

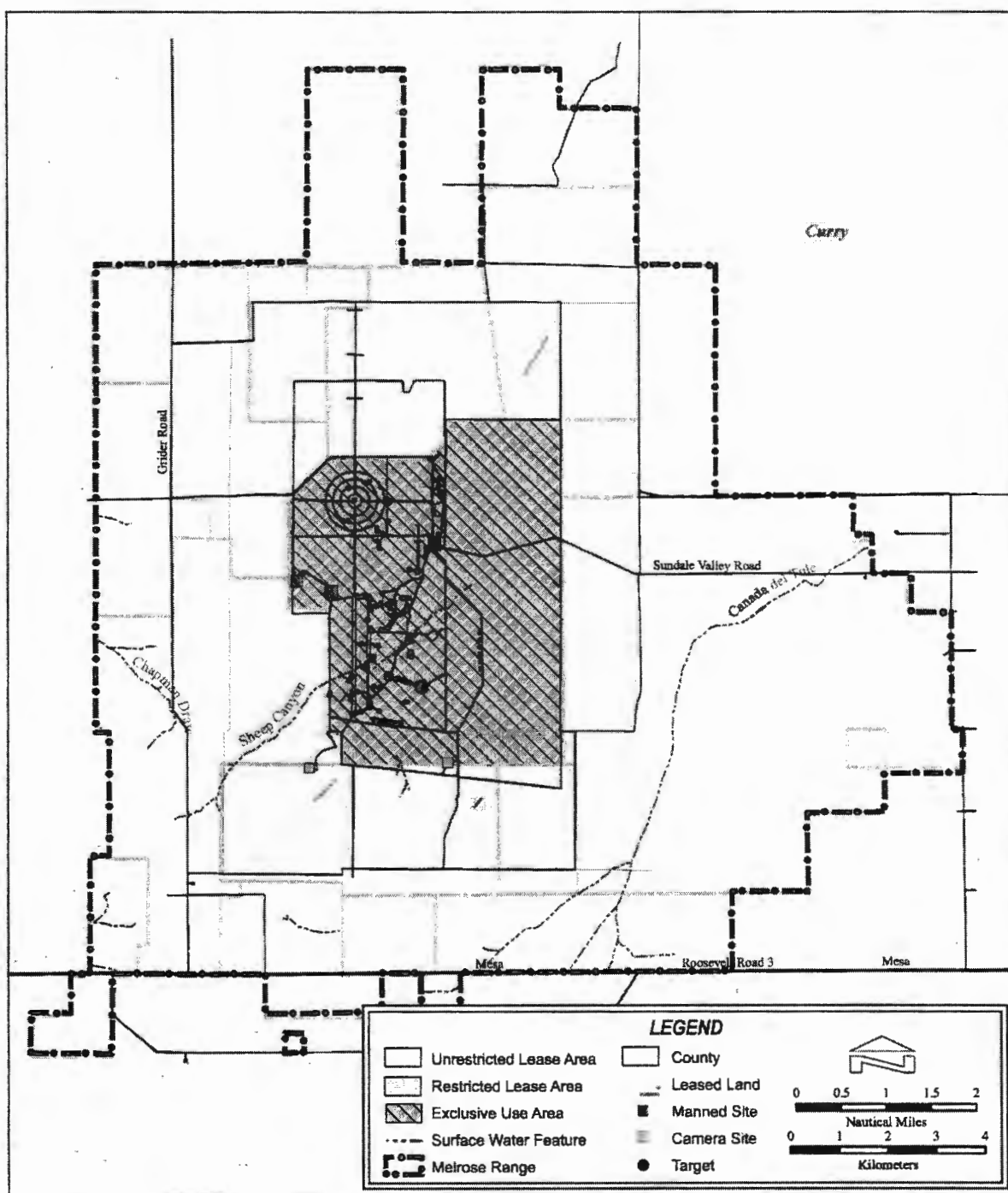


FIGURE 2.2-1. MELROSE AFR TARGETS

The Exclusive-Use land includes manned areas, targets, and impact areas. Restricted Leased Land restrictions include prohibiting human access to specific days and times. Unrestricted Leased Land can be used for human access 24 hours a day. No permanent structures, or structures over 50 feet tall, are permitted on any leased land. Development rights have been acquired to ranch lands on the periphery of the range to reduce the risk of encroachment and improve safety.

Melrose AFR soils are sandy in nature, predominately flat, with a rocky 200-foot-tall mesa bounding the impact area on the west and south. The range supported prairie dog communities, and currently supports hawks, golden eagles, owls, many other birds, porcupines, badgers, several kinds of snakes, antelope, deer, rabbits, and coyotes.

There is an average annual rainfall of 16 inches and winds of varying speed throughout the year. There are no permanent surface water bodies on Melrose AFR. There are two wells used for supplying water for the target area and numerous government-owned irrigation wells. The government uses these wells for firefighting, to provide water for wildlife habitats, and for agriculture.



SANDY SOILS ARE GRADED AROUND MELROSE AFR TARGETS.

2.2.1 MELROSE AFR TARGETS AND FACILITIES

Melrose AFR has a variety of conventional and non-conventional targets (see Figure 2.2-1) used for laser targeting and inert bombing runs. The range is capable of Weapons Impact Scoring System (WISS) scoring on 101 targets day and night. Tactical targets include a complete airfield; anti-aircraft artillery sites; an SA-3 missile site; bridge; train; dam; tunnel; convoys; ground control intercept site; petroleum, oils, and lubricants (POLs) storage area; munitions storage area; and revetted surface-to-surface missiles.

Melrose AFR also includes permanent structures, which support personnel and range activities. These are listed in Table 2.2-1.



REPRESENTATIVE EXISTING BUILDINGS AND VEHICLE TARGETS. AREAS AROUND TARGETS ARE GRADED TO REDUCE THE RISK OF FIRE.

TABLE 2.2-1. PERMANENT STRUCTURES ON MELROSE AFR

Main Towers	Main Building and Patio	UPPD Facility
Flank Tower	Fire Department	EW Admin
Generator Shed	EW Support (2)	EW Interconnect
Wind Meter	Antenna Towers (4)	EOD Facility

2.2.2 MELROSE AFR RESTRICTED AIRSPACE

R-5104 and R-5105 constitute the restricted airspace associated with Melrose AFR (see Figure 1.1-1). R-5104 is divided into two altitude blocks. The restricted area airspace is R-5104A from the surface to, but not including Flight Level (FL) 180 and R-5104B from FL180 to FL230. When not in use, control of the restricted airspace is turned over to Cannon AFB Command Post, who normally returns it to Albuquerque Air Route Traffic Control Center (ARTCC).

FL180 (FLIGHT LEVEL 180) REFERS TO THE FLIGHT LEVEL AND IS EFFECTIVELY 18,000 FEET ABOVE MEAN SEA LEVEL (MSL) FOR THE PURPOSES OF THIS EIS. MOST AFSOC AIRCRAFT NEVER FLY ABOVE FL180.

R-5105 comprises the restricted airspace (surface to 10,000 feet MSL) north of the range. When not in use, control is turned over to Cannon AFB Command Post, who normally returns it to Albuquerque ARTCC.

AFSOC proposes an array of aircraft utilizing Melrose AFR and associated Restricted Areas as presented in Table 2.2-2. Ground level in the vicinity of Melrose AFR is from 4,500 to 5,000 feet MSL. Due to normal operating altitudes, realistic Predator training in restricted airspace over the range would primarily occur in R-5104A and B. Airspace over the base and range is restricted, although transit between the base and range is in FAA Class E controlled airspace. AFSOC would request a COA for an airspace corridor extending from the Class D Cannon Airport Traffic area through existing Class E Controlled Airspace to the Restricted Areas that overlap the Class E airspace around Cannon AFB. This COA could permit UAS transit (see Section 3.1.2 for airspace discussion).

TABLE 2.2-2. PROPOSED ANNUAL AIRCRAFT SORTIE-OPERATIONS FOR MELROSE AFR AND RESTRICTED AREAS

Aircraft	R-5104A ¹		R-5104B ²		R-5105 ³	
	Day ⁴	Night ⁵	Day ⁴	Night ⁵	Day ⁴	Night ⁵
AC-130H	936	312	9	3	936	312
MC-130H	468	312	60	39	468	312
MC-130P	468	312	60	39	468	312
CV-22	750	500	0	0	750	500
C-47 Type	137	91	0	0	137	91
UH-1	113	38	0	0	113	38
NSA	456	456	0	0	456	456
UAS	90	90	90	90	90	90
MC-130W	468	312	60	39	468	312
Transient	1,170	300	1,170	300	1,170	300

- Notes: 1. To 18,000 feet
 2. 18,000 feet to 23,000 feet
 3. To 10,000 feet
 4. Day operations would be from 7:00 a.m. to 10:00 p.m.
 5. Night operation is considered 10:00 p.m. to 7:00 a.m.

The Pecos and Taiban Military Operations Areas (MOAs) bound range airspace on the west (see Figure 1.1-2). Primary attack headings on range targets are from the north or south, with a secondary attack heading from the west.

The following Cannon-scheduled MTRs offer entry to the range: Instrument Route (IR)-107 (the only Cannon assigned route B-1s and B-52 bombers can use), IR-111, IR-113, Visual Route

(VR)-100, VR-108, VR-114, and VR-125. They comprise day/night, all weather (IR only), and varied-altitude range entry capabilities. Albuquerque ARTCC controls all routes. 27th Operations Support Squadron (27 OSS/OSOS) currently schedules all of the routes, the Pecos MOAs, and other airspace pictured in Figure 1.1-2. This responsibility would transfer to the SOW.

2.2.3 ORDNANCE USE AT MELROSE AFR

Melrose AFR currently has two strafe pits, which take up to 30 millimeter (mm) munitions and are scored by Improved Remote Strafe Scoring System (IRSSS). Targets support MK-106, BDU-33, and BDU-48 practice bombs, inert ordnance up to MK-82s, 84s, BDU-38s, and inert GBU-10s and GBU-12s.

The range currently supports the F-16 Targeting Pod (Laser), F-117 lasing system, PAVE TACK, PAVE SPIKE, the GLLD, the MULE, and the LTD-1 lasing systems. The range includes a Smokey Sam (ground-to-air missile simulator) and Laser Detector Scoring systems.

Chaff and flare use is approved in Restricted Airspace associated with the range. Melrose AFR also includes a small arms (9mm, M-16, M-60, etc.) range. This small arms range is located to the east of the range facilities and between the manned facilities and east entrance road (see Figure 2.2-1). The small arms range is used by 27 FW personnel. When in use, small arms ranges are conducted under the strict control of the Range Control Officer (RCO).



AMERICAN AND ALLIED PERSONNEL CURRENTLY PRACTICE LASING TARGETS FROM GROUND POSITIONS. PERSONNEL WOULD CONTINUE TO TRAIN WITH LASER SYSTEMS.

2.2.4 PROPOSED CHANGE IN ORDNANCE USE

AFSOC training would increase the annual ordnance use at Melrose AFR as shown in Table 2.2-3. Table 2.2-3 lists aircraft delivered ordnance used at Melrose AFR currently by the 27 FW and proposed for AFSOC training. The Draft EIS included proposed C-130 use of 25 mm munitions for training on Melrose AFR. These munitions extended the safety footprint and Exclusive-Use area around the target area. During the public comment period on the Draft EIS, several commenters expressed concern with the size of the Exclusive-Use area driven by the 25 mm safety footprint. To reduce the safety footprint, 25 mm munitions are not proposed for use on Melrose AFR as part of this Final EIS.

TRAINING IS DEFINED THROUGHOUT THIS EIS TO INCLUDE ALL PHASES OF THE OPERATIONAL USE OF MUNITIONS INCLUDING WEAPONS AND TACTICS TEST AND EVALUATION.

Table 2.2-4 lists proposed ground ordnance expended by ground personnel that include Special Tactics Squadron, Security Forces (Security Police), Survival, Evasion, Resistance, and Escape (SERE) personnel, other SOF components, and New Mexico Army National Guard (NMARNG) personnel.

2.2.5 ALTERNATIVE AIR-TO-GROUND TARGET AREAS

Two alternatives are under consideration to meet AFSOC training requirements for air-to-ground gunnery training.

2.2.5.1 MELROSE AFR TWO-TARGET ALTERNATIVE

The Two-Target Alternative adds two new target areas on Melrose AFR for AFSOC training with the capability to operate two AC-130 gunships simultaneously on the range. The two new live-fire target areas are shown in Figure 2.2-2. A minimum of two target areas are needed for live-fire training. Two target areas permit training by two aircraft and, if for any reason, such as clean-up or target maintenance, one target is inoperable, there would be at least one target for minimally required training.

Typical targets within the impact area would include tank hulks (approximately 30) and four 15-foot-by-15-foot sheets of steel armor. During an average year, approximately 25 percent of the Melrose AFR training activity would occur during environmental night (after 10:00 p.m. and before 7:00 a.m.).

**TABLE 2.2-3. CURRENT AND PROPOSED ANNUAL ORDNANCE USE
WITHIN MELROSE AFR**

Aircraft Ordnance ²	MELROSE AFR	
	Current Conditions	Proposed Action ³
BDU-33	15,720	2,000
BDU-50HD	419	40
BDU-50LD	419	40
GBU-12	35	5
GBU-10	42	5
20 mm	51,200	3,500 ¹
30 mm Target Practice Rounds (AC-130)	0	600
30 mm High Explosive Incendiary (AC-130)	0	50,000
40 mm (AC-130)	0	50,000
105 mm Target Practice Rounds (AC-130)	0	12,500
105 mm High Explosive Incendiary (AC-130)	0	2,500
105 mm High Frag (AC-130)	0	280
2.75 Rockets -M151	73	73 ¹
2.75 Rockets -Other	24	24 ¹

Notes: 1. Ordnance expended by transient users.

2. See Section 2.3.2 for chaff and flare discussion.

3. CV-22 ordnance has not yet been determined.

**TABLE 2.2-4. PROPOSED ANNUAL GROUND USE ORDNANCE ON MELROSE AFR
(PAGE 1 OF 2)**

<i>Ground User Ordnance</i>	MELROSE AFR	
	<i>Current Conditions</i>	<i>Proposed Action¹</i>
40 mm Smoke	0	504
40 mm Practice M781	0	26,250
40 mm FXD Mult Proj xm 576	0	<10
40 mm White Star Para M583	0	<10
40 mm HEDP M433 Sngl Rd	0	<10
Fragmentation Grenade	0	<10
Hand Smoke M18	0	389
Mine Anti Personnel M18A1	0	<10
A/P25S-5A Sig Kit Personl Distress	0	18
MK124-0 Sig Smoke Illum Marine	0	<10
MK125A1 Sig Illum Ground	0	<10
M49A1 Surface Trip Flare	0	<10
MK25 Marker	0	<10
M115A2 Sim Proj Ground Burst	0	<10
M118 Sim Booby Trap	0	<10
M119 Sim Explosive Booby Trap	0	<10
M116A1 Sim Hand Grenade	0	<10
M60 Igniter Time Blast Fuze	0	100
M112 Comp 4, 1.25lb Demo Charge	0	100
1LB TNT Demo Charge	0	<10
M7 Non Electric Blasting Cap	0	77
M2A2 15LB Comp B Demo Charge	0	<10
Detonating Cord Assembly	0	1,475
M700 Time Blast Fuse	0	1,500
7.62 Ball 4-1 Linked	0	1,030,000
7.62 Blank, M82 Linked	0	3,200
9mm (sub cal)	0	1,960,000
.50 cal ball/Tracer Linked	120	425,000
40mm TP M918 Linked	0	16,000
40mm HEDP M430AI Linked	0	8,832
84 MM AT4 HE Rocket	0	410
Hand Smoke White HC	0	32
Hand Incendary	0	16
35mm Practice F/ M190 LAU Rocket	0	1,058
Inter Tube Assy Fit F/LAU M190	0	1,058
66 mm LAU Rocket	0	23
66 mm M72A3 HE rocket	0	<10
Practice Launcher	0	<10
Smoke Grenades (Ground)	0	60
Training Flares (Ground)	0	600
5.45 mm	0	26,000
5.56 mm	1,035	2,430,000
12 gauge	0	33,000

TABLE 2.2-4. PROPOSED ANNUAL GROUND USE ORDNANCE ON MELROSE AFR
(PAGE 2 OF 2)

<i>Ground User Ordnance</i>	MELROSE AFR	
	<i>Current Conditions</i>	<i>Proposed Action¹</i>
60 mm	0	7,000
81 mm	0	5,100
Mines	0	2,200
Grenades	0	7,600
Flares	0	2,100
66 mm LAW	0	60
84 mm AT-4	0	60

Note: 1. Includes NMARNG and Special Forces Group use.

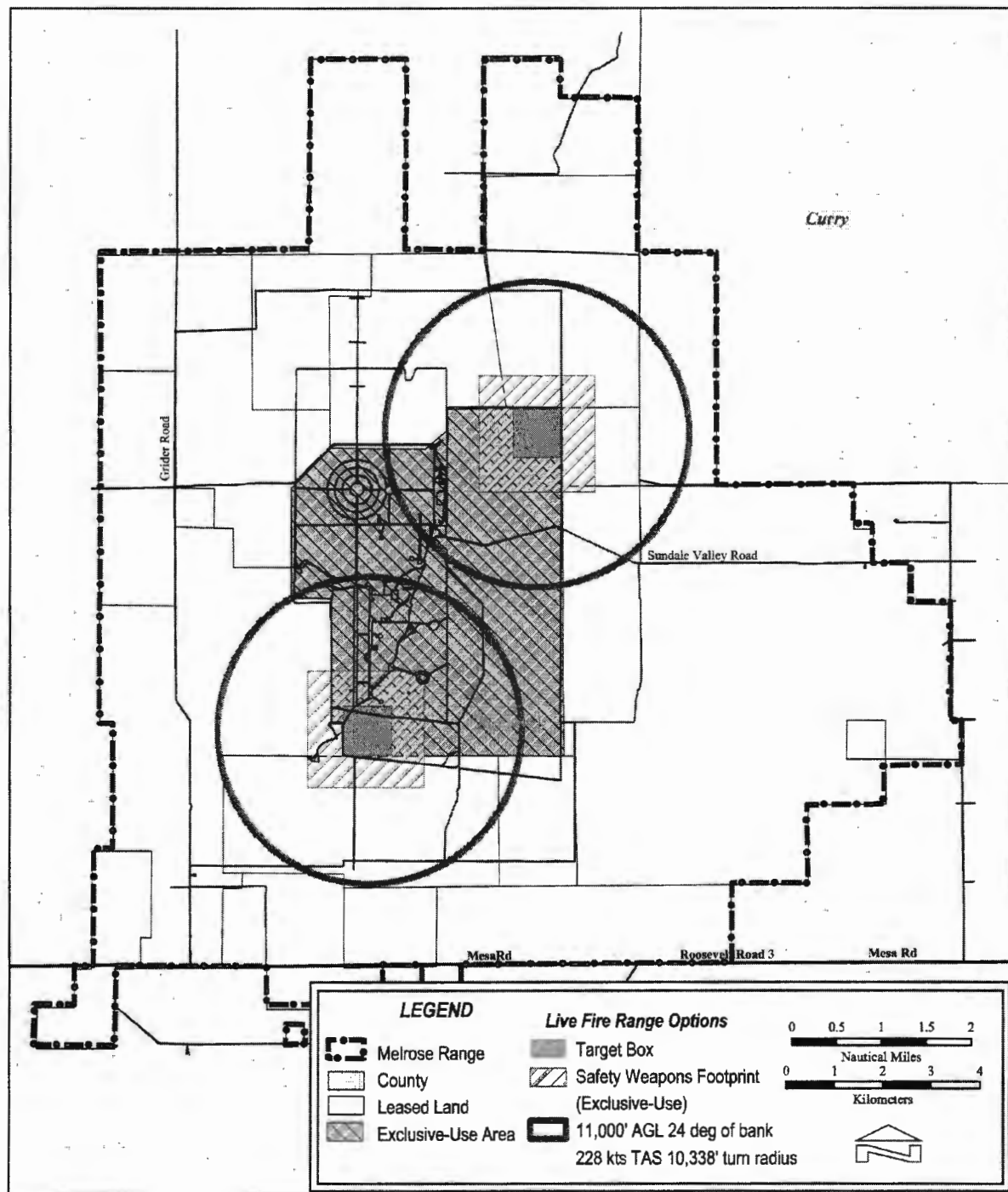


FIGURE 2.2-2. MELROSE AFR PREFERRED TWO-TARGET ALTERNATIVE

A variety of targets would be constructed within each approximately 1 kilometer by 1 kilometer target area. One target set could include approximately 271 SEALAND containers placed on Melrose AFR to simulate an urban setting. The SEALAND containers are depicted in Figure 2.2-3 with a variety of targets. The SEALAND containers would not be used specifically as targets; rather targets would be located among the containers. These containers would be located within the live-fire exclusive-use area. There is an estimated expenditure of \$30 million split between FY 2008 and FY 2009 for targets, a defense access roads project, and improved range and fire safety improvements.

Table 2.2-5 presents the estimated acreage in each of the Exclusive-Use, Restricted Leased, and Unrestricted Leased categories within the 60,010-acre Melrose AFR.

TABLE 2.2-5. ACRES OF LAND USE¹

<i>Land Use</i>	<i>Existing Conditions</i>	TWO-TARGET ALTERNATIVE		THREE-TARGET ALTERNATIVE	
		<i>Draft EIS</i>	<i>Final EIS²</i>	<i>Draft EIS</i>	<i>Final EIS</i>
Exclusive-Use	8,800	16,613	10,600	23,275	12,700
Restricted Grazing ¹	18,710	12,247	18,600	12,615	23,300
Unrestricted Grazing ¹	32,500	31,150	30,810	24,120	24,010
Total	60,010	60,010	60,010	60,010	60,010

Note: 1. Acres summarized from Geographic Information System; survey acreage may vary.
2. Preferred Alternative.

2.2.5.2 MELROSE AFR THREE-TARGET ALTERNATIVE

The Three-Target Alternative would better meet operational training requirements for all AFSOC assets proposed to be located at Cannon AFB. Training personnel would regularly require two targets, and experience has demonstrated that target maintenance and cleanup would render at least one target unavailable for training use approximately one and one-half months per year. This means that a two-target alternative would be reduced to one useable target approximately three months of the year. A three-target alternative would permit rotation of target use so that at least two targets would be available for required training throughout the year.

The Melrose Three-Target Alternative has three live-fire target areas on Melrose AFR as depicted in Figure 2.2-4. Table 2.2-5 includes the land management areas for Melrose AFR under the Three-Target Alternative. The Three-Target Alternative would include all mission training described in Section 2.2.1 for the Two-Target Alternative. This includes the munitions and chaff and flare use identified in Section 2.2.1. The day/night proportion of training would also apply to the Three-Target Alternative. As described for the Proposed Action, there would be one Landing Zone (LZ) and Drop Zone (DZ) and several Helicopter Landing Zones (HLZs) on Melrose AFR.

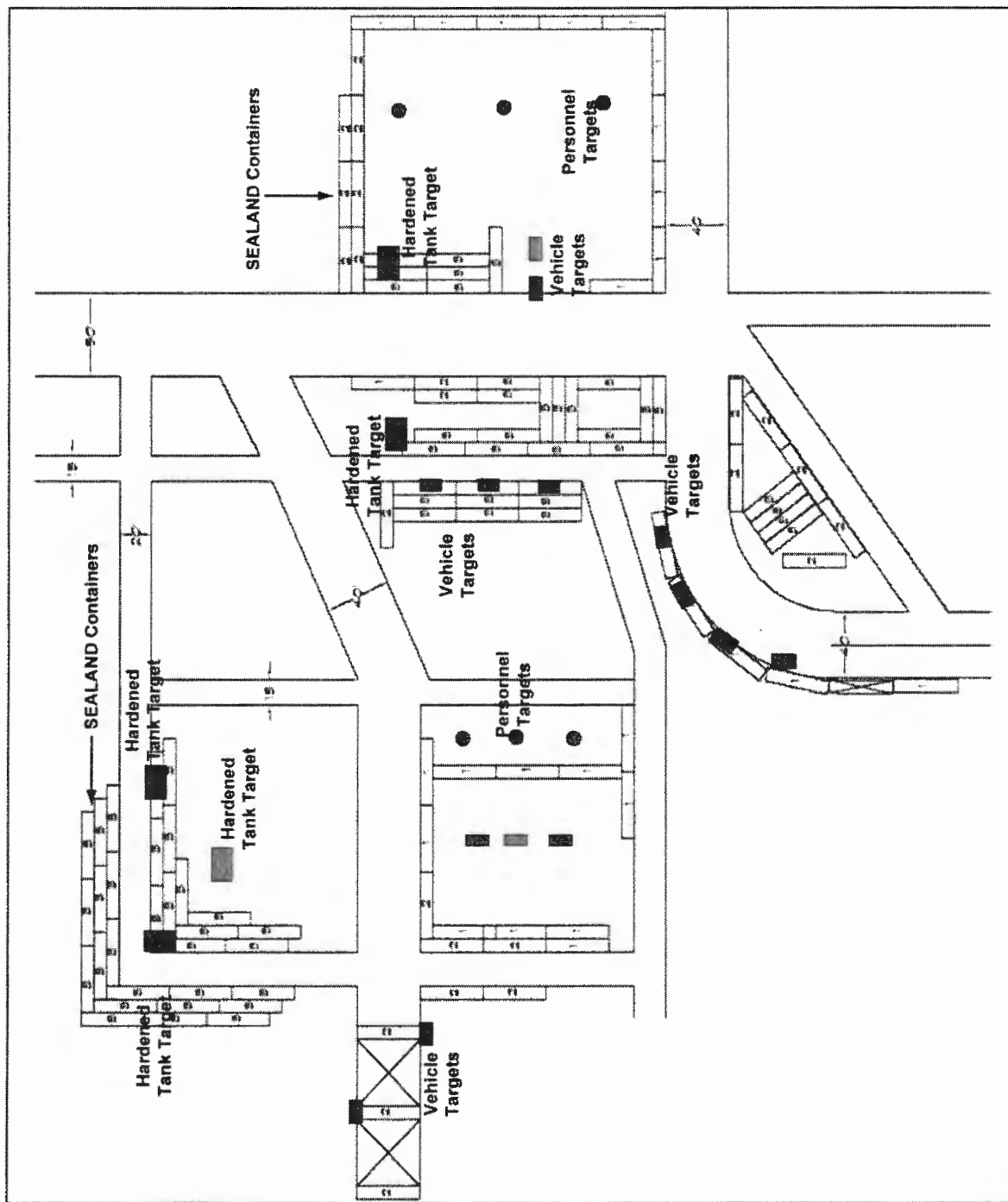


FIGURE 2.2-3. REPRESENTATIVE 11-ACRE TARGET LAYOUT

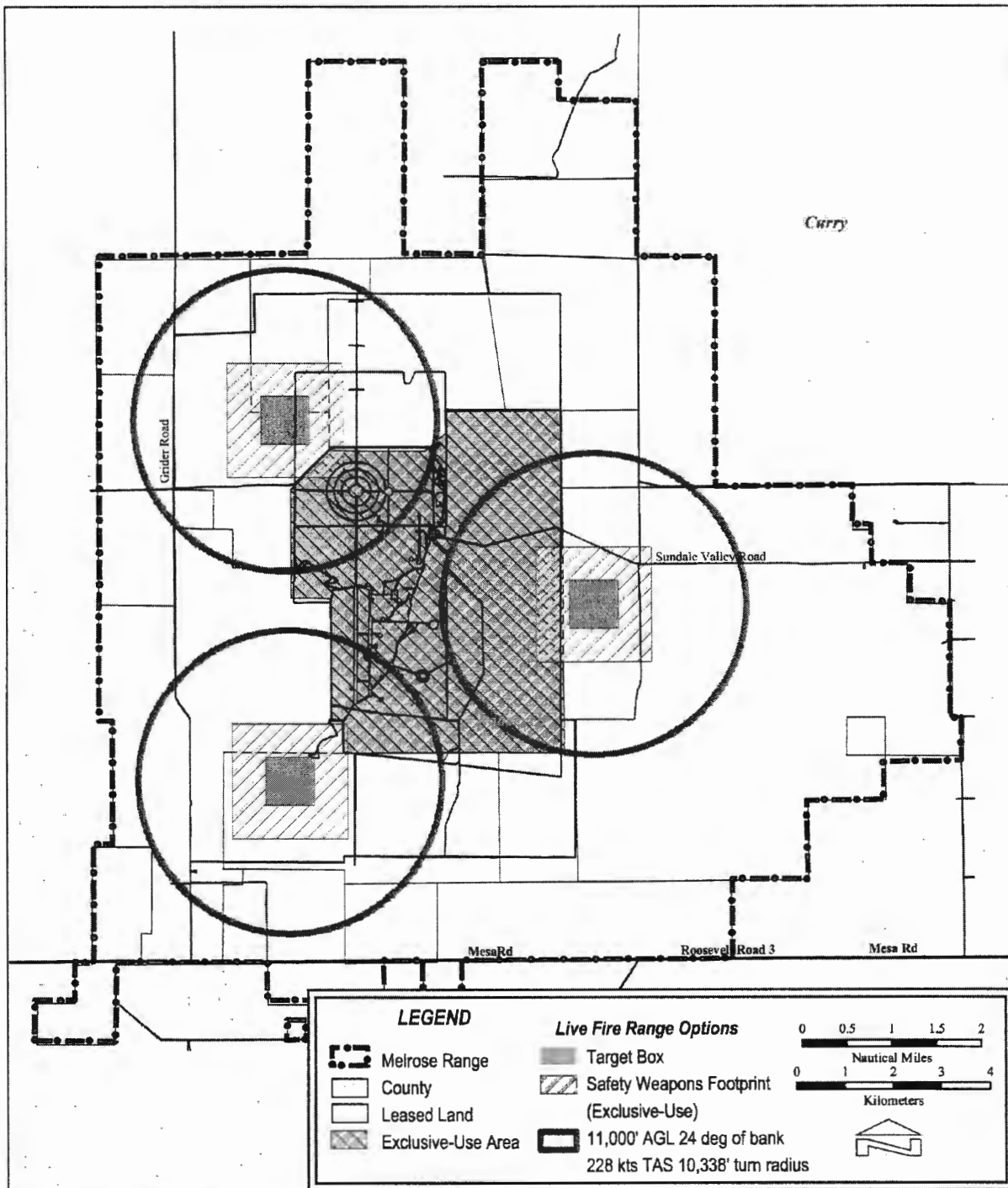


FIGURE 2.2-4. MELROSE AFR THREE-TARGET ALTERNATIVE

As with the Two-Target Alternative, the estimated Three-Target Alternative expenditure for Melrose is \$30 million split between FY 2008 and FY 2009. The primary difference between the Two-Target and the Three-Target Alternatives would be the changes in targets and resulting changes in grazing leases associated with the safety zones. This difference is presented in Table 2.2-5.

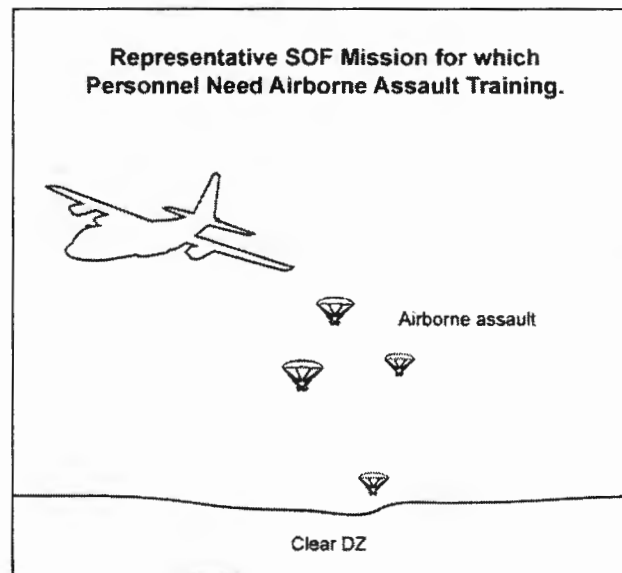
2.2.6 ADDITIONAL MELROSE AFR ACTIVITIES

Additional proposed Melrose AFR activities include the ability to land and recover personnel training for insertion and extraction and improved small arms range capability.

2.2.6.1 LANDING ZONE AND DROP ZONE

Eventually there would be one proposed C-130, UAS, and NSA LZ on Melrose AFR. Several HLZs would be surveyed on Melrose AFR to accommodate CV-22 and helicopter use. A DZ would be surveyed on Melrose AFR to accommodate all aircraft. Training using LZ/DZ/HLZ would be approximately 50 percent during environmental night (after 10:00 p.m. and before 7 a.m.). LZ/DZ training could include the following:

- Fixed wing aircraft landing on the strip in darkened conditions to off-load supplies, equipment or personnel.
- C-130 or CV-22 landing for refueling training at a remote location.
- C-130 or CV-22 discharging paratroops to simulate a drop behind "enemy" lines.
- C-130 landing or CV-22 landing or hovering to retrieve personnel after a mission.
- Personnel deployed from a C-130 or CV-22 securing the location and/or moving from the strip to "attack" Melrose targets.



LZ/HLZ/DZ sites would be graded and would include a soil stabilizer to reduce the potential for debris to affect engine performance. LZ/DZ/HLZ sites would result in approximately 50 acres being cleared of vegetation and stabilized. An LZ would require a paved strip to support C-130 aircraft. Figure 2.2-5 presents a representative 50-acre LZ/DZ which would be located on Melrose AFR following decisions regarding the Two- or Three-Target Alternatives presented in this EIS.

2.2.6.2 SMALL ARMS RANGE

SOF train to enter an area, carry out a mission, and exit the area. To accomplish this process, they must be proficient in the use of a variety of arms and ammunition. NMARNG personnel must also be trained in the use of a variety of arms. Proposed enhancements to the Melrose

AFR small arms range would meet the needs of both the 515th Regiment of the NMARNG and the Cannon-based AFSOC personnel.

The proposed small arms enhancements take into consideration past usage of the range for small arms training. The proposed range would provide basic and advanced weapons marksmanship ranges to include the following:

- Rifle/Machine Gun Zero Range
- Multi-Purpose Machine Gun Range
- Automated Record Fire Range
- Combat Pistol Qualification Course
- Grenade Launcher Range
- Range Operations Center

The proposed munition usage for the small arms range is presented in Table 2.2-4.

Figure 2.2-5 presents the area that could be affected by live fire from the small arms ranges above. The range facilities and firing locations would be in the upper right of the red polygon and the typical shape of these firing locations is presented in the figure. Targets would be located to the southwest of the firing locations. The red polygon encompasses all safety zones for all small arms training. Depending upon the type of training, portions or the entire polygon could be subject to stray or ricocheting rounds. During training, and depending on the weapons being used, personnel would be excluded from potential risk areas for safety.

Potential impacts from munitions use would be mitigated by having all targets meet stringent Air Force requirements for cleanup and collection of lead.

2.2.7 NO ACTION ALTERNATIVE AT MELROSE AFR

Section 1502.14(d) of the CEQ implementing regulations requires an EIS to analyze the No Action Alternative. Analysis of the No Action Alternative provides a benchmark and enables decision-makers to compare the magnitude of the environmental effects of the proposal. No Action for this EIS means Melrose AFR continues to be used for New Mexico Air National Guard (NMANG) and transient user training.

2.3 ELEMENTS AFFECTING AIRSPACE

2.3.1 TRAINING MISSIONS WITHIN AIRSPACE

There are four types of local training airspace scheduled by Cannon AFB. Figure 2.3-1 displays these types of airspace and a COA. Airspace scheduled by Cannon AFB associated with this proposal encompasses all the Restricted Airspace supporting Melrose AFR, the MOAs, and the MTRs. AFSOC aircraft do not normally fly in Air Traffic Control Assigned Airspace (ATCAAs). Restricted airspace use is discussed in Section 2.2.2.

THE SCOPING BRIEFINGS EXPLAINED THAT AFSOC AIRCREWS CAN MEET AIRSPACE TRAINING REQUIREMENTS WITHIN THE EXISTING CANNON AFB MANAGED AIRSPACE, INCLUDING THE PECOS, MT. DORA, TAIBAN, AND BRONCO MOAs AND RESTRICTED AIRSPACE ASSOCIATED WITH MELROSE AFR. THE MOAs, RESTRICTED AIRSPACE, AND MTRs SCHEDULED BY CANNON AFB WOULD SUPPORT AFSOC LOW LEVEL, NIGHT, AND OTHER TRAINING MISSIONS AS WELL AS ON-GOING TRAINING BY OTHER MILITARY USERS OF THE AIRSPACE. AN FAA COA WOULD BE NEEDED TO PERMIT PREDATOR TRANSITION FROM CANNON AFB TO MELROSE AFR.

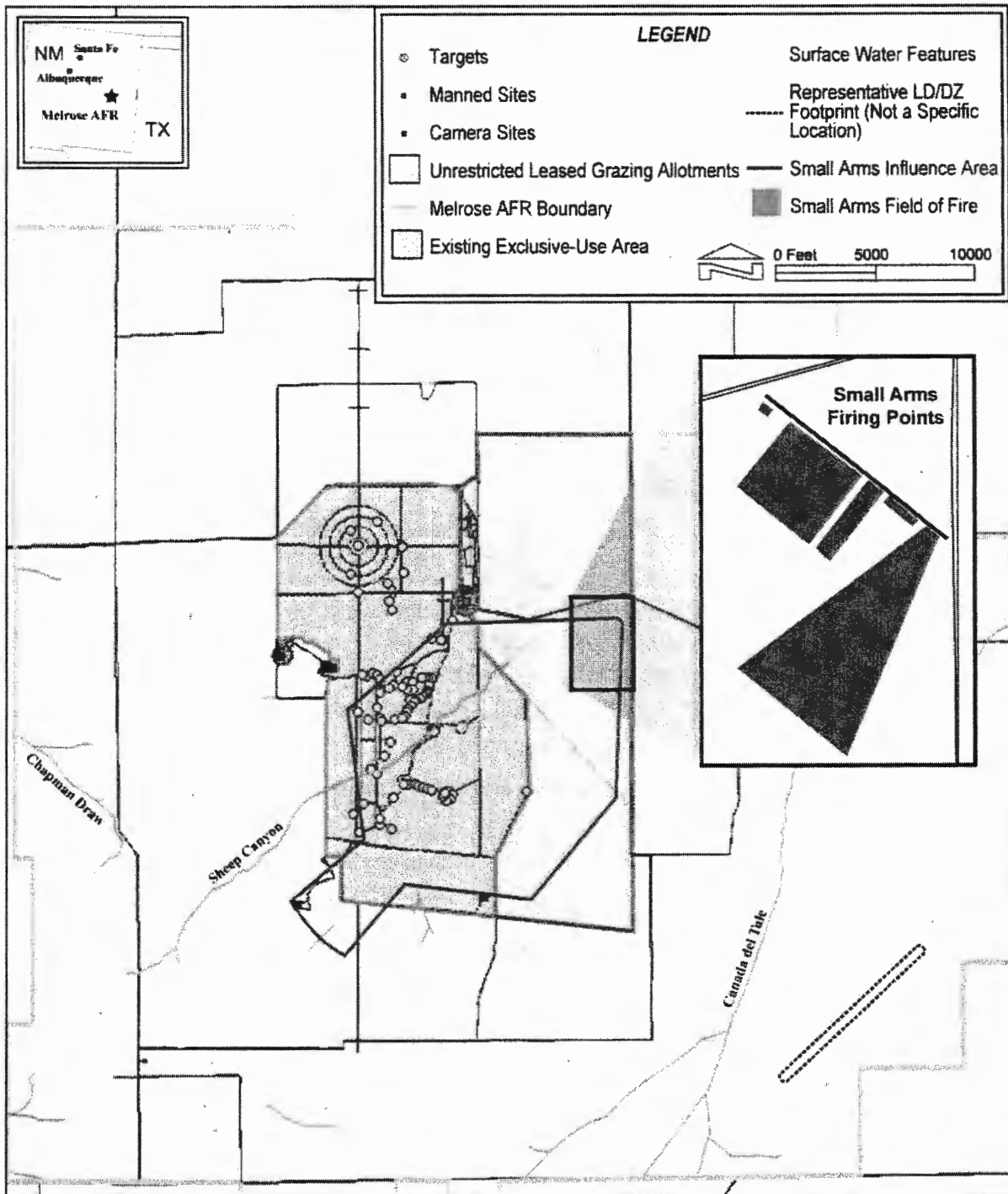


FIGURE 2.2-5. INFLUENCE AREA FOR PROPOSED ARMY GUARD RANGE ON MELROSE AFR

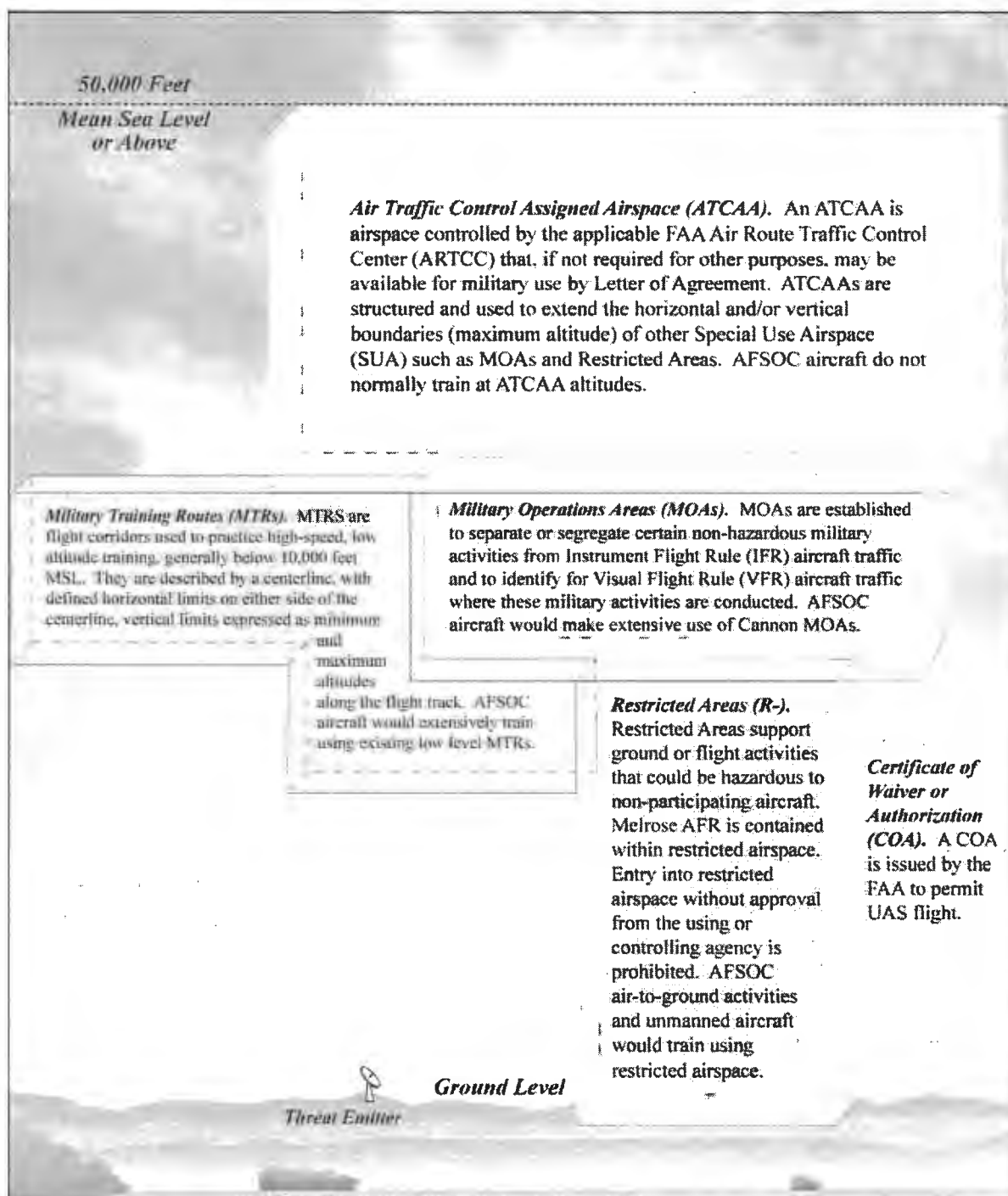


FIGURE 2.3-1. TYPES OF TRAINING AIRSPACE

Figure 1.1-2 presents the existing airspace scheduled by Cannon AFB. This airspace includes the Pecos MOAs, the Mt. Dora MOA, the Taiban MOA, and the Bronco MOA. The Taiban and Pecos MOAs are often used in conjunction with Melrose AFR. The Pecos MOAs are divided into a north and south segment, with each segment having a high and low component. In general, these MOAs abut each other horizontally and vertically, essentially forming one contiguous block of airspace. The exception to this is the Pecos South High MOA, which extends to the south beyond the southern border of the Pecos South Low MOA. This structuring of the MOA airspace, in effect, created a "shelf" of MOA airspace extending to the south of the southern border of the Pecos South Low MOA that begins at 11,000 feet MSL.

The Taiban MOA is situated along the northeastern edge of the Pecos MOAs. This MOA effectively extends the Pecos North Low MOA and a portion of the Pecos South Low MOA eastward to the Restricted Airspace, which supports operations on Melrose AFR. These MOAs are scheduled by staff at Cannon AFB; airspace utilization is under the control of the Albuquerque ARTCC.

A COA is issued by FAA to permit a special use of a defined airspace for a specified period of time. The Predator aircraft based at Cannon AFB would need a COA to traverse the corridor between Cannon AFB and R-5104 and R-5105 associated with Melrose AFR. The Mt. Dora MOA is located north of Cannon AFB and has not been extensively used by Cannon AFB F-16 aircraft because of its distance from the base. As noted by participants at scoping meetings, the F-111s previously based at Cannon AFB used the Mt. Dora MOA. AFSOC C-130 and CV-22 aircraft can access and train in the Mt. Dora MOA. There is no proposed ground activity under the Mt. Dora MOA as part of this EIS.

Representative SOF Mission for which Personnel Need Refueling Training.

Midair refueling CV-22 or C-130.



The Bronco MOA is south of Cannon AFB and has been used for F-16 air-to-air training. AFSOC would train in the Bronco MOA. There is no proposed ground activity under the Bronco MOA as part of this EIS.

AFSOC aircraft would utilize the existing airspace for a variety of training missions. Table 2.3-1 briefly describes AFSOC training missions.

Table 2.3-1 includes two AR cases. Different AFSOC C-130 aircraft have air-to-air refueling capability from KC-135 and KC-10 aircraft. AFSOC C-130s can also refuel CV-22s, CSAR helicopters, and some U.S. Army Special Operations helicopters. AR can be accomplished by both the tanker aircraft and the refueling aircraft flying an orbit pattern such as the existing AR-602 refueling track on Figure 1.1-2. The existing refueling tracks for F-16 aircraft are too high an altitude for AFSOC aircraft. AFSOC will coordinate with appropriate agencies to lower the altitudes of existing tracks and/or designate other refueling tracks. The CV-22 is a new weapon system and operational capabilities and requirements for refueling are currently under development. Proposed C-130/CV-22 AR tracks would be established in conjunction with FAA when operational capabilities are refined. Civil aviation would be notified of the location, altitudes, and time of use. An FAA modification to MTR use to document AR tracks would be requested for AFSOC training.

**TABLE 2.3-1. TRAINING ACTIVITY DESCRIPTION
(PAGE 1 OF 2)**

<i>Training Activity</i>	<i>Description</i>
Live Fire (aircraft)	Identify and engage targets with one or more available aircraft weapons in addition to weapons currently authorized on Melrose AFR. Table 2.2-3 includes AFSOC ordnance. These activities would occur within the restricted airspace of Melrose AFR.
Live Fire (ground)	Identify and engage targets with one or more man-portable weapons. Personnel may approach the target(s) by foot or vehicle and would normally be executing a tactical scenario that culminates in a live-fire activity. AFSOC man-portable weapons are included in Table 2.2-4. Other weapons would be used on the Melrose AFR in addition to those currently authorized. Training would take place on the approved small arms firing ranges at Melrose AFR.
Low Level Navigation Training	Four- to five-hour flights consist of both day and night activities (50 percent environmental night) with altitudes being between 100 feet AGL and 1,000 feet AGL (75 percent in the 500 feet AGL range) and airspeeds between 100 and 250 knots. These flights normally consist of flying to an objective (simulated or real) and then departing the objective area to recover back to base. Simulated or real objectives can consist of LZs, DZs, or target areas.
Air Drops (land)	Air drops normally consist of personnel and equipment exiting the aircraft from approximately 250 to 1,000 feet AGL on a DZ that is either owned or leased by the federal government. High-altitude drops would occur at 12,000 feet AGL. These DZs are normally 2,300 yards long by 800 yards wide or smaller and can be identified to the aircraft by visual or electronic means. These DZs would be manned with logistic support prior to a drop occurring. Medical and safety support personnel would be available at the site. All items that exit the aircraft would be recovered and transported back to the nearest military installation.
Air Drops (water)	Air drops over water normally consist of personnel and equipment exiting the aircraft from approximately 1,000 to 3,500 feet AGL and landing in a large body of water. These water DZs would be manned prior to executing the drop and all items that exit the aircraft would be recovered as quickly as possible and transported back to the nearest military installation. Water drops would have at least one safety boat on the DZ in time to survey the area for hazards. If any non-participating vessels were located within the DZ, the safety boat would ask them to exit the area. The drop would not take place if the area could not be safely secured.
Vertical Landings (tactical)	Vertical landings would normally be executed to a 320 by 160-foot clearing located on government-leased or owned land. These landings would be day or night. Activities can include offloading and on-loading of personnel and equipment. Normally the aircraft would spend very little time on the ground and would attempt to exit the area as quickly as possible. There are times when training requires the aircraft to stay in the area for extended periods while accomplishing required training. Multiple aircraft executing simultaneous landings could occur at DZs.

TABLE 2.3-1. TRAINING ACTIVITY DESCRIPTION
(PAGE 2 OF 2)

<i>Training Activity</i>	<i>Description</i>
Fixed Wing Landings (tactical)	Most AFSOC aviators require training in NVG landings. C-130 crewmembers accomplish this training by landing on improved (paved) runways without the aid of airfield or aircraft lighting. These fields are no less than 3,500 feet long, 60 feet wide, and capable of supporting C-130 type aircraft. These events can take place on military or non-military airfields. Some events would only consist of landings and departures while others may consist of offloading and on-loading personnel and equipment. The military must formally request permission to accomplish this training at non-military fields from the owner/operator of that facility.
Chaff and Flares	Expending chaff and/or flares is achieved in conjunction with ground/aircraft radar while performing evasive maneuvers. These events would take place in approved MOAs or in Restricted Airspace. The minimum MOA altitude identified for flare use under less than very high fire danger is 2,000 feet AGL. Most AFSOC aircraft require this training event.
Strategic Aerial Refueling (high altitude)	Most AFSOC aircraft have the capability to refuel while airborne. AR training would be accomplished nightly in one of the local MOAs between KC-135/KC-10 aircraft and AFSOC C-130s and CV-22s. These refueling events would normally take place between 9,000 and 14,000 feet MSL and would take several hours as different C-130s and CV-22s cycle to the tanker. CV-22s would also practice AR in this same environment as they rendezvous with AFSOC's C-130 aerial tanker fleet. Both types of refueling would be accomplished at approximately 200 knots.
Tactical Aerial Refueling (low altitude)	AFSOC has a fleet of C-130s that have the ability to extend an AR basket behind the aircraft while allowing modified helicopters and CV-22s to receive fuel. This procedure would normally occur at 1,000 feet AGL or higher at 100 to 210 knots and could occur on designated refueling tracks. An FAA modification to MTR use to document AR tracks would be requested for AFSOC training.
Self-Contained Underwater Breathing Apparatus (SCUBA) Operations	SCUBA operations would take place in local lakes to allow AFSOC personnel to stay proficient in these tactical skills. During operations, there would be several safety boats on site to ensure training events take place as planned and to provide a buffer between divers and civilian observers. The Blue Hole is the regional location that provides adequate conditions for direct certification.
Forward Area Refueling Point	Fuel is transferred from tanker aircraft (C-130 or C-17) to a receiver aircraft (C-130, H-60, H-53, H-47, and H-6) via a Forward Area Manifold (FAM) cart and other specialized refueling equipment. Fuel is transferred from the tanker's internal tanks to a maximum of three simultaneous receivers.
Airborne Intercepts	C-130s would fly against fighter-type aircraft to simulate an airborne threat engagement. Airborne Intercepts between C-130s and fighters would be flown inside the MOA.

Table 2.3-2 presents proposed sortie operations for AFSOC aircraft within MTRs and MOAs. Sortie-operations on these MTRs and within the MOAs could include, from Table 2.3-1, low-level navigation training, flying a route to simulate airdrops, flying to meet refueling aircraft, and other missions.

Currently there are several noise avoidance areas under the MOAs and MTRs scheduled by Cannon AFB. AFSOC airspace schedulers would identify these avoidance areas, assess the applicability and use by AFSOC, and mitigate noise impacts by adopting noise-sensitive avoidance areas.

2.3.2 AFSOC USE OF CHAFF AND FLARES IN CANNON MANAGED AIRSPACE

Military aircraft are currently authorized to use chaff and defensive flares in Restricted Areas (R-5104, R-5105), Taiban MOA, Sumner ATCAA, and in the Pecos MOA/ATCAA. Flares are authorized for use in the MOAs and ATCAAs above 2,000 feet AGL under conditions not designated at, or above, high fire risk. When conditions are designated at or above high fire conditions, the minimum flare altitude for MOAs is 5,000 feet AGL. Chaff is also authorized in the northern portion of VRs-100/125. The NMANG will continue to use chaff and flares in the previously approved, existing airspace. RR-188 chaff and M-206 flares (or equivalent) are the only defensive countermeasures assessed for airspace outside R-5104 or R-5105.

AFSOC pilots use chaff and flares as self-protection measures against radar-directed anti-aircraft artillery and radar-guided and heat-seeking missiles. When aircrews detect threats from these systems, they must respond instantly and instinctively using appropriate countermeasures. The inability of aircrews to actually use these countermeasures in training results in the loss of critical response habit patterns. The instinctive nature of these habit patterns often determines an aircrew's survivability in a hostile environment. The following discussion provides information characterizing military training chaff and flares that would be used under the Proposed Action. Figure 2.3-2 depicts the life cycle and processes upon release of chaff and flares.

An annual total of 60,770 chaff bundles and 40,286 flares are assessed for F-16 and transient training throughout the permitted airspace. Table 2.3-3 presents the current and proposed chaff and flare usage with the proposed AFSOC beddown.

Chaff. Modern training chaff (known as "angel hair" chaff) consists of bundles of extremely small strands of aluminum-coated silica fibers that are designed to reflect radio waves from a radar set. Chaff is made as small and light as possible so that it will remain in the air long enough to confuse enemy radar. Individual chaff fibers are approximately the thickness of a very fine human hair and range in length from 0.3 inch to 1.0 inch (0.76 centimeters to 2.5 centimeters). The length of the chaff determines the frequency range of the radio wave most effectively reflected by that particular fiber. Chaff fibers are cut to varying lengths in order to make it effective against the wide range of enemy radar systems that may be encountered. Chaff used in the Cannon airspace is typically training chaff and may include RR-188 chaff or other versions of training chaff depending on the user. This specific chaff contains fibers cut to lengths that will not interfere with radars operated by the FAA for Air Traffic Control (ATC) throughout the National Airspace System.

TABLE 2.3-2. PROPOSED ANNUAL AIRCRAFT SORTIE-OPERATIONS FOR MTRs AND MOAs

	AC-130H		MC-130H		MC-130P		CV-22		C-47		UH-1		NSA		MC-130W		TRANSIENT	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
MTRs																		
VR-100	0	0	154	102	154	102	307	205	0	0	0	0	60	40	154	102	60	0
VR-108	0	0	154	102	154	102	307	205	0	0	0	0	60	40	154	102	19	0
VR-114	0	0	154	102	154	102	307	205	0	0	0	0	60	40	154	102	37	0
VR-125	0	0	154	102	154	102	307	205	0	0	0	0	60	40	154	102	18	0
IR-107	0	0	154	102	154	102	307	205	0	0	0	0	0	0	154	102	6	0
IR-109	0	0	154	102	154	102	307	205	0	0	0	0	0	0	154	102	19	0
IR-111	0	0	154	102	154	102	307	205	0	0	0	0	0	0	154	102	11	0
IR-113	0	0	30	20	30	20	30	20	0	0	0	0	0	0	13	37	25	0
MOAs																		
Mt. Dora	207	112	507	273	507	273	0	0	0	0	0	0	0	0	507	273	356	10
Pecos	811	437	507	273	507	273	1,008	543	148	80	130	70	130	70	507	273	606	200
Taiban	811	437	507	273	507	273	813	438	148	80	107	57	593	319	507	273	1,170	300
Bronco	169	91	169	91	169	91	0	0	0	0	0	0	0	0	169	91	150	85

Note: Day is considered as 7:00 a.m. to 10:00 p.m. and night is 10:00 p.m. to 7:00 a.m.

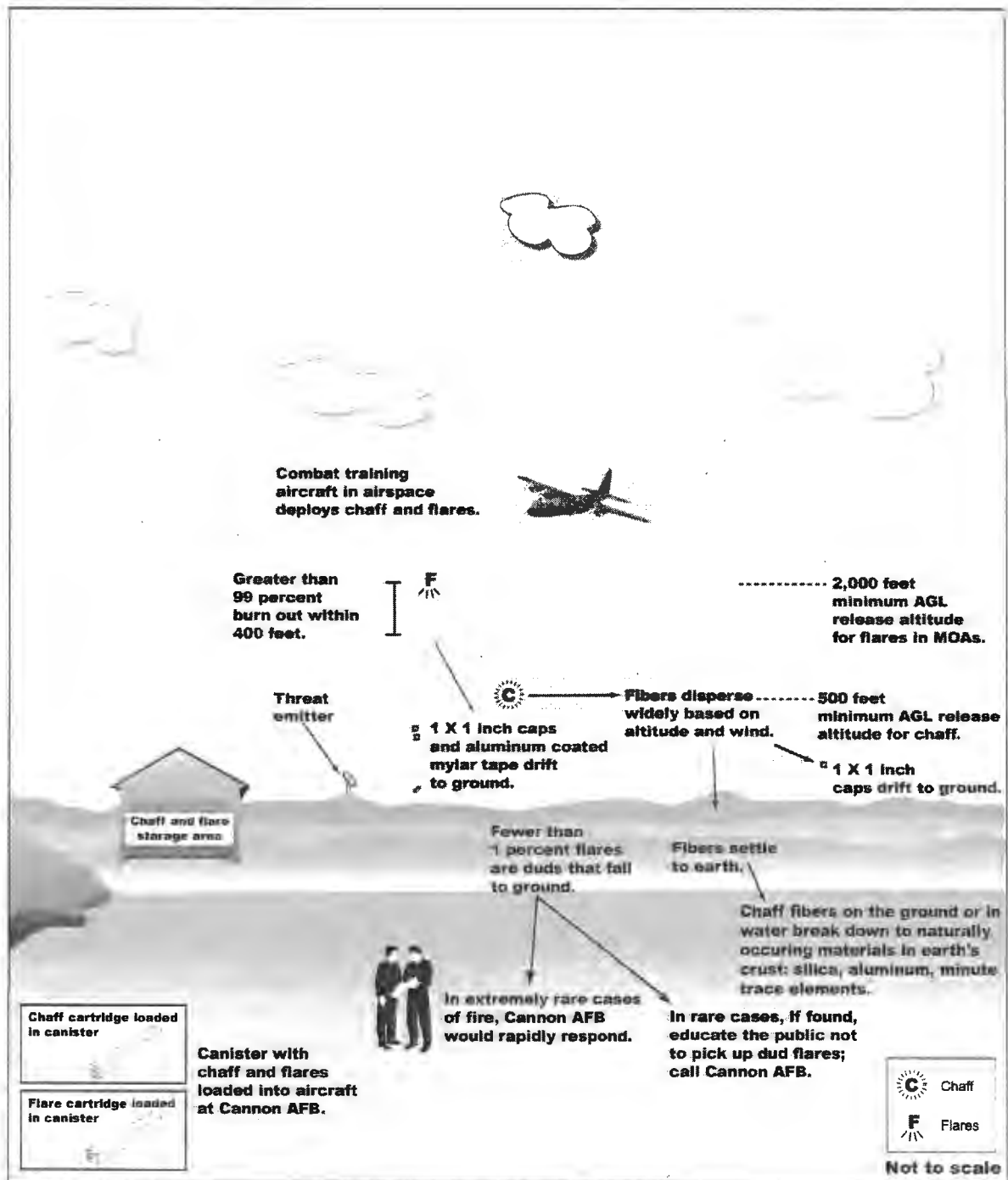


FIGURE 2.3-2. LIFE CYCLE OF DISPENSING CHAFF AND FLARE

TABLE 2.3-3. CURRENT AND PROPOSED CHAFF AND FLARE USAGE

<i>Airspace</i>	<i>Current Chaff</i>	<i>Proposed Chaff</i>	<i>Current Flares</i>	<i>Proposed Flares</i>
Mt. Dora MOA	0	0	0	0
Pecos MOA	20,484	10,000	15,100	9,000
Bronco MOA	0	0	0	0
Taiban MOA	20,483	6,000	15,099	5,000
Restricted (R-5104/5105)	3,762	18,000	2,031	10,000
VR-100/125	3,888	2,000	0	0
Totals	48,617	36,000	32,230	24,000

About 5 million chaff strands are dispensed in each bundle of chaff. When released from an aircraft, chaff initially forms an "electronic cloud" that disperses widely in the air. Dispersed chaff effectively reflects radar signals and forms an image on a radar screen. If the pilot quickly maneuvers the aircraft while momentarily obscured or "masked" from precise radar detection by the electronic cloud, the aircraft can avoid the threat. When multiple chaff bundles are ejected, each forms a similar cloud that further confuses radar-guided weapons. Chaff itself is not explosive; however, it is ejected from the aircraft pyrotechnically using a small explosive charge that is part of the ejection system. The chaff dispenser remains in the aircraft. Two 1-inch square by 1/8-inch thick pieces of plastic and a felt spacer are ejected with the chaff. On rare occasions, the chaff may not wholly separate and may fall to earth as a clump. For more detailed information on chaff, please refer to Appendix A.

Flares. M-206 (or equivalent) defensive training flares are the only flares assessed for use outside of the restricted airspace associated with Melrose AFR. M-206 flares are magnesium pellets that, when ignited, burn for a short period (3.5 to 5 seconds) at approximately 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the exhaust of an aircraft engine and therefore attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. The flares are wrapped with aluminum filament reinforced tape and inserted into an aluminum case closed with a felt spacer and a plastic end cap. The top of the case has a pyrotechnic impulse cartridge that is activated electrically to produce hot gases that push one 1-inch square by 1/4-inch thick cap and the flare material out of the flare dispenser mounted in the aircraft. The flare ignites as it is ejected from the dispenser. Two approximately 1-inch square by 1/4-inch thick nylon or plastic pieces and an up to 2-inch by 13-inch piece of aluminum wrapped Mylar (similar to dry, aluminum-coated duct tape) fall to the earth with each flare. On extremely rare occasions, a flare may not ignite and could fall to the earth as a dud flare. For more detailed information on flares, refer to Appendix B.

Use of training flares where approved within Cannon AFB-managed airspace incorporates the following management practices:

- The minimum altitude for flare release in special use airspace is 2,000 feet AGL (flares burn out after falling approximately 400 feet).
- When the National Fire Danger Rating System indicates high fire conditions or above, the minimum altitude for flare release would be raised to above 5,000 feet AGL.

- The Air Force will maintain a record of chaff and flare usage within the training airspace.
- The Air Force will establish and maintain a method whereby chaff or flare materials found on private property can be identified for safety risk and removed to ensure safety.
- Cooperation will occur with local agencies for mutual aid response to fires.
- Continue an education program for fire departments beneath the airspace to include information on flares.

2.3.3 PROPOSED AIRSPACE ENHANCEMENTS AND USE

Cannon AFB scheduled airspace meets the training needs of AFSOC training with one exception. Training with UAS currently can only be performed in restricted airspace. A COA by the FAA would be requested for UAS aircraft based at Cannon AFB to transit between Cannon AFB and the restricted airspace over the Melrose AFR. Predator aircraft could launch from Cannon AFB, be under visual or satellite control between Cannon AFB and Melrose AFR, and train in Restricted Airspace associated with Melrose AFR. A COA between the Air Force and FAA could permit Predator flights between Cannon AFB and the Restricted Airspace associated with Melrose AFR.

THE SCOPING BRIEFING DESCRIBED AFSOC'S PREDATOR UAS MISSION CURRENTLY BEING FULFILLED AT CREECH AFB IN NEVADA AND EXPLAINED THAT IT COULD BE BENEFICIAL TO INCLUDE THAT MISSION AT CANNON AFB. A UAS CORRIDOR AT A SPECIFIC ALTITUDE COULD CONNECT CANNON AFB WITH THE RESTRICTED AIRSPACE ASSOCIATED WITH MELROSE AFR.

Existing ARs are at higher altitudes than those needed for AFSOC aircraft. AFSOC controllers would work with the FAA to identify refueling locations. Figure 2.3-3 presents such an AR track where AFSOC aircraft could refuel.

2.3.4 ADDITIONAL TRAINING OUTSIDE CANNON AFB AND MELROSE AFR

Section 1.1.2 explains that the mission of AFSOC includes precision application of firepower, which would occur at Melrose AFR (see Section 2.2.1). In addition, AFSOC SOF has missions that include infiltration, exfiltration, resupply, and refueling. Search and rescue of SOF personnel is also part of AFSOC's role. Table 2.3-1 describes the training activity required to be proficient for these SOF and other missions.

Those training activities include LZ, DZ, and water training as well as recovering airdrop loads, personnel, and equipment. Section 2.2.6.1 describes the LZ/DZ training that could occur at a location within Melrose AFR. An estimated 200 LZ/DZ training events per month could be required to ensure combat proficiency.

Amphibious infiltration training could involve a variety of types of dives ranging from compass dives to amphibious operations to underwater search and recovery. These training events could occur during any weather conditions as AFSOC personnel could be called on to perform anywhere, anytime. Some amphibious training that involves open water would occur when personnel are on assignment to locations other than Cannon AFB. In addition, the Cannon base pool could support some level of proficiency and emergency procedure training.

AFSOC MISSIONS DESCRIBED DURING SCOPING INCLUDED AIR DROPS, INSERTIONS, AND EXTRACTATIONS. LZs, DZs, OR WATER AREAS FOR TRAINING COULD BE ON THE RANGE OR AT LOCATIONS WITH ESTABLISHED AGREEMENTS SUCH AS WITH RANCHERS, AT STATE OR COMMUNITY MANAGED LOCATIONS, AND/OR ON AN EXISTING AIRFIELD SUCH AS FT. SUMNER OR CLOVIS MUNICIPAL AIRPORTS.

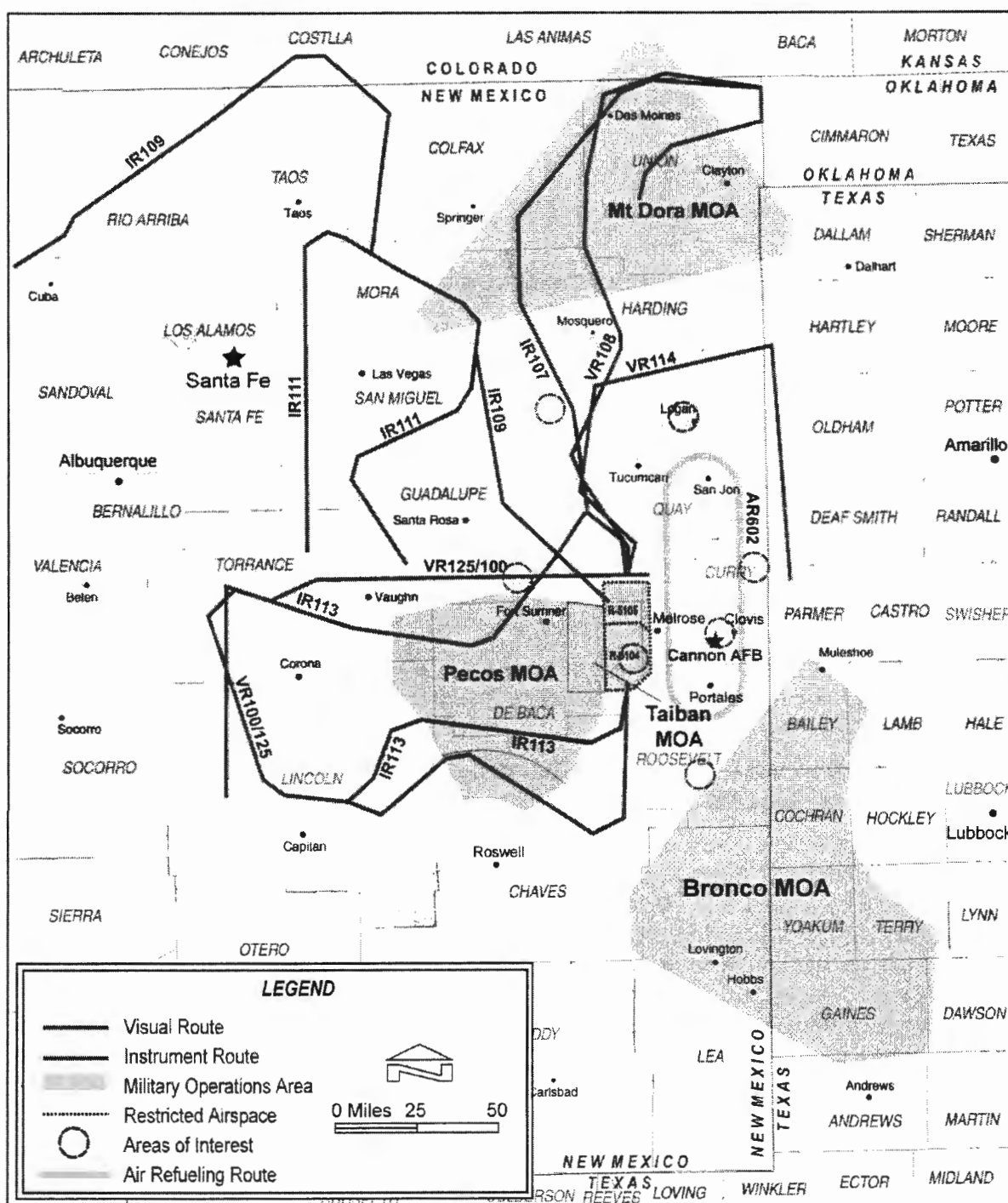


FIGURE 2.3-3. LZ, DZ, and Water Training Areas of Interest

Comprehensive, real life LZ, DZ, and water training would require realistic settings and different locations to test SOF personnel skills. AFSOC proposes to utilize lakes in the local area for water operations. Activities could include personnel and equipment airdrop, scuba, and boat operations.

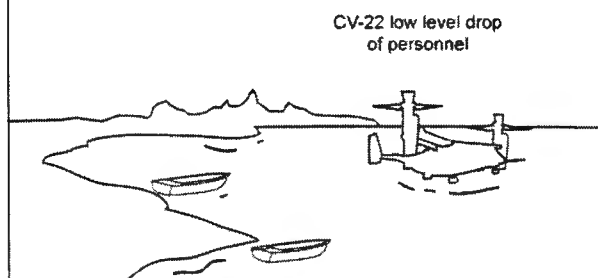
Four lakes within 100 miles of Cannon AFB have the potential to support water training. These are Sumner Lake, Ute Lake, Conchas Lake, and Santa Rosa Lake. Training at lake water bodies would involve personnel and boats accessing the site prior to the drop for safety of personnel and/or later retrieval of dropped personnel and equipment. Activities would occur during the mission itself and during recovery of personnel and materials for transport back to Cannon AFB. Support vehicles (light trucks, vans) and support boats would use existing infrastructure including roads, parking areas, and launch ramps. Coordination with agencies responsible for lakes would be necessary to obtain access to lakes for training. Revisions to lake policies may be needed to permit low-flying aircraft or landing CV-22 aircraft at an LZ agreed to by lake managers.

Typically there would be four to five monthly training events in a given lake during spring to fall, water levels and weather permitting. Prior to the event, two boats with safety personnel would be launched from existing ramps. A typical event would last four to five hours. Either a C-130 or a CV-22 aircraft would fly over several times, and there could be three to five drops with 7 to 10 Special Operations personnel dropped into the lake with each drop. These events could be during day or night, but when they are at night they would generally avoid lights from campers and homes along the shore. For safety and operational realism, drops would be toward the middle of the water, away from shorelines and trees. After the drop, the Special Operations personnel would move to shore in a dark area of the lake and proceed covertly on foot to the objective. Either a vehicle or a CV-22 would use existing access or a designated LZ to pick up personnel and complete the mission. Where a CV-22 would land and where the Special Operations personnel come ashore would be surveyed at each lake similar to the survey for the other LZ/DZ locations. Such surveys would be performed sometime over the next 3 years before any CV-22s are assigned to Cannon. Preparation of separate environmental analysis, tiered from this EIS, would be expected for each LZ/DZ site. This analysis would be completed once developmental CV-22 operational capabilities and requirements for LZs/DZs are refined.

There is also a need for approximately four LZs/DZs in the vicinity of Cannon AFB to accommodate MC-130 and CV-22 training. Figure 2.3-3 identifies general areas of interest for LZ, DZ, or water training. LZ, DZ, or water training areas outside of Cannon AFB or Melrose AFR boundaries cannot be determined prior to a decision to beddown AFSOC assets at Cannon AFB. These locations are subject to review by Air Force real property personnel and required property ownership and environmental conditions must be evaluated before a state, federal, or private property could be used, or otherwise agreed to, or leased (in the case of an LZ or DZ) for off-base or off-range training.

**Representative SOF Mission for which
Personnel Need Water Training.**

CV-22 and low level drop of personnel and AFSOC boats
deployed by vehicle to lake for safety of personnel.



LZ, DZ, or water training sites require the following operational, safety, and environmental considerations:

- The site should be located in an area free from obstructions such as towers, wires, wind machines, or underground utilities such as oil or gas pipelines that could make aircraft or ground operations hazardous.
- The site should be within an approximate two-hour drive from Cannon AFB and have good vehicular access to support training, recover air drop loads, recover personnel and equipment, and support safety oriented activities.
- Training operations, to the extent possible, should avoid residential buildings with a buffer of approximately 1,000 feet.
- Open, relatively flat areas remote from city lights are desirable for specific training missions.
- Training operations should avoid, to the extent possible, populated areas, ranches, or other noise-sensitive areas.

Training areas of interest would be identified and compared with the siting criteria listed above to determine the feasibility of the site. Any site would be subject to a subsequent evaluation of potential environmental concerns as well as a field evaluation of environmental conditions at the site. State Historic Preservation Office (SHPO) and natural resources agencies would be consulted, as appropriate, in the final determination of LZ, DZ, and water training locations. All applicable environmental impact analysis and permitting processes would be followed.

2.3.5 NO ACTION ALTERNATIVE WITHIN THE NEW MEXICO AIRSPACE

Section 1502.14(d) of CEQ implementing regulations requires an EIS to analyze the No Action Alternative. Analysis of the No Action Alternative provides a benchmark and enables decision-makers to compare the magnitude of the environmental effects of the proposal. No Action for this EIS means that Cannon AFB becomes an AFSOC installation, but no beddown of AFSOC assets would occur within New Mexico airspace at this time. NMANG and transient aircraft using the Cannon managed airspace would continue to conduct training within the airspace and on Melrose AFR.

2.4 IDENTIFICATION OF ALTERNATIVES

2.4.1 REVIEW OF ALTERNATIVE AFSOC MISSIONS AT CANNON AFB

The BRAC Commission received and considered a May 2005 recommendation from the Secretary of Defense (SECDEF) to close Cannon AFB. Subsequently, a final report (September 2005) from the Commission to the President recommended Cannon AFB remain open as an enclave until at least 31 December 2009 and that the 27 FW be disestablished. In the interim, the SECDEF was to seek other missions for Cannon AFB and if no such mission were found Cannon AFB would close by December 2009. As a result of this search, the SECDEF designated AFSOC as the new mission for Cannon AFB. This designation provides the basis for the proposed AFSOC beddown as well as opportunities for training and assumption of management responsibilities for Melrose AFR, and associated airspace.

2.4.2 CONSIDERATION OF ALTERNATIVES

Recognized Cannon AFB assets included little encroachment upon the base, an associated military range for training, extensive airspace for training personnel, and an environment with some characteristics similar to areas of current and potential continuing conflict.

With BRAC, there are relatively few growing Air Force commands with a need for expanded facilities. AFSOC, however, is one such growing command. The experiences with recent devastating Gulf hurricanes points to a need for an additional location for AFSOC assets and a more arid training location than Hurlburt/Eglin in Florida to simulate real-world combat threats. The growing mission requirements for AFSOC, combined with BRAC-directed actions at the AFSOC currently-used Eglin Range, make identification of a second location critical.

Without a back-up operating base, AFSOC aircraft and units would have to split up for months if Hurlburt were devastated by a hurricane. Combat capability would suffer and so would AFSOC's ability to support the War on Terror. Beddown of substantial additional AFSOC assets at Hurlburt Field was not considered a reasonable alternative for operational reasons.

Cannon AFB availability and its associated assets mesh perfectly with the AFSOC requirements. Which AFSOC assets to locate at Cannon AFB was the next question. AFSOC assets are interdependent. AC-130 gunships and low-level flying aircraft like the MC-130 and SOF ground forces depend upon the extraction capabilities of the CV-22. Predators supply battlefield information in support of all aspects of the missions. Operations in host countries utilize a variety of international common aircraft and both urban and rural locations.

The interdependence of AFSOC assets makes replication of the mission capabilities at Hurlburt Field the most efficient asset mix for Cannon AFB. The types of aircraft, personnel, and training missions proposed for Cannon AFB and Melrose AFB create a second AFSOC capability to both meet growing defense requirements and provide a location where a catastrophic storm would not neutralize AFSOC capabilities. Cannon AFB was designated as the best location for AFSOC assets.

2.5 ENVIRONMENTAL IMPACT ANALYSIS PROCESS PUBLIC PARTICIPATION

This Final EIS has been prepared in accordance with NEPA (42 United States Code [USC] 4321-4347), CEQ (40 CFR § 1500-1508), and 32 CFR Part 989, *et seq.*, *Environmental Impact Analysis Process* (formerly known as Air Force Instruction [AFI] 32-7061). NEPA is the basic national requirement for identifying environmental consequences of federal decisions. NEPA ensures that environmental information is available to the public, agencies, and the decisionmaker before decisions are made and before actions are taken.

An EIS is prepared as a tool for compiling information about a proposal and providing a full and fair discussion of potential environmental impacts to the natural and human environment. The Air Force analyzes alternatives to ensure that fully informed decisions are made after review of the comprehensive, multidisciplinary analysis of potential environmental consequences. The Air Force actively solicited comments during the EIS scoping period (August 25,



OPPORTUNITIES FOR PUBLIC INPUT INCLUDE SCOPING MEETINGS AND PUBLIC HEARINGS.

2006 through October 5, 2006) through press releases, newspaper advertisements, public service announcements, and letters to the public, local governments, federal and state agencies, Native Americans, and pilot associations.

On March 30, 2007, the Air Force issued a Notice of Availability (NOA) for the Draft EIS. The NOA began the 45-day public comment period of the document. The Air Force actively solicited comments during this review period (March 30, 2007 through May 14, 2007) through press releases, newspaper advertisements, public service announcements, postcards, flyers, and letters to the public, local governments, federal and state agencies, Native Americans, and pilot associations.

Public hearings were held in New Mexico to present the Draft EIS, environmental analysis, and opportunities for public and agency involvement (refer to Table 2.5-1). A total of 131 members of the public and agency representatives attended the three public hearings. At the hearings, 19 members of the public provided oral comments and 11 people provided written comments. Eighteen additional comments were received during the comment period. These comments, the transcripts of the public meeting, and responses to comments are contained in Chapter 7.0 of this Final EIS. Also included in Chapter 7.0 is a description of the process used to review and incorporate public comments into the Final EIS. A Privacy Advisory was provided to commenters on the public meeting information brochure, written comment forms, speaker registration cards, as well as the briefing given in the public meetings. The Privacy Advisory provided on the internal title page of the Draft EIS is included in Appendix C. A summary of scoping participation and responses to public and agency comments to help focus the Draft EIS are contained in Appendix C.

TABLE 2.5-1. AFSOC PUBLIC HEARINGS CONDUCTED DURING APRIL 2007

<i>Date</i>	<i>Time</i>	<i>Location</i>	<i>Address</i>
April 17, 2007, Tuesday	6:00 – 8:00 p.m.	Clovis, New Mexico	Clovis Community College 417 Schepps Blvd.
April 18, 2007, Wednesday	6:00 – 8:00 p.m.	Fort Sumner, New Mexico	Fort Sumner Community House, 137 East Baker Avenue
April 19, 2007, Thursday	6:00 – 8:00 p.m.	Clayton, New Mexico	Clayton High School, 323 South Fifth Street

2.6 REGULATORY COMPLIANCE

This EIS has been prepared to satisfy the requirements of the NEPA (42 USC 4321 *et seq.*), and its implementing regulations.

This analysis of environmental resources considered all applicable federal, state, and local regulations. Certain areas of federal legislation, such as the Endangered Species Act (ESA) and National Historic Preservation Act (NHPA), include direct contact with agencies. Other state and federal regulations used for guidance in this analysis are presented in Appendix D.

Implementation of an alternative would involve coordination with several agencies. Compliance with the ESA involves consultation with the Department of the Interior (delegated to the U.S. Fish and Wildlife Service [USFWS]) in cases where a federal action could affect listed threatened or endangered species, species proposed for listing, or candidates for listing. The

primary focus of this consultation is to request information on whether any of these species occur in the region of influence of the Proposed Action or an alternative. If any of these species are present, a determination of the potentially adverse effects on the species is made. Should no species protected by the ESA be affected by the Proposed Action or an alternative, no additional action is required. A letter was sent to the appropriate USFWS office as well as New Mexico Department of Game and Fish (NMDGF), informing them of the Proposed Action and alternatives and requesting information on protected species (Appendix C).

The preservation of cultural resources falls under the purview of SHPO, as mandated by the NHPA and its implementing regulations. A letter was sent to the New Mexico SHPO and the Mescalero Apache, Jicarilla Apache, and Comanche tribes informing them of the proposal to beddown and train AFSOC assets (Appendix C).

2.6.1 PERMIT REQUIREMENTS

This EIS has been prepared in compliance with NEPA; other federal statutes, such as the Clean Air Act (CAA) and the Clean Water Act (CWA); Executive Orders (EOs); and applicable state statutes and regulations. A list of Cannon AFB permits and certifications was compiled and reviewed during the EIS process. Table 2.6-1 summarizes these applicable federal, state, and local permits and the potential for change to the permits due to implementing the proposed beddown or an alternative. No new compliance permits are expected to be required as a result of this action. As noted in Section 2.3.4, coordination with lake managers would be required for water training.

TABLE 2.6-1. ENVIRONMENTAL-RELATED PERMITTING

<i>Permit</i>	<i>Resource</i>	<i>Proposed Action</i>
Air Quality Synthetic Minor Permit	Air	New construction may require modifications to existing air quality permit.
Cannon AFB National Pollutant Discharge Elimination System (NPDES) Storm Water	Storm Water	There are no jurisdictional waters of the U.S. located on Cannon AFB or Melrose AFR; therefore, there is no requirement to obtain a storm water construction NPDES permit for any construction activity.

2.7 ENVIRONMENTAL COMPARISON OF ALTERNATIVES

2.7.1 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 2.7-1 presents the summary of environmental consequences for the West Flightline Alternative, the Air Force preferred East and West Airfield Alternative, and the No Action Alternative for Cannon AFB. Table 2.7-2 presents the summary of environmental consequences for the Air Force preferred Two-Target Alternative, Three-Target Alternative, and the No Action Alternative for Melrose AFR. Table 2.7-3 presents the summary of environmental consequences for the Proposed Training and No Action Alternative for the Cannon AFB-managed airspace.

**TABLE 2.7-1. CANNON AFB SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 1 OF 3)**

<i>Resource, EIS Section</i>	<i>West Flightline Alternative</i>	<i>East and West Airfield Preferred Alternative</i>	<i>No Action Alternative</i>
Airspace Management and Air Traffic Control, EIS Section 3.1	Airspace management and control procedures would be adjusted to include AFSOC mission requirements. Airfield operations would be reduced by approximately 40 percent annually.	Same as West Flightline Alternative.	Aircraft operations at the airfield would be limited transient aircraft and would be substantially below current (27 FW) conditions.
Noise, EIS Section 3.2	Noise levels around the airfield would be reduced in nearly all areas in the vicinity of Cannon AFB.	Approximately the same as West Flightline Alternative with minor changes in engine runup locations.	Noise levels would be substantially lower than current conditions.
Safety, EIS Section 3.3	Flight safety would be affected by the change in aircraft at Cannon AFB. Class A mishap rates for C-130 aircraft are low (1 per 100,000 flight hours). Class A mishap rates for newer aircraft (CV-22) are unknown. The overall AFSOC aircraft Class A mishap rate is expected to be comparable to the F-16 rate of 3.6 per 100,000 flight hours. Aircraft safety, bird aircraft strikes and ground safety conditions should be unchanged. Explosive safety procedures will be developed to address changing munitions needs for Melrose AFR training.	Same as West Flightline Alternative.	Safety provisions would continue as under current conditions. Flight safety issues would be limited to transients.
Air Quality, EIS Section 3.4	Emissions associated with construction would increase ambient air pollutants on a short-term basis. Aircraft emissions are expected to decrease with array of AFSOC aircraft.	Same as West Flightline Alternative	Emissions would be reduced following the departure of the 27 FW.

**TABLE 2.7-1. CANNON AFB SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 2 OF 3)**

<i>Resource, EIS Section</i>	<i>West Flightline Alternative</i>	<i>East and West Airfield Preferred Alternative</i>	<i>No Action Alternative</i>
Physical Resources, EIS Section 3.5	Disturbance of approximately 342 acres should not affect base earth or water resources. Addition of approximately 20 acres of impervious surface may increase stormwater runoff. Hazardous materials and construction debris would be addressed in accordance with all applicable regulations. A waiver would be submitted to the state to construct on or near 6 Environmental Restoration Program sites.	Disturbance of approximately 284 additional acres over West Flightline Alternative. Additional 150 acres of impervious surface. Otherwise, same as West Flightline Alternative.	Physical resources would remain the same as current conditions.
Biological Resources, EIS Section 3.6	Construction would occur in disturbed areas. Aircraft noise levels would change, but wildlife are habituated to the airfield environment.	Same as West Flightline Alternative.	Biological resources would remain the same although noise levels would be reduced.
Cultural Resources, EIS Section 3.7	The construction or renovation projects would not affect National Register of Historic Properties. AFSOC will continue to manage cultural resources in accordance with the 2004 Cultural Resources Management Plan (CRMP).	Same as West Flightline Alternative.	Cultural resources would continue to be managed in accordance with the 2004 CRMP.
Land Use and Transportation, EIS Section 3.8	Construction would be consistent with the updated base plan. Some off-base land uses may be impacted by noise. Traffic volume increases would be accommodated by existing roadways.	Same as West Flightline Alternative.	Land uses would be unchanged from current conditions. Noise levels and traffic volumes would be reduced.

**TABLE 2.7-1. CANNON AFB SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 3 OF 3)**

<i>Resource, EIS Section</i>	<i>West Flightline Alternative</i>	<i>East and West Airfield Preferred Alternative</i>	<i>No Action Alternative</i>
Socioeconomics, EIS Section 3.9	Dependent upon Congressional appropriations, direct and secondary employment is projected to drop for a year, peak at 13,533 in 2011, and stabilize at 8,724 in 2014. Approximately 5,000 housing units and education capabilities for 2,253 students would be needed for Curry and Roosevelt counties.	Same as West Flightline Alternative.	Substantial socioeconomic downturn upon the overall economy of Curry and Roosevelt counties.
Environmental Justice, EIS Section 3.10	No disproportionate affect to minority or low-income populations. Regional economic stimulation may be beneficial. Classroom crowding may occur.	Same as West Flightline Alternative.	Substantial economic effect may affect minority, low-income populations.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 1 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Airspace Management, EIS Section 4.1	Airspace management of Restricted Airspace would remain unchanged from current conditions except for modifying procedures to include AFSOC requirements. Landing zones would be consistent with other Melrose AFR training activities. A proposed COA allowing UAS operation between Cannon AFB with Melrose AFR in airspace other than restricted areas or military Class D airspace would not be expected to affect most general aviation, although some pilots may elect to avoid airspace potentially occupied by a UAS complying with "see and avoid" requirements of Federal Aircraft Regulation 91-113.	Same as Two-Target Alternative.	Aircraft operations would be limited to transient aircraft and would be substantially below current (27 FW) conditions.
Noise, EIS Section 4.2	Under the Two-Target Alternative, noise would increase to a Day-Night Average Sound Level (L_{dn}) of 55 to 58 decibels (dB) under the Restricted Airspace and the Taiban MOA. This would be noticeable and potentially annoying. Domestic or wild animals in areas subject to aircraft operations or impulse noise would be expected to avoid the specific impact area and habituate to noise levels. Penned range cattle have been known to react to jet aircraft low-level overflight. Impulse noise contours of 62 dB CDNL would be nearly	Under the Three-Target Alternative, live munitions use would occur at three locations. Aircraft noise would be approximately the same as the Two-Target Alternative. Impulse noise would be felt over a greater area. The 62 dB CDNL contour would be nearly completely contained within the range. Effects would be as described for the Two-Target Alternative.	The noise environment for Melrose AFR would be reduced due to the removal of the 27 FW F-16 aircraft.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 2 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Noise, EIS Section 4.2 (continued)	completely contained within the range. Impulse noise within 6 miles from the target could produce an off-range sound comparable to strong knocking on a door and a vibration comparable to thunder. Such noises would not be expected to cause damage to a structure or its contents, but when heard and felt, especially during night hours, could cause annoyance to residents within approximately 6 miles of Melrose AFR. Target construction noise is not expected to extend beyond the boundaries of the 60,010-acre range under this alternative. Small arms live-fire could result in annoyance to residents on the periphery of the range.		
Safety, EIS Section 4.3	Exclusive-Use areas would be expanded for safety from 8,800 to 10,600 acres. AFSOC has proposed adoption of continued and expanded fire management practices, including grading of firebreaks, clearing of vegetation around targets, and aggressive reduction of weedy plants, which would improve fire management on Melrose AFR. Designation of additional areas for more buffer area grazing management would be needed to contain weapon safety footprints. AFSOC will prepare a supplement to AFI 13-212 to address the use of live munitions and residues.	Exclusive-Use areas would be expanded for safety from 8,800 to 12,700 acres. Otherwise, same as Two-Target Alternative except more aggressive fire management as this will cover three targets instead of just two.	Safety risks on Melrose AFR would be somewhat reduced due to the deactivation of the 27 FW. Continued use of Melrose AFR by transient aircraft, including the NMANG F-16s, would continue the requirement for existing safety measures on the range.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 3 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Air Quality, EIS Section 4.4	Air emissions under the aircraft and munitions use of the Two-Target Alternative would increase particulates, but not exceed any emission significance thresholds. Melrose AFR. Chaff and flare residue would not be expected to change air quality conditions.	Same as Two-Target Alternative.	No Action Alternative would produce less than significant air quality impacts within and around the Melrose AFR and Taiban MOA project region.
Physical Resources, EIS Section 4.5	The Two-Target Alternative would quadruple the amount of chaff or flare materials currently used over Melrose AFR. However, because chaff rapidly breaks down to the common elements of silica and aluminum no impacts to the soil are expected. Any fire in the arid east New Mexico environment has the potential to detrimentally affect soils, vegetation, and other resources. Improved fire management procedures would serve to protect Melrose AFR and off-range resources from fire caused by munitions or other sources. Surface disturbance from live munitions and fire management could increase wind erosion of soils. The training would increase chemicals from munitions, lead, and other heavy metals and potentially affect soil and water chemistry on the range. HE munitions use on the range could add up to 250 acres needing explosive ordnance disposal (EOD) clearance. Up to an additional 3,200 acres would have increasing lead	Similar to Two-Target Alternative. Munitions, including high-explosive (HE) munitions, would be used on three targets under this alternative. The area needing EOD clearance would increase by up to 750. Potential for HE chemical residuals would increase with three live-fire targets as compared with two live-fire targets. Small arms effects would be comparable to those for the Two-Target Alternative. Chaff and flare materials would be as described for the Two-Target Alternative. Wind erosion effects expected to be greater due to exposure of additional soils areas. No significant impacts would be expected from chaff use. Flares properly deployed would not be expected to increase fire risk. Enhanced fire management programs would apply to all three targets areas to reduce the potential for munitions-caused impacts.	Impacts would be the same as current conditions, with a reduction in overall chaff, flare, and munitions use associated with the deactivation of the 27 FW.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 4 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Physical Resources, EIS Section 4.5 (continued)	munitions from the small arms range. Hazardous materials and chemical residues result from HE munitions would be managed through the Cannon AFB hazardous materials management program. AFSOC will prepare a supplement to AFI 13-212 to address the use of live munitions and residues.		
Biological Resources, EIS Section 4.6	Construction of targets and use of AFSOC aircraft would result in some habitat loss and potentially impact wildlife in the area. Disturbance-related behavioral and ecological changes in wildlife would include changes in home range and abandonment of habitats. These changes will vary with wildlife species group and wildlife species. Long-term effects of aircraft training activities under the Two-Target Alternative would include localized species loss, species displacement, and a modification of ecological community structure at Melrose AFR. No federal or state-listed endangered, or threatened species have been observed at Melrose AFR. Recent monitoring at Melrose AFR revealed the presence of lesser prairie-chickens (federal candidate, New Mexico state sensitive). Surveys are being conducted	Same as Two-Target Alternative except wildlife habitat loss would be greater.	Biological resources on Melrose AFR would be expected to experience less human and training activity than present.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 5 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Biological Resources, EIS Section 4.6 (continued)	and a candidate species plan will be prepared. No critical habitat is present on the range. The increased chaff and flare use over Melrose AFR would not be expected to impact biological systems.		
Cultural Resources, EIS Section 4.7	No National Register of Historic Places (NRHP)-eligible buildings are located on Melrose AFR. Prior to construction of the targets, an archaeological review would be conducted to identify any archaeological sites within areas selected for target construction.	Same as Two-Target Alternative.	Cannon AFB would continue to manage all cultural resources within the range in accordance with the 2004 CRMP.
Land Use and Ranching, EIS Section 4.8	Modification to the existing Melrose AFR land use designations would occur. The Exclusive-Use area would increase in size from 8,800 to 10,600 acres and the Restricted Leased Land would be reduced from 18,710 to 18,600 acres. The Unrestricted Leased Lands would decrease from 32,500 to 30,810 acres. The reduced acreage would not be regionally significant, but could significantly impact grazing or agricultural operations of specific lessees. New impulse noise and vibration effects would not be expected to change general land use patterns, land ownership, or land management, although individuals living within	Same as Two-Target Alternative except the target area would be greater. The exclusive-use impact area would increase in size to 12,700 acres and the Restricted Leased Land would be reduced to 23,300 acres. The Unrestricted Leased Lands would decrease to 24,010 acres. Greater impact upon affected lessees.	Melrose AFR would continue to operate as a training range for military aircraft. Land ownership and the general land use patterns would remain the same.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 6 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Land Use and Ranching, EIS Section 4.8 (continued)	audible range of this noise could be annoyed. Chaff would not be expected to cause a significant impact on land resources or land uses. Improved fire management would reduce the risk to property owners from fires on Melrose AFR.		
Socioeconomics, EIS Section 4.9	Live-fire training would affect the ability to access portions of the range. The Exclusive-Use area would increase and currently Restricted Leased Grazing Lands and Unrestricted Leased Grazing Lands would change. The approximately 2.8 sections of new Exclusive-Use land removed from Restricted or Unrestricted grazing leases could reduce stock grazing by an estimated 45 animal units (AUs). Such a reduction would not significantly affect regional cattle operations, although it could detrimentally affect ranching operations of the affected lessees. The preferred alternative is not expected to significantly impact existing irrigated agricultural on two leases. Residents within a few miles of Melrose AFR would be subject to increased impulse noise from munitions use and increased night overflight by training AFSOC aircraft. These training activities could be considered significant impacts by residents within approximately 6 miles of the Melrose AFR boundary.	Same as Two-Target Alternative except that the rangeland available for grazing would be reduced more than under the Two-Target Alternative. Approximately 6.1 sections of the rangeland removed from Restricted or Unrestricted grazing leases could reduce stock grazing by an estimated 98 AUs. Such a reduction would not significantly affect regional cattle operations, although it could detrimentally affect ranching operations of the affected lessees.	Melrose AFR grazing lease programs would remain as they currently exist. Noise levels and range activities would be reduced as the 27 FW was deactivated.

**TABLE 2.7-2. MELROSE AFR SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 7 OF 7)**

<i>Resource, EIS Section</i>	<i>Two-Target Preferred Alternative</i>	<i>Three-Target Alternative</i>	<i>No Action Alternative</i>
Environmental Justice, EIS Section 4.10	No permanent residents are on the Melrose AFR. Residents under the restricted airspace associated with Melrose AFR or in areas immediately adjacent to the range are representative of the minority, low-income, and youth in adjacent counties. No disproportionate impacts are expected to minority or low-income populations or to children.	Same as Two-Target Alternative.	No impacts on minority or disadvantaged individuals. Some residents within approximately 6 miles of Melrose AFR boundaries would receive less impulse or aircraft noise with no action than with either action alternatives. These individuals are not disproportionately minority or low-income.

**TABLE 2.7-3. TRAINING AIRSPACE SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 1 OF 4)**

<i>Resource, EIS Section</i>	<i>Proposed Training</i>	<i>No Action Alternative</i>
Airspace Management, EIS Section 5.1	Increased annual sortie operations would occur in the MOAs and MTRs. At night, MTR training altitudes would be below those used by general aviation. During daylight, low-altitude general aviation aircraft could be encountered at training altitudes. C-130 and CV-22 aircraft are piloted and would employ see-and-avoid procedures during four- to five-hour daylight and night operations. LZ, DZ, and water training could involve landing at locations not currently used by aircraft; coordination with FAA and land or lake managing agencies would be initiated to identify specific locations. AR would be performed under ATC and would not be expected to affect civil aviation.	Airspace use would be less than current use, but would still include NMANG 150 th Fighter Wing (150 FW) aircraft and transient users.
Noise, EIS Section 5.2	Annual average noise levels would generally be at or below Day-Night Average Sound Level (L_{dn}) 55 dB in Pecos, Taiban, Mt. Dora, and Bronco MOAs. Certain MTR segments would experience noise levels of approximately L_{dn} 49 dB. Some of the MTRs could experience an average of four overflights during environmental night, resulting in some segments experiencing substantial changes from ambient conditions. LZ, DZ, and water training locations would be subjected to increased noise from C-130, CV-22, or other aircraft. Night activity in the Taiban MOA, on MTRs, and at lakes used for training could produce sufficient noise to be perceived as an intrusion and annoyance to residents and recreationists.	Noise levels would be lower than existing conditions since the number of military training sorties would be reduced with the disestablishment of the 27 FW.
Safety, EIS Section 5.3	Aircraft safety is not expected to be measurably different from baseline conditions; AFSOC aircraft (C-130 and CV-22) possess improved situational awareness. Bird-aircraft strike of small night-migrating songbirds could increase with the MTR low-level flights. All national forests, national monuments, and state parks would be avoided by 2,000 feet. No safety consequences are anticipated from continued and reduced chaff and flare use. LZ, DZ, and water training would include safety procedures.	Safety procedures would continue within the military training airspace.

**TABLE 2.7-3. TRAINING AIRSPACE SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 2 OF 4)**

<i>Resource, EIS Section</i>	<i>Proposed Training</i>	<i>No Action Alternative</i>
Air Quality, EIS Section 5.4	Air pollutant emissions associated with the AFSOC training would not have an effect upon ambient air conditions within the MOAs or MTRs.	Emissions associated with military training aircraft would be reduced with the disestablishment of the 27 FW.
Physical Resources, EIS Section 5.5	Overflight activities would not cause disturbances to the ground. DZ and LZ construction would occur on permitted or leased land using Best Management Practices (BMPs). Water training would occur within the four existing lakes and would require coordination and scheduling with lake management agencies. The amount of fuel and other products near reservoirs would increase; procedures would be employed to ensure that no fuel spills or debris was deposited in the water bodies. Chaff and flare use would decrease in the airspace except under the restricted airspace.	No changes to physical resources would occur.
Biological Resources, EIS Section 5.6	AFSOC aircraft produce less noise and fly at slower speeds with a slower onset of the noise than jet aircraft currently operating in the airspace or on the MTRs. Wildlife respond more to noise from helicopters than fixed-wing aircraft. CV-22 training in support of LZ, DZ, or water activities would be conducted in the helicopter mode. Increased night use could disturb nocturnal species. Water training would occur within developed areas. No significant impacts from chaff or flares on biological resources are anticipated.	No changes to biological resources would occur. Noise levels would be reduced with the disestablishment of the 27 FW.
Cultural Resources, EIS Section 5.7	Airspace use, including the proposed UAS corridor, would not affect cultural resources. LZ, DZ, or water locations for training would be surveyed for cultural resources prior to agreements for their use. State parks associated with lakes identified for water training possess cultural and paleontological resources. Avoidance includes using existing boat ramps and disturbed shoreline areas for training activity. Training activities on MTRs would not be expected to impact historical or cultural resources.	No changes to cultural resources would occur.

**TABLE 2.7-3. TRAINING AIRSPACE SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 3 OF 4)**

<i>Resource, EIS Section</i>	<i>Proposed Training</i>	<i>No Action Alternative</i>
Land Use and Recreation, EIS Section 5.8	<p>Land use, land ownership and land management plans are not expected to be affected by changes in noise levels associated with AFSOC aircraft. No new restrictions on any property outside of the Melrose AFR are anticipated. Recreational hunting currently occurs in areas under MOAs with low-level overflight to 500 feet. Additional noise in MTRs and MOAs could result in increased annoyance, although the noise is not at the level that would damage human health. Training LZ and DZ sites would be selected to avoid noise effects on nearby land uses. Water training sites would occur in existing lakes as coordinated with managing agencies. Continued CV-22 training could annoy lake recreationalists or residents. Coordination with State Park superintendents will be initiated and changes to management plans may be required to permit low-flying aircraft. Chaff and flare use is not expected to result in modifications to land use. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. AFSOC training activities within the airspace could result in annoyance to individuals who experience noise, vibration, low-level night overflights, or find pieces of chaff or flare residual materials. None of these events would be expected to significantly affect overall land use or land ownership within the area.</p>	No changes to land use and recreation resources would occur.

**TABLE 2.7-3. TRAINING AIRSPACE SUMMARY OF CONSEQUENCES BY RESOURCE
(PAGE 4 OF 4)**

<i>Resource, EIS Section</i>	<i>Proposed Training</i>	<i>No Action Alternative</i>
Socioeconomics, EIS Section 5.9	Activities associated with AFSOC training are not expected to have any significant adverse impacts on the human, social, or economic resources of the region. Recreational land use, ranching operations, wind energy operations, oil and gas exploration and production, and other economic pursuits are not expected to experience any limitations or negative effects as a result of beddown of AFSOC assets. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. Increased noise associated with low-altitude training, particularly night training, could be viewed as an annoyance or an impact by residents under the MTRs, under the Taiban, Pecos, and Mt. Dora MOAs, and near water training areas.	Regional economic activity would experience a downturn associated with Cannon AFB assuming enclave status.
Environmental Justice, EIS Section 5.10	Populations under the MOAs and MTRs are not disproportionately minority or low-income and no disproportionate impacts are expected. Low-altitude night training would be widely dispersed and would not specifically impact children.	Any downturn in regional economic activity could affect workers, including minorities and low-income populations.

2.7.2 ENVIRONMENTALLY PREFERRED ALTERNATIVE

CEQ requires the identification of the environmentally preferred alternative. For most environmental resources at Cannon AFB, Melrose AFB, and training airspace, the No Action Alternative would be the environmentally preferred alternative. For socioeconomic and environmental justice at Cannon AFB, the No Action Alternative is not the environmentally preferred alternative. For these environmental resources, the East and West Airfield Alternative would be the environmentally preferred alternative.

2.8 MITIGATION AND MANAGEMENT MEASURES

Mitigation and management measures for the proposed beddown of AFSOC assets have been identified and will be carried forward in implementing the selected action. Management measures are defined as those measures incorporated in the design of the preferred alternative to avoid, minimize, or reduce the impacts to most of the resource areas. These management measures are primarily discussed in Chapter 2.0. Chapters 3.0, 4.0, and 5.0 include management and mitigation measures required by regulation or agency guidance (even though impacts may not be significant) for each relevant resource. Management measures can refer to the planning and implementation of efforts to restore degraded ecosystems, where applicable. Mitigations can include permit requirements, Best Management Practices (BMPs), New Mexico State regulatory requirements for fugitive dust and noise, burn permits, and Memoranda of Understanding between agencies.

For those resource areas where potential impacts are not mitigated by avoidance (i.e., project design), mitigation and management measures are proposed and discussed in this section. An example of this type of mitigation is taking action in accordance with the Cannon AFB CRMP in the case of inadvertent discovery of cultural artifacts uncovered during construction.

Each of the following resource subsections includes a description of possible measures to avoid, minimize, rectify, reduce, or compensate for the identified impact.

2.8.1 DEFINING A MITIGATION MEASURE

The mitigation measures discussed in an EIS cover a range of issues generally addressing mitigation measures applied in the design of reasonable alternatives (i.e., mitigation by avoidance) or address mitigations not included in the design, but applied after impact analysis (i.e., reduction, et al.). Mitigation measures are considered even for impacts which, by themselves, would not be considered "significant." The AFSOC asset beddown proposal is considered as a whole to address specific effects on the environment (whether or not "significant"), and mitigation measures are developed where it is feasible to do so. Mitigations already in place for the training airspace are described in Section 2.8.3. Once environmental consequences are described and mitigation measures are presented, those effects that would still occur are identified in Section 2.8.4.

CEQ regulations (at § 1508.20) define mitigation in the following five ways:

1. **Avoiding** the impact altogether by not taking a certain action or parts of an action.
2. **Minimizing** impacts by limiting the degree or magnitude of the action, and its implementation.
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.

4. **Reducing or eliminating** the impact over time by preservation and maintenance operations during the life of the action.
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

During the initial development of this project, mitigation and management measures were included in the design parameters. This meant that avoiding, minimizing, or reducing potential impacts was a priority guiding the development of the alternatives. These mitigation and management measures, which are incorporated into the overall design of the alternatives, include BMPs.

The Air Force will develop plans to address specific mitigations. These plans, for example, will include a Temporary Erosion Sediment Control Plan, a Stormwater Pollution Prevention Plan (SWPPP), and a Spill Prevention, Control, and Countermeasure (SPCC) Plan. These plans are in addition to, and complement, any permits that may be issued to the Air Force for the project.

2.8.2 RESOURCE-SPECIFIC MEASURES ADOPTED TO REDUCE THE POTENTIAL FOR ENVIRONMENTAL IMPACTS

Section 2.8.1 describes the CEQ definition of mitigation measures (§ 1508.20). This section describes measures adopted to reduce the potential for environmental impacts. Each measure is listed by environmental resource identified during development of this EIS or during public and agency participation in the environmental process. Example sections where the resource is addressed are noted for each measure. In addition, the type of mitigation action is identified from the CEQ list (§ 1508.20) presented in Section 2.8.1. The mitigation measures from Section 2.8.1 are abbreviated as follows: Avoiding = A; Minimizing = M; Rectifying = Rc; Reducing = Re; Compensating = C.

2.8.2.1 AIRSPACE MANAGEMENT AND AIR TRAFFIC CONTROL

- Employ FAA COA measures for UAS operations outside restricted or Class D airspace to minimize conflicts with general aviation: A (Section 2.3.3).
- Perform after-dark (before 10:00 p.m.) MTR training at altitudes not frequented by general or commercial aviation: A (Section 2.3.1).

2.8.2.2 NOISE

- Schedule after-dark training to occur as much as possible (approximately 40 percent) before 10:00 p.m. to reduce activity during environmental night: M (Section 4.1.3).
- Place new live targets as close as possible toward the center of the range to reduce impulse noise effects on surrounding ranches: M, Re (Section 4.2.3).
- Apply LZ/DZ siting criteria to avoid residences and reduce noise effects: A, Re (Section 2.3.4).
- Identify noise sensitive avoidance areas under the airspace: M (Sections 2.3.1 and 5.2.3).

2.8.2.3 SAFETY

- Identify a Cannon AFB contact telephone number for ranchers to call to help training aircraft avoid cattle roundups: A (Section 5.9.3.1).

- Expand fire response capabilities at Melrose AFR and exercise an aggressive vegetation control program to reduce fire risk: Re (Sections 4.2 and 4.3.2.1).
- Expanded small arms range to overlap with historic small arms ranges to keep munitions within existing impact areas to the extent possible: M (Section 2.2.6.2).
- Prepare a new AFSOC responsibilities and procedures supplement to AFI 13-212 for the maintenance operation and use of Melrose AFR: M (Section 2.2).

2.8.2.4 AIR QUALITY

- Stabilize soils during construction and replace ground cover in disturbed areas to reduce particulates: Rc (Section 3.4.3).
- Apply dust suppression and soils stabilization measures to areas disturbed by construction-related activities on Melrose AFR: M (Section 4.5.3.1).
- Conduct sortie-operations over the Pecos Wilderness Area Class I area at altitudes above 2,000 feet AGL in order to reduce the effect of potential aircraft emissions on ground-level pollutant concentrations within this area: M (Section 5.4.3.1).

2.8.2.5 PHYSICAL RESOURCES

- Revegetate construction-disturbed areas to the extent practicable to prevent soils migration: Rc (Sections 3.4.3 and 4.5.3.1).
- Perform regular EOD cleanup on Melrose AFR to reduce concentrations of lead or other munitions residual materials in accordance with the new AFI 13-212 Supplement: Rc (Section 2.2).
- Use existing lake access locations, to the extent possible, and retrieve all elements used during water training to reduce potential for impacts to soil, lakeshores, or reservoirs: M (Section 2.3.4).

2.8.2.6 BIOLOGICAL RESOURCES

- Conduct after dark training as much as practicable prior to early morning hours to reduce disturbance on species such as lesser prairie-chickens: M (Section 5.6.3.1).
- Confer and cooperate with USFWS to develop appropriate and reasonable conservation measures to minimize, mitigate, and identify significant adverse effects on a population of migratory bird species of concern: M (Section 3.6).
- Perform water training during daylight or early evening hours to the extent possible to be similar to ongoing lake recreational activities to which species have adapted: M (Section 5.6.3.1).
- Avoid, to the extent possible, low-level overflights of concentrations of cattle during identified seasonal ranching operations when Cannon AFB is notified of the concentrations: A (Section 5.9.3.1).
- Use existing access locations for water safety craft training to be consistent with other human activities: M (Section 2.3.4).

- Perform LZ/DZ biological surveys consistent with site selection criteria: Re (Section 2.3.4).

2.8.2.7 CULTURAL AND PALEONTOLOGICAL RESOURCES

- Perform LZ/DZ cultural surveys consistent with site selection criteria: Re (Section 2.3.4).
- Use existing access locations for water training to avoid lakeshore paleontological or cultural resources: M (Section 2.3.4).
- Continue to make available information regarding AFSOC training activities to agencies and Native American tribes: M (Section 2.8.3).
- Require personnel to notify the Air Force archaeologist in the event of inadvertent discoveries of cultural artifacts during construction. Cannon AFB will take action in accordance with the Cannon AFB CRMP: A, Rc (Sections 3.7.3 and 4.7.3).

2.8.2.8 LAND USE AND TRANSPORTATION

- Provide information on potential AFSOC personnel and growth to support regional planning and transportation: Re (Section 3.9.3).
- Schedule training on lakes to reduce, to the extent possible, potential impacts on recreational and residential locations bordering the lakes, especially during holidays or other high use periods: M (Section 5.2.3.1).
- Apply LZ/DZ criteria to be consistent with rural land uses to the extent possible: A (Section 2.3.4).
- Construct Cannon AFB facilities consistent with long-term base planning goals: Re (Section 2.1.3).
- Locate Melrose AFR new live-fire targets to minimize, to the extent possible, changes to land use in the area: Re (Section 2.2).
- Coordinate scheduling of AFSOC water training exercises with agencies to reduce surprise effects on property owners and recreationalists: M (Section 2.3.4).

2.8.2.9 SOCIOECONOMICS

- Provide projected population and education information for regional management decisions to meet anticipated demands: Re (Section 3.9.3).
- Identify Melrose AFR potentially-affected lands for ranching decisions regarding grazing lands: Re (Sections 2.2.4 and 2.2.5).

2.8.2.10 ENVIRONMENTAL JUSTICE

- Scheduling after-dark MTR and MOA training missions to the extent possible (approximately 40 percent) before 10:00 p.m. to reduce environmental night noise to residents and children under the training airspace: M (Section 4.1.3).

2.8.3 ONGOING MITIGATION ACTIONS

Cannon AFB has committed to a variety of management actions associated with the use of defensive countermeasures where approved within Cannon AFB-managed training airspace.

These actions were formalized in a mitigation plan prepared subsequent to the New Mexico Training Range Initiative (NMTRI) ROD (13 February 2007).

All pilots receive a Local Area Orientation brief prior to conducting operations in Cannon AFB-managed training airspace. The briefing includes information on the local airspace, including operating altitudes, aircraft restrictions, and type of chaff and flare authorized for use. The Cannon Operations Support Squadron webpage publishes the current National Fire Danger Rating System indication, specifying which expendables may currently be used in Cannon AFB-managed training airspace. Aircrews not assigned to Cannon AFB are provided the web link to the Local Area Orientation airspace brief containing all applicable restrictions and information for their flights. The specific actions may be summarized as follows:

MINIMUM ALTITUDE

The minimum altitude for defensive countermeasure flare release in NMTRI SUA continues to be above 2,000 feet AGL (flares burn out after falling approximately 400 feet).

HIGH FIRE CONDITIONS

When the National Fire Danger Rating System indicates high fire conditions or above, the minimum altitude for flare release in SUA shall be raised to above 5,000 feet AGL. As part of the above referenced flight briefing, all aircrews will check the National Fire Danger Rating System status for Pecos MOA and comply with the appropriate altitudes for flare expenditures.

MUTUAL AID AGREEMENTS

Cannon AFB has established Mutual Aid Agreements with civilian communities or other government agencies to supplement internal levels of fire protection staffing and equipment. Cooperation with local agencies for mutual aid response to fires will continue. Cannon AFB currently has Mutual Aid Agreements with seven surrounding communities, including Broadview, Clovis, Floyd, House, Melrose, Portales, and Texico. The Cannon Civil Engineer Squadron, Fire and Emergency Services Flight, maintains these agreements. Additional mutual aid response and coordination will be in accordance with formal Military Support to Civil Authorities guidance.

EDUCATION PROGRAM

An education program for fire departments in the communities surrounding Cannon AFB, including those beneath airspace assessed for flare use, will continue to include information on flares. The Cannon Civil Engineer Squadron Fire and Emergency Services Flight provides educational training with the fire departments serving the communities. This training includes precautions for emergency response to chaff/flares, to include identification, proper disposal and recovery of residual materials and dud flares.

RECORDING DEFENSIVE COUNTERMEASURE USE

Records of defensive countermeasure (chaff and flares) use will reflect, to the maximum extent practicable, all defensive countermeasures expended in airspace assessed for use of defensive countermeasures. Cannon Operations Group will be responsible for recording defensive countermeasure expenditures and will maintain annual records. Records include the type of countermeasures used, the period of use, and the airspace in which the countermeasures were used, for both Cannon AFB and transient aircraft.

RESPONSE AND RECOVERY PROCEDURES

Response and recovery procedures for defensive countermeasure residual materials and dud flares discovered off-range are employed, including:

- Use of Cannon AFB personnel to identify, render safe if necessary, and remove if feasible, any chaff or flare residual materials and dud flares discovered off-range. In particular, Cannon personnel will render safe any chaff or flare residual materials and dud flares discovered off-range, which pose an imminent and substantial threat.
- Disseminate of information annually to the public through Cannon AFB Public Affairs concerning precautions with dud flare and residual materials.
- Establish Cannon AFB Public Affairs as the initial point of contact for members of the public who discover a dud flare or residual material resulting from the use of chaff and flares. Cannon Public Affairs will immediately notify Cannon Judge Advocate and Civil Engineer Squadron response personnel who will coordinate a response and work to resolve issues as required.
- Ensure that claims of potential loss or damage due to training operations will be referred to the Cannon AFB Judge Advocate for appropriate processing.

2.8.4 UNAVOIDABLE ADVERSE IMPACTS

Some of the AFSOC training activities are projected to result in disturbance and/or noise within areas not previously or recently subject to these effects. In other cases, AFSOC training would continue to result in activities that have been identified as an annoyance during scoping meetings. To the extent possible, mitigation measures, such as those identified in Sections 2.8.2 and 2.8.3, would be applied to reduce potential effects to acceptable levels. However, some impacts that cannot be mitigated would occur. These impacts, while not likely to be significant to environmental resources, could be considered significant or annoying to individuals potentially affected.

Potential impacts that could occur and cannot be mitigated include the following:

- Noise from low-level training overflights would be heard on MTRs (Section 5.2.3).
- Available lakes would receive some impacts from water training to biological species, recreationalists, and residents (Sections 5.6.3.1 and 5.8.3.1).
- Training missions would increase noise during environmental night (between 10:00 p.m. and 7:00 a.m.) (Sections 4.2.3 and 5.2.3).
- Chaff and flare debris, although reduced from existing levels, would continue to be deposited under training airspace where chaff and flare use has been assessed (Section 5.6.3.1).
- Munitions chemicals and materials would be deposited at target areas and such chemicals could eventually affect soils or water resources on the range (Section 4.5.3).
- Noise from munitions would be audible off range (Section 4.2.3).
- New live-fire target restrictions on Melrose AFR for required AFSOC training and the safety would change land use and ranching operations on Melrose AFR (Section 4.8.3).

- Individual species would be affected by changes in Melrose AFR and/or water training activities (Sections 4.6.3.1, 4.6.3.2, and 5.6.3.1).
- Increased numbers of temporary workers have the potential to increase the need for local safety and protection services (Section 3.9.3.1).
- Expanded student population would increase the requirement for school services (Section 3.9.3.1).
- Increased demand for construction resources could result in a short-term increase in construction costs (Section 3.9.3.1).

3.0 CANNON AIR FORCE BASE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and potential environmental consequences at Cannon Air Force Base (AFB). Chapter 4.0 addresses Melrose Air Force Range (AFR) and Chapter 5.0 addresses areas under the training airspace. In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 32 Code of Federal Regulations (CFR) Part 989, et seq., the description of the affected environment focuses on those resources and conditions potentially subject to impacts. The affected environment is described for ten resource topics: Airspace Management and Air Traffic Control, Noise, Safety, Air Quality, Physical Resources (including Hazardous Materials and Waste), Biological Resources, Cultural Resources, Land Use and Transportation, Socioeconomics and Environmental Justice. Many of these resources are extensively interrelated. In recognition of those interrelationships, each resource topic relies upon the findings of relevant other analyses. For example, noise analyses are reflected in the analysis of land use, socioeconomics, and biological resources

The sections for each resource topic begin with an introduction that defines the resources addressed in the section, defines key terms as necessary and describes the region of influence (ROI) within which the effects from the Alternative Actions are anticipated to occur. The ROI varies from resource to resource, but in general, effects from Cannon AFB Alternative Actions are expected to be concentrated on base and in Roosevelt and Curry counties (see Figure 1.1-1). There are three primary reasons why the ROI can differ among resources:

- The resource itself has a geographic definition. For example, the ROI for earth resources can be defined as limited to the location where ground disturbance from construction would occur (i.e., Cannon AFB), whereas the ROI for air quality is defined by a much larger area (i.e., air quality control region) due to the nature of air pollutants to migrate throughout a broad region.
- The nature of potential impacts from the alternative actions can vary from resource to resource. For example, impacts to water resources may be defined by drainage patterns from the location of proposed development to surrounding surface water, while impacts from aircraft noise may be defined by proposed flight paths.
- In some cases, data about the resource are only available for certain defined areas (e.g., at the Census block or block group level); as a result, the analysis can only be performed at that level.

Following the introduction for each resource topic, information is presented about existing environmental conditions in the ROI. This information provides a frame of reference about conditions that prevail currently or existed in the recent past. Applicable laws and regulations for each resource are presented in Appendix D.

For each resource the Action Alternatives and No Action Alternative, as described in Section 2.1, are assessed for their potential to impact the natural and human environment. In some

instances a brief methodology is provided to explain how the analysis of impacts was conducted, and to describe what would constitute a significant impact.

The impacts described in this section represent a best estimation of the consequences of the beddown of Air Force Special Operations Command (AFSOC) assets at Cannon AFB. The impact analysis for each alternative includes direct and indirect, as well as short-term and long-term impacts. The impacts of each alternative are compared against the baseline conditions. Cumulative impacts and other environmental considerations are described in Section 6.0.

3.1 AIRSPACE MANAGEMENT AND AIR TRAFFIC CONTROL

3.1.1 DEFINITION OF THE RESOURCE

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (U.S.) and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC § 40102). Congress has charged the Federal Aviation Administration (FAA) with responsibility for developing plans and policy for the use of the navigable airspace and assigning by regulation or order the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b); FAA Order 7400.2 2004).

There are two categories of airspace or airspace areas: regulatory and non-regulatory. Within these two categories, there are four types of airspace: Controlled, Special Use, Other, and Uncontrolled airspace. Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rule (IFR) flights and to Visual Flight Rule (VFR) flights in accordance with the airspace classification (Pilot/Controller Glossary [P/CG] 2004). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace. Uncontrolled airspace is designated Class G airspace and has no specific prohibitions associated with its use. Other airspace consists of advisory areas, areas that have specific flight limitations or designated prohibitions such as Military Training Routes (MTRs) and parachute jump areas.

Special Use Airspace (SUA) identified for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400.2 and other applicable regulations and orders. Management of this resource considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple and sometimes competing demands for aviation airspace in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements. Specific rules and regulations concerning airspace designation and management are listed in FAA Order 7400.2.

SUA is airspace of defined dimensions wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. The types of SUA areas are Prohibited Areas, Restricted Areas, Military

Operations Areas (MOAs), Warning Areas, Alert Areas, Controlled Firing Areas, and National Security Areas. MOAs and Restricted Areas are proposed to be used for AFSOC training missions.

The United States Air Force (Air Force) manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, *Air Force Airspace Management*. AFI 13-201 implements Air Force Planning Document 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, and Department of Defense (DoD) Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters*. It addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations.

The airspace directly associated with the proposed AFSOC beddown includes Restricted Areas R-5104 A/B and R-5105 (addressed in Chapter 4.0), and the Pecos, Taiban, Mt. Dora, and Bronco MOAs, and the following MTRs: IR-107, IR-109, IR-111, IR-113, VR-108, VR-114, VR-100/125 and Aerial Refueling (AR) Route AR-602 (addressed in Chapter 5.0). The volume of airspace encompassed by the combination of these airspace elements constitutes the Environmental Impact Statement (EIS) ROI for airspace management.

3.1.2 EXISTING CONDITIONS

Airspace areas associated with the Cannon AFB airfield consist of those designated to serve civil and military aircraft operating to and from the base or transiting the local area. Two types of controlled airspace are designated around Cannon AFB to support airfield operations. Class D controlled airspace immediately surrounds the base, forming a uniform circle with a radius of approximately 6 nautical miles (nm) and extending from the surface up to 6,800 feet above mean sea level (MSL). Class D airspace is comprised of an Airport Traffic Area and Control Zone. Class E controlled airspace represents the larger area in which Air Traffic Control (ATC) radar services are provided to base air traffic as well as to other pilots (military and civilian) transiting the area. Air Force ATC personnel provide radar approach control services to commercial aircraft using Clovis Municipal Airport. For most of its extent, this Class E airspace encompasses a radius of 20 nm surrounding Cannon AFB. To the northeast, an additional corridor of Class E airspace extends from this circle for approximately 20 nm. Southeast of Cannon AFB, the Class E airspace bulges slightly to accommodate activities at the public airport in Portales. The Class E airspace around Cannon AFB also overlaps partially with the eastern edge of restricted areas R-5104A and R-5105 when these areas are inactive. When the restricted areas are active, the border of the Class E airspace is coincident with the eastern edge of the restricted areas to support air-to-ground training at Melrose AFR.



AIR FORCE PERSONNEL IN THE NEW CANNON AFB TOWER PICTURED HERE ARE RESPONSIBLE FOR AIRCRAFT TRAFFIC IN THE IMMEDIATE VICINITY OF THE BASE.

The proposed Certificate of Waiver or Authorization (COA) would specify a corridor to be established to connect the Cannon Class D airspace with R-5104 by traversing the Class E airspace between Cannon AFB and Melrose AFR. This COA is discussed in Section 4.1.

The base has two intersecting runways that cross near its southwest corner: Runway 04/22, oriented northeast and southwest, is 10,000 feet long; and the northwest and southeast runway, 31/13, is 8,200 feet in length. The majority of takeoffs and landings use Runway 04/22. Cannon AFB supports both visual and instrument flight operations.

There are three public and two private airports located within the vicinity of Cannon AFB. Public airports are located at Portales, approximately 14 nm to the southwest, and at Clovis and Benger, approximately 12 and 35 nm, respectively, east of the base. Private airfields consist of Lockmiller, 12 nm northwest of Cannon AFB, and Farwell, 15 nm to the east.

Three federal airways (V routes) cross the Class E airspace and two are adjacent to the Class E airspace east of Cannon AFB. Victor Airways are controlled airspace and can be likened to highways in the sky for aircraft. These airways are used by both IFR and VFR aircraft. The airspace set aside for a Victor Airway is 8 miles wide with a floor at 1,200 AGL extending up to 18,000 feet MSL ceiling.

Military aircraft conduct approximately 23,600 sorties at Cannon AFB annually under baseline conditions. Of these, over 97 percent are operations conducted by F-16 aircraft. Transients (i.e., aircraft from other bases), ranging from helicopters to C-5A transport aircraft, account for the remainder. These airfield operations consist of departures and arrivals in the airfield airspace.

3.1.3 ENVIRONMENTAL CONSEQUENCES

3.1.3.1 WEST FLIGHTLINE ALTERNATIVE

With the implementation of the West Flightline Alternative, airspace management and ATC procedures in the vicinity of Cannon AFB would require changes with the beddown of AFSOC assets. Modification to the Cannon AFB Airfield Operating Instruction (AOI) 11-250 would be needed to accommodate the type of operations typically executed by AFSOC aircraft. Alterations to the local approaches/departure patterns, aircraft separation and provisions for operations with night vision devices and airfield lights out operations would need to be incorporated into the AOI. Airfield operations, including approaches/departures and closed patterns, would be reduced by approximately 40 percent annually. This reduction would not result in any modifications to Cannon Tower procedures.

3.1.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

Under the East and West Airfield Alternative, the number of annual airfield operations and sorties would be the same as those described under the West Flightline Alternative; thus, the airspace effects are identical. The East and West Airfield Alternative includes a variation on the construction, renovation, and infrastructure improvement projects. The consequences to the airspace environment from aircraft operations would be similar to those described for the West Flightline Alternative.

3.1.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. After the 27th Fighter Wing (27 FW) is disestablished, aircraft operations around the airfield would be limited to transient aircraft and would be substantially below current conditions.

3.2 NOISE

3.2.1 DEFINITION OF RESOURCE

The noise environment is generally described by the sound level or the amplitude of a sound that occurs at any given time. From the ground, the sound level of an aircraft changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance. Sound levels are on a logarithmic decibel scale; a sound level that is 10 decibels (dB) higher than another will be perceived as twice as loud. Specific noise metrics include 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 (as dBC) to denote when C-weighting is used. Each of these metrics is summarized below and discussed in detail in Appendix F.

- L_{max} is used to define maximum sound levels. L_{max} is the highest sound level measured during a single aircraft overflight. For an observer, the sound level starts at the ambient sound level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance.
- SEL accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event. This provides a better measure of intrusion than L_{max} alone.
- L_{dn} is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a cumulative average computed over a set of 24-hour periods to represent total noise exposure. L_{dn} also accounts for more intrusive night time noise, adding a 10 dB penalty for sounds after 10:00 p.m. and before 7:00 a.m. L_{dn} is the appropriate measure to account for total noise exposure around airfields and airports. Depending on the regularity of operations, L_{dn} is computed either as an annual average or for operations representing an average busy day.
- L_{dnmr} is the measure used for subsonic aircraft noise in military airspace (MOAs or Warning Areas). When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid onset rate carries a "surprise" effect that can make noise seem louder than its measured SEL would suggest. L_{dnmr} contains a penalty of up to 11 dB to account for this effect. It is computed for the busiest month of the year, so as to account for the seasonal use of some airspaces. L_{dnmr} is interpreted by the same criteria as used for L_{dn} .
- C-Weighted Day-Night Sound Level (CDNL) is a day-night average sound level computed for areas subject to impulsive noise or sonic booms, including munitions. These areas are also subjected to subsonic noise assessed according to L_{dnmr} .

Specific guidelines concerning noise are discussed in Appendix F. The ROI for Cannon AFB is the airfield and the vicinity potentially affected by aircraft takeoffs and landings. Noise contributions from aircraft operations and ground engine run-ups at the base airfield were calculated using the NOISEMAP model, the standard noise estimation methodology used for military airfields. NOISEMAP uses the following data to develop noise contours: aircraft types,

runway utilization patterns, engine power settings, airspeeds, altitude profiles, flight track locations, number of operations per flight track, engine run-ups, and time of day.

3.2.2 CANNON AFB EXISTING CONDITIONS

At Cannon AFB, the noise environment is primarily influenced by aircraft operations. Noise from these operations typically occurs beneath main approach and departure corridors and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft take off and gain altitude, their contribution to the noise environment drops to levels indistinguishable from the background.

Land use guidelines identified by Federal Interagency Committee on Urban Noise (1980) are used to determine compatible levels of noise exposure for various types of land use surrounding airports; L_{dn} 65 dB noise contours are frequently used to help determine compatibility of aircraft operations with local land use. Figure 3.2-1 presents the L_{dn} 65 to 80 dB noise contours in 5 dB increments surrounding the Cannon AFB airfield based on existing airfield operations. Table 3.2-1 presents the current land acreage exposed to noise levels between L_{dn} 65 and 80 dB or more. Further discussion of land use compatibility and noise in areas surrounding Cannon AFB is included in Section 3.8, Land Use and Transportation.

**TABLE 3.2-1. BASELINE NOISE CONTOUR ACREAGE
IN THE VICINITY OF THE CANNON AFB AIRFIELD**

	NOISE CONTOUR (L_{dn})			
	65-70 dB	70-75 dB	75-80 dB	80 +dB
Acres	4,575	2,270	1,050	1,420

3.2.3 ENVIRONMENTAL CONSEQUENCES

3.2.3.1 WEST FLIGHTLINE ALTERNATIVE

Under the West Flightline Alternative, noise levels in the vicinity of Cannon AFB would decrease from baseline conditions. This is primarily due to the lower number of missions and quieter turbo-prop aircraft as compared with current F-16 operations. A noise contour overlay representing baseline and projected noise contours is presented in Figure 3.2-2. This is attributed to the new array of aircraft that would be based at Cannon AFB including the AC-130H, MC-130H/P/W, CV-22, C-47, UH-1, and Predator unmanned aerial system (UAS). Airfield operations for these aircraft is based on Table 2.1-2.

Short-term noise increases due to construction and renovation, as well as infrastructure (stormwater and electric lines) installment and realignment would also occur. Construction occurs in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, apron). This stage of construction would be temporary and isolated to those areas where construction would occur. Later stages of construction involve less heavy equipment, are also temporary, and occur in the same areas. Most of these projects would be undertaken adjacent to the flight line and occupy industrial areas, and would be isolated from any off base communities. In addition, construction would take place during daylight hours and would follow Best Management Practices (BMPs) to minimize noise to any off base receptors. Construction noise would be contained within base environs since most heavy construction would occur near the flight line, where noise would be compatible with ongoing activities.

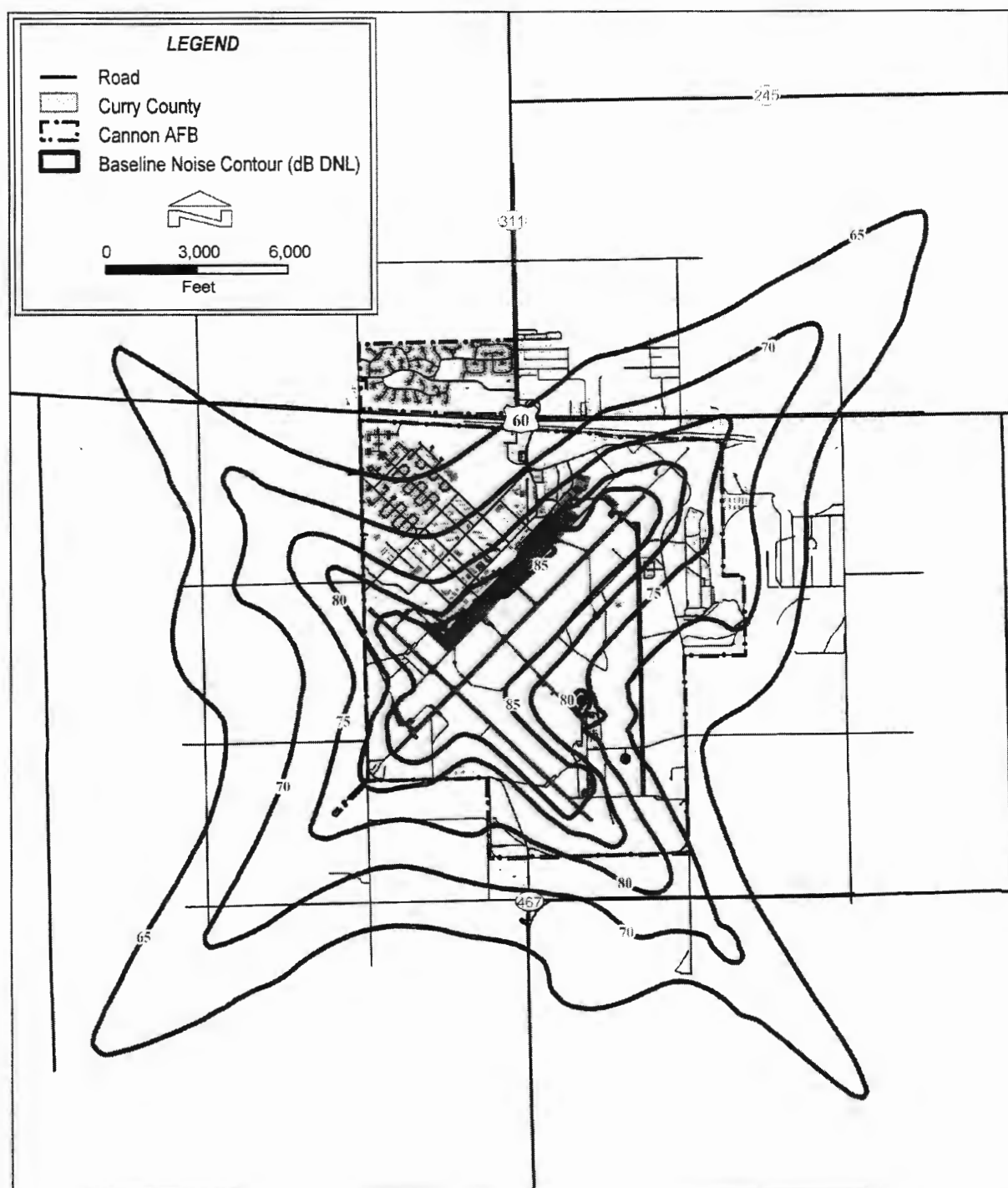


FIGURE 3.2-1. EXISTING OR BASELINE NOISE CONTOURS AT CANNON AFB

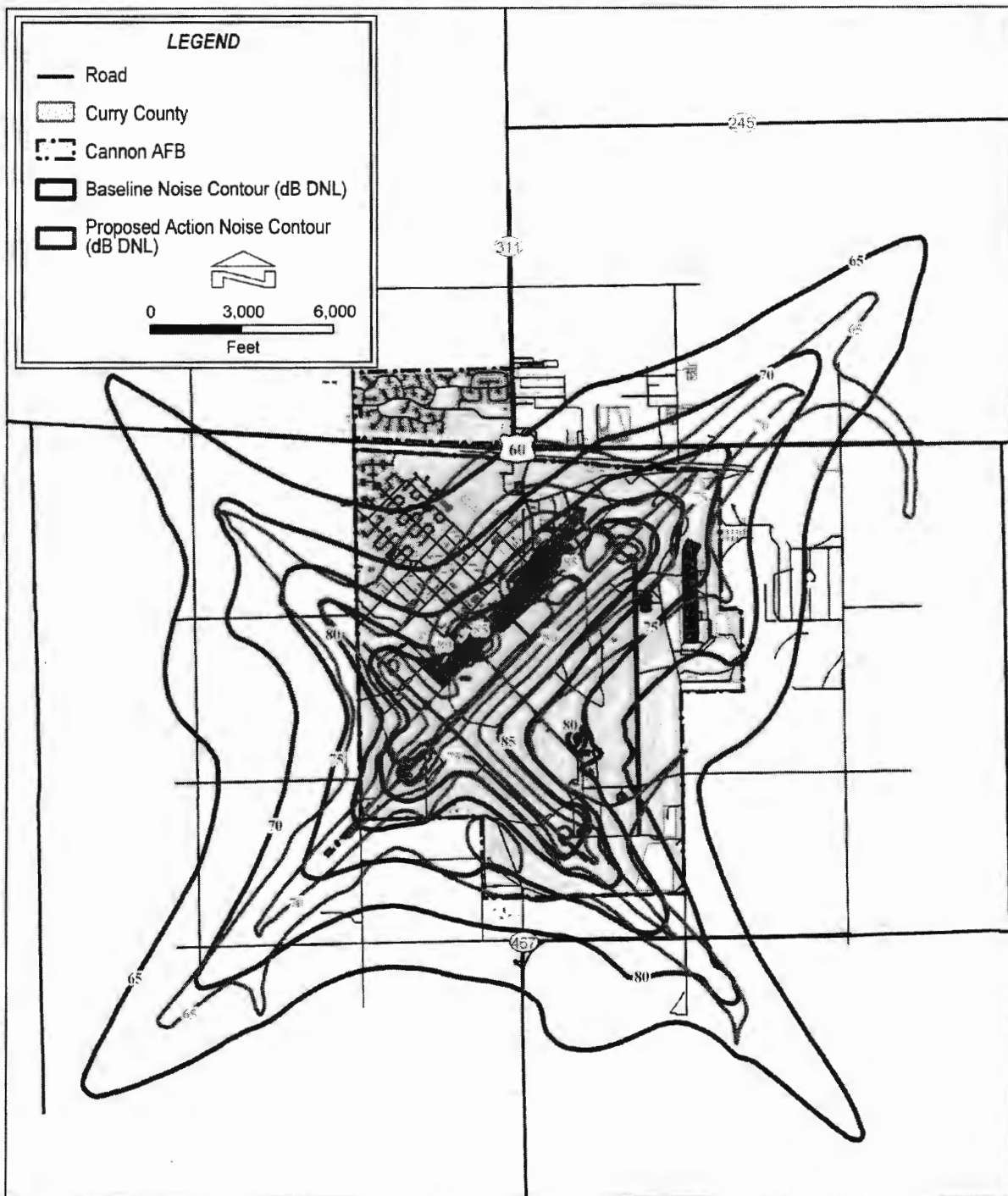


FIGURE 3.2-2. BASELINE AND PROPOSED NOISE CONTOURS AT CANNON AFB

3.2.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

Under the East and West Airfield Alternative, the number of annual sorties would be the same as those described under the West Flightline Alternative; thus, the noise effects are identical. The East and West Airfield Alternative includes a variation on the construction, renovation, and infrastructure improvement projects. However, because the overall construction noise would be temporary and often masked by aircraft taking off and landing, adverse impacts from construction noise is not expected. The consequences to the noise environment from aircraft operations would be essentially the same as those depicted for the West Flightline Alternative in Figure 3.2-2.

3.2.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Noise levels around the airfield would remain as discussed in Section 3.2.2 until the F-16 aircraft depart. After the departure of the F-16 aircraft, the base could only host transient aircraft and would have substantially lower noise levels than at present.

3.3 SAFETY

3.3.1 DEFINITION OF RESOURCE

This section addresses ground, flight, and explosive safety associated with operations conducted at Cannon AFB. Ground safety considers issues associated with operations and maintenance activities that support base operations, including fire response. Flight safety considers aircraft flight risks. Explosive safety discusses the management and use of ordnance or munitions associated with airbase operations.

The safety ROI includes Cannon AFB and environs. Safety at Melrose AFB is discussed in Section 4.3 and safety in military training airspace used by aircrews from the 27 FW is discussed in Section 5.3.

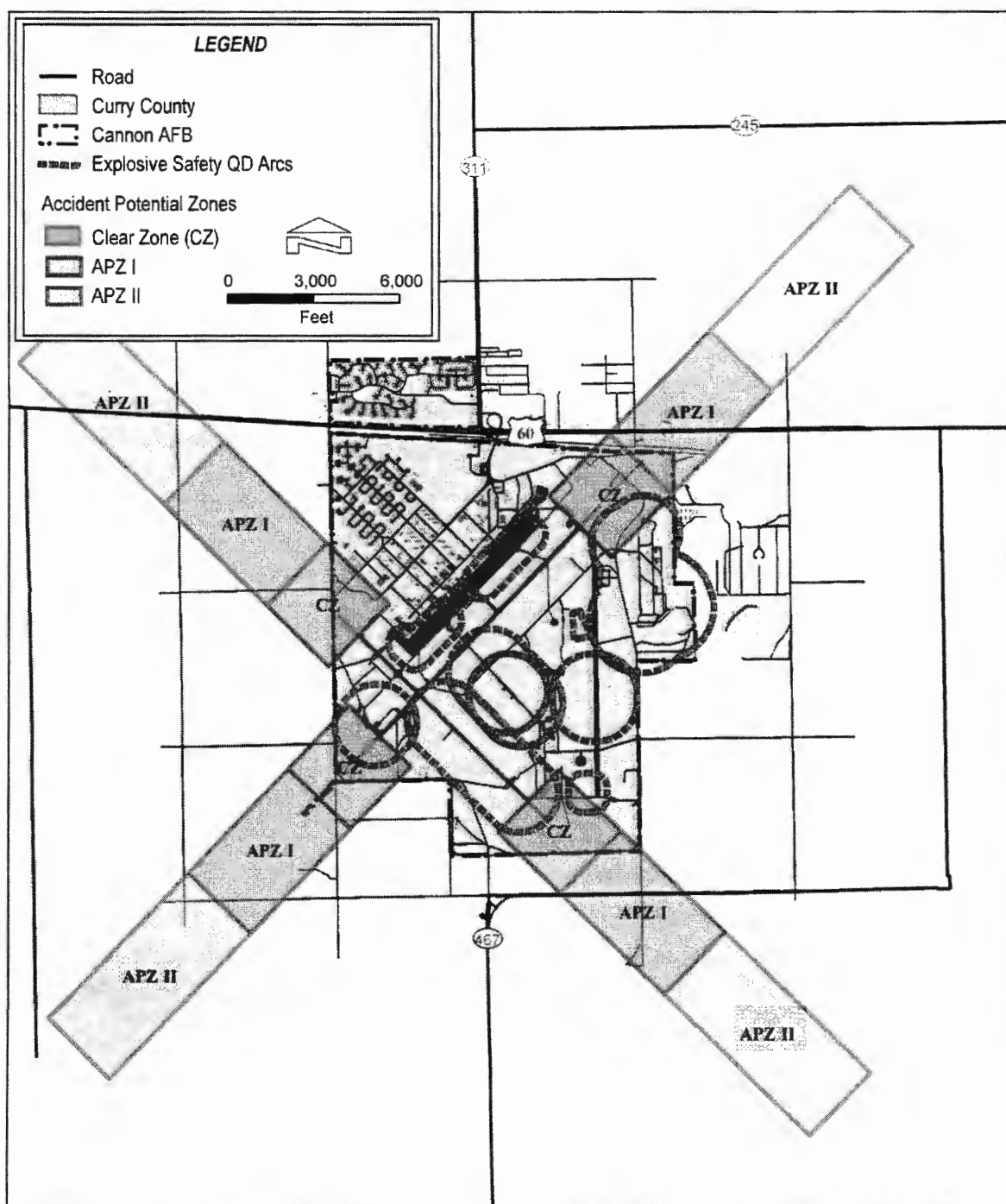
3.3.2 EXISTING CONDITIONS

3.3.2.1 GROUND SAFETY

Ongoing operations and maintenance activities conducted by the 27 FW 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 requirements.

The 27 FW fire department provides fire and crash response at Cannon AFB. The unit has a sufficient number of trained and qualified personnel, and possesses all equipment necessary to respond to aircraft accidents and structure fires. There are no response-equipment shortfalls. Should extraordinary requirements occur, the Cannon AFB Fire Department has established seven mutual aid support agreements with the nearby communities of Clovis, Portales, Floyd, Texico, House, Broadview, and Melrose (Air Force 2001a).

To minimize the results of a potential accident involving aircraft operating from Cannon AFB, Clear Zones (CZs), Accident Potential Zones (APZs), and safety zones have been established around the airfield (see Figure 3.3-1). In developing these zones, Cannon AFB is considered to have two Class B runways. Within clear and safety zones, construction is either prohibited (CZs) or limited in terms of placement and height (safety zones). Areas around the airfield where experience has shown most aircraft accidents occur are designated as APZs.



**FIGURE 3.3-1. ACCIDENT POTENTIAL ZONES AND
EXPLOSIVE SAFETY QUANTITY DISTANCE ARCS**

The CZ is an area 3,000 feet wide by 3,000 feet long for both Class A and Class B runways, and is located at the immediate end of the runway. The accident potential in this area is so high that no building is allowed. For safety reasons, the military is authorized to purchase the land for these areas if not already part of the installation (U.S. Army Center for Health Promotion and Preventive Medicine 2001).

APZ I is less critical than the CZ, but still poses significant potential for accidents. This 3,000-foot wide by 5,000 foot-long area located just beyond the CZ has land use compatibility guidelines that allow a variety of industrial, manufacturing, transportation, communication, utilities, wholesale trade, open space and agricultural uses. Uses that concentrate people in small areas are not compatible (Air Force 2001f).

APZ II is less critical than APZ I, but still poses potential for accidents. APZ II is 3,000 feet wide and extends 7,000 feet beyond APZ I. Compatible land uses include those of APZ I, as well as low density single family residential, and those personal and business services and commercial retail trade uses with low intensity or scale of operation. High density functions such as multistory buildings, places of assembly (e.g., theaters, schools, churches and restaurants) and high-density offices are not considered compatible (U.S. Army Center for Health Promotion and Preventive Medicine 2001).

Unified Facilities Criteria 3-260-01 also specifies requirements for imaginary surfaces on and around the runway. These criteria specify encroachment-free standards along and on either side of the runway (U.S. Army Center for Health Promotion and Preventive Medicine 2001). Currently, Cannon AFB is operating under 14 permanent waivers and exemptions to these criteria.

3.3.2.2 FLIGHT SAFETY

Air Force flight operations are conducted according to specific procedures contained in various AFIs. Among them, the AFI-11 series addresses general flight rules, aircrew training, as well as aircraft specific operational requirements. These instructions establish the framework for safe operation of Air Force aircraft.

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

The Air Force defines four categories of aircraft mishaps: Classes A, B, C, and High Accident Potential (HAP). Class A mishaps must result in one of the following: 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, result in permanent partial disability or inpatient hospitalization of three or more personnel, but do not result in fatalities. Class C mishaps involve reportable damage of more than \$20,000, but less than \$200,000, or a lost workday involving 8 hours or more away from work beyond the day or shift on which it occurred; or occupational illness that causes loss of work at any time. 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 accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public (Air Force 2001b). Class A mishaps are of primary

concern in environmental analyses because of their potentially catastrophic results either on or off base.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Again, because the extent of these secondary effects is situationally dependent, they are difficult to quantify. A crash of any aircraft can cause damage and loss of life. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky areas during the winter. When an aircraft crashes, it may release hydrocarbons. Those petroleum, 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.

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. Table 3.3-1 presents Class A mishap rates for aircraft flown in the Pecos airspace. CV-22 and Predator are new aircraft that have not flown the requisite hours to calculate Class A accident rates. During operational testing, V-22 aircraft variants have incurred several Class A accidents. This is not unusual for a new aircraft type just entering production. CV-22 aircraft could have mishap rates comparable to CH-46 type helicopters or 6.78 per 100,000 flying hours. Predator aircraft are new and are expected to have mishap rates comparable to or below military fighter aircraft from Table 3.3-1.

TABLE 3.3-1. PROJECTED CLASS A MISHAP RATES FOR AIRCRAFT

<i>Aircraft</i>	<i>Mishap Rates per 100,000 Flying Hours</i>
A-10	2.30
F-15	2.46
F-16	3.60
F/A-18 ¹	3.34
UH-1	3.22
C-130 ²	0.90
B-1B	4.51
CH-46	6.78
CV-22	N/A ³

- Notes: 1. F-18 mishap rate.
 2. Includes all C-130 variants.
 3. New aircraft that have not flown the requisite hours to calculate Class A accident rates.

Source: Air Force Safety Center 2006

A Class A mishap can result in metal debris on the ground. The extent of the debris field depends upon the aircraft accident. Both for reconstructing the cause of the accident and for

restoring the accident site as much as possible, the Air Force makes every effort to locate, document, and then clean up debris resulting from the accident.

For purposes of comparison, aircrews at Cannon flew their first F-16 training sortie in September 1995. Since 1995, Cannon-based F-16s have been involved in eight Class A mishaps. All accidents except one occurred on local training missions, but not necessarily in the Cannon airspace (personal communication, Zahnley 2004). The most recent Class A mishap involving Cannon-based aircraft occurred in April 2006 and was caused by ingestion of a Swainson's Hawk into engine intake, resulting in engine damage (personal communication, Steele 2006). The last fatal crash in the U.S. involving a Cannon AFB aircraft occurred in September 2002 and occurred 50 miles west of Cannon AFB. Citizens incurring damage from Cannon AFB mishaps can contact Cannon AFB directly to inquire about the damage claims process. The Air Force has an established claims process for citizens who have damages as a result of aircraft training activities. This process is initiated through contact with a base's Public Affairs Office.

Cannon AFB maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. 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 focuses on rescue, evacuation, fire suppression, safety, 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 second or investigation phase is accomplished.

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

The Air Force has no specific rights or jurisdiction just because a military aircraft is involved. Regardless of the agency initially responding to the accident, efforts are directed at stabilizing the situation and minimizing further damage. If the accident has occurred on non-federal property, a National Defense Area will normally be established around the accident scene and the site will be secured for the investigation phase.

After all required actions on the site are complete, the aircraft will be removed and the site cleaned up. Depending on the extent of damage resulting from a Class A mishap, only the largest damaged parts may be located and removed from a crash site.

Tall structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet (61 meters) above ground level (AGL) or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards because of its particular location (FAA 2000). The

obstruction standards in 14 CFR Part 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports (14 CFR Part 77 1971).

3.3.2.3 WILDLIFE STRIKE HAZARD

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. Over 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airfield environment.

Bird-aircraft strike data from 1996 to 2003 indicate that Cannon-based aircraft experience an average of approximately 25 bird-strikes per year. The majority, approximately 41 percent, occur during July, August, and September. The months of January, February, and March exhibit the lowest incidence (approximately 12 percent). The dominant species involved are doves (27 percent), horned larks (16 percent), swallows (12 percent), and kingbirds (11 percent). The remaining 33 percent of strikes involved a wide variety of raptors, owls, shore birds, and small songbirds (personal communication, Zahnley 2004). As noted previously, the last reported Class A mishap involving a bird strike occurred in April 2006.

3.3.2.4 EXPLOSIVES SAFETY

The 27 FW controls, maintains, and stores all ordnance and munitions required for mission performance. Ordnance is handled and stored in accordance with Air Force explosive safety directives (Air Force Manual 91-201), and all munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data. Ample storage facilities exist and all facilities are approved for the ordnance they store.

During current training, aircraft are not loaded with any ordnance configured with high explosive warheads. Inert training bombs and several different types of rockets are delivered on Melrose AFR, as well as training projectiles fired from the aircrafts' 20 millimeter (mm) cannon. Aircraft may also be configured with training air-to-air and air-to-ground missiles. AFSOC aircraft will utilize a variety of munitions on Melrose AFR that will be stored and located at Cannon AFB. These munitions are shown in Table 2.2-4.

3.3.3 ENVIRONMENTAL CONSEQUENCES

3.3.3.1 WEST FLIGHTLINE ALTERNATIVE

GROUND SAFETY

Other Cannon AFB activities, including the construction of new buildings and facilities under the West Flightline Alternative, would not take place in CZs or APZs. The construction would be consistent with the Base General Plan and construction safety procedures would be part of any construction contract. Construction of a Hot Cargo Pad would require the establishment of an Explosive Quantity-Distance (QD) arc that measure 1,250 feet from the corners of the pad. This Explosive QD arc should not impact construction or operations at Cannon AFB. The change in personnel is not expected to have an effect on safety.

FLIGHT SAFETY

The beddown of AFSOC assets at Cannon AFB would essentially replace existing F-16 with variants of the C-130 and add new aircraft, including the CV-22, Predator, and, potentially Non-

Standard Aircraft (NSA). Cannon AFB aircraft ground safety conditions would not change as a result of the new aircraft.

Historically, when new military aircraft first enter the inventory, the flight safety accident rate is higher. For example, safety data are limited for the CV-22 because it is a new aircraft with multiple complex systems. These systems are undergoing refinement as the CV-22 transitions from a test and training platform to an operational system. Class A mishaps are calculated on a basis of 100,000 flight hours. The CV-22 has not yet achieved that level of flight hours. During test activities and weapons system development, the CV-22 had a number of Class A mishaps; this is not unusual for a new aircraft.

As the CV-22 becomes operationally mature, the aircraft mishaps rate is expected to become comparable with a similarly sized helicopter aircraft with a similar mission. Historical trends show that mishaps of all types decrease the longer an aircraft is operational as operations and maintenance personnel learn more about the aircraft's capabilities and limitations.

WILDLIFE STRIKE HAZARD

The C-130 and CV-22 would operate in the same airfield environment as the F-16, and the overall potential for bird-aircraft or wildlife strikes is not anticipated to be greater than current levels given the reduced number of sorties to be conducted by AFSOC aircraft within the Cannon AFB airspace. There would be no significant adverse effects of the military readiness activities described in this EIS on any population of resident or migratory birds.

EXPLOSIVE SAFETY

The amount of munitions associated with the beddown of AFSOC assets is projected to be higher than that associated with the existing F-16 squadrons. Training requirements for AC/MC-130 crew are established in AFI 11-2AC130 and require training with live ordnance. Existing Air Force instructions and procedures that address explosive, flying, and ground safety will provide a basis for a new Melrose AFR specific instruction for Cannon-based personnel. Table 2.2-3 shows current and projected annual ordnance use within Melrose AFR.

The number of chaff bundles and flares would be reduced with the introduction of AFSOC assets in comparison to the amount currently deployed by F-16 squadrons. Cannon AFB has the personnel and facilities to handle the level of munitions and chaff and flares associated with implementing the West Flightline Alternative.

3.3.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

Under the East and West Airfield Alternative, the number of annual sorties would be the same as those described under the West Flightline Alternative; thus, the flight safety effects are identical. The East and West Airfield Alternative includes a variation on the construction, renovation, and infrastructure improvement projects. However, the variation in construction activity would not result in any greater safety risk than that posed by activity under the West Flightline Alternative.



CANNON AFB HAS AN ACTIVE BASH PROGRAM TO REDUCE THE POTENTIAL FOR BIRD AND WILDLIFE STRIKES AND ENHANCE AIRFIELD SAFETY.

3.3.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Safety conditions around the airfield would remain as discussed in Section 3.3.2 until the F-16 aircraft departed. Under No Action conditions, aircraft training activity would be reduced to limited numbers of transients.

3.4 AIR QUALITY

3.4.1 DEFINITION OF RESOURCE

This section discusses air quality considerations and conditions in the area around Cannon AFB in Curry County, New Mexico. It addresses air quality standards and describes current air quality conditions in the region. The potential influence of emissions on regional air quality would typically be confined to the air basin in which the emissions occur. Therefore, the ROI for the West Flightline Alternative is the Pecos-Permian Basin Intrastate Air Quality Control Region (AQCR) (AQCR 155), which includes Chaves, Curry, DeBaca, Eddy, Quay, and Roosevelt counties in New Mexico.

Federal Air Quality Standards. Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety. These federal standards, known as the National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations and were developed for seven "criteria" pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than or equal to 10 micrometers in diameter (PM₁₀), particulate matter less than or equal to 2.5 micrometers in diameter (PM_{2.5}), ozone (O₃), and lead (Pb). The NAAQS are defined in terms of concentration (e.g., parts per million [ppm] or micrograms per cubic meter [µg/m³]) determined over various periods of time (averaging periods). Short-term standards (1-hour, 8-hour, or 24-hour periods) were established for pollutants with acute health effects and generally may not be exceeded more than once a year. Long-term standards (annual periods) were established for pollutants with chronic health effects and may never be exceeded.

Based on measured ambient criteria pollutant data, the USEPA designates areas of the U.S. as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Upon achieving attainment, areas previously in nonattainment are considered to be in maintenance status for a period of 10 or more years. Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis of attainment status. For the purpose of applying air quality regulations, unclassifiable areas are treated similar to areas that are in attainment of the NAAQS.

State Air Quality Standards. Under the CAA, state and local agencies may establish ambient air quality standards and regulations of their own, provided that these are at least as stringent as the federal requirements. The New Mexico Air Quality Bureau (NMAQB) has promulgated the New Mexico ambient air quality standards (NMAAQs) that meet these guidelines and they have adopted standards for pollutants not included in the NAAQS. Table 3.4-1 summarizes the NAAQS and NMAAQs.

TABLE 3.4-1. FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Air Pollutant	Averaging Time	NAAQS		NEW MEXICO
		Primary	Secondary	AAQS
Carbon Monoxide (CO)	8-hour	9 ppm	---	8.7 ppm
	1-hour	35 ppm	---	13.1 ppm
Nitrogen Dioxide (NO ₂)	Annual	0.053 ppm	0.053 ppm	0.05 ppm
	24-hour	---	---	0.10 ppm
Sulfur Dioxide (SO ₂)	Annual	0.030 ppm	---	0.02 ppm
	24-hour	0.14 ppm	---	0.10 ppm
	3-hour	---	0.50 ppm	---
Total Suspended Particulates	Annual	---	---	60 µg/m ³
	30-day	---	---	90 µg/m ³
	7-day	---	---	110 µg/m ³
	24-hour	---	---	150 µg/m ³
Particulate Matter (PM ₁₀) ¹	Annual	---	---	---
	24-hr	150 µg/m ³	150 µg/m ³	---
Particulate Matter (PM _{2.5}) ¹	Annual	15 µg/m ³	15 µg/m ³	---
	24-hour	35 µg/m ³	35 µg/m ³	---
Hydrogen Sulfide (H ₂ S)	1-hr ²	---	---	0.010 ppm
	1/2-hr ³	---	---	0.100 ppm
	1/2-hr ⁴	---	---	0.030 ppm
Total Reduced Sulfur ⁵	1/2-hr ²	---	---	0.003 ppm
	1/2-hr ³	---	---	0.010 ppm
	1/2-hr ⁴	---	---	0.003 ppm
Ozone (O ₃)	8-hour	0.08 ppm	0.08 ppm	---
Lead (Pb) and Lead Compounds ⁶	Calendar Quarter	1.5 µg/m ³	1.5 µg/m ³	---

- Notes: 1. In 2006 the federal annual standard of 50 µg/m³ for PM₁₀ was revoked, and the federal PM_{2.5} standard for the 24 hour averaging time was changed from 65 µg/m³ to 35 µg/m³; the State of New Mexico does not have any standards for PM₁₀ or PM_{2.5}.
2. Entire state except for the Pecos-Permian Air Basin (AQCR 155), which includes De Baca, Chaves, Curry, Quay, and Roosevelt counties.
3. Within the Pecos-Permian Air Basin.
4. Within corporate limits of municipalities in the Pecos-Permian Air Basin, or within 5 miles of the corporate limits of municipalities having a population greater than 20,000 and within the Pecos-Permian Air Basin.
5. Total reduced sulfur does not include Hydrogen Sulfide.
6. The State of New Mexico does not have any standard for lead or lead compounds.

Sources: 40 CFR 50; 20.2.3 New Mexico Administrative Code (NMAC).

State Implementation Plan (SIP). An SIP is a detailed description of the programs a state uses to carry out its responsibilities under the CAA. State implementation plans are collections of the regulations used by a state to reduce air pollution. The CAA requires that USEPA approve each SIP. For attainment, non-attainment regions, and unclassifiable regions, all states are required to develop an SIP designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal of bringing state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state.

Prevention of Significant Deterioration (PSD). Section 162 of the CAA further established the goal of PSD of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas and memorial parks which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have the authority to redesignate certain areas as (non-mandatory) PSD Class I areas (e.g., a national park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres). PSD Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. Class III areas are those designated by the governor of a state as requiring less protection than Class II areas. No Class III areas have yet been so designated. The PSD requirements affect construction of new major stationary sources in areas that attain the NAAQS and serve as a pre-construction permitting system. In attainment and unclassifiable areas, the federal New Source Review (NSR) program is implemented under the PSD preconstruction program requirements of Section 165 of the CAA and the implementing regulations in 40 CFR § 52.21. New Mexico's PSD program regulations that are part of the SIP are contained in 20.2.74 New Mexico Administrative Code (NMAC).

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in PSD Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for Class I areas that will address contributions from mobile sources and pollution transported from other states or regions. Emission levels are used to qualitatively assess potential impairment to visibility in PSD Class I areas. Decreased visibility may potentially result from elevated concentrations of NO₂, particulate matter, and SO₂ in the lower atmosphere.

Stationary Source Operating Permits. In New Mexico, the NMAQB Permitting Section processes permit applications for industries that emit pollutants to the air. The Permitting Section consists of two groups: (1) NSR and (2) Title V. NSR under the NMAC, is subdivided into a number of subcategories including, but not limited to: (1) minor new source review (Minor NSR) (20.2.72 NMAC); (2) PSD (20.2.74 NMAC); (3) new source performance standards (NSPS) (20.2.77 NMAC); (4) national emission standards for hazardous air pollutants (NESHAPS) (20.2.78 NMAC); and (5) nonattainment area new source review (NA NSR) (20.2.79 NMAC). In general, Minor NSR applies to all stationary sources with the potential emission rate greater than 10 pounds per hour, or 25 tons per year (TPY), of criteria pollutants (such as

nitrogen oxides [NO_x] and CO), except as otherwise provided. The exceptions are too numerous to summarize here (e.g., 20.2.72.202 NMAC Exemptions), but they include the majority of emissions sources that are analyzed here in both the existing conditions and environmental consequences sections for air quality. Examples of such exceptions include highway and nonroad mobile sources; 'fire fighter training' (20.2.72.202 A(4)); 'Government military activities such as field exercise, explosions, weapons testing and demolition to the extent that such activities: (a) Do not result in visible emissions entering publicly accessible areas; and (b) are not subject to NSPS or NESHAP (20.2.72.202 A(5))'; and 'Use of portable aerospace ground equipment (such as power generators, compressors, heaters, air conditions, lighting units) in direct support of aircraft operations and or in the immediate vicinity of an airfield (20.2.72.202 A(13))'. Title V of the CAA Amendments of 1990 requires states to issue Federal Operating Permits for major stationary sources. In New Mexico, 20.2.70 NMAC implements the federal Title V Operating Permit program requirements for existing and new major stationary sources. A major stationary source in an attainment or maintenance area is a facility (i.e., plant, base, or activity) that emits more than 100 TPY of any one criteria air pollutant, 10 TPY of a hazardous air pollutant, or 25 TPY of any combination of hazardous air pollutants. The purpose of the permitting rule is to establish regulatory control over large, industrial activities and to monitor their impact upon air quality (NMAQB 2006).

Conformity of General Federal Actions to the State Implementation Plan (20.2.98 NMAC). In nonattainment and maintenance areas in New Mexico, new or modified federal mobile and fugitive sources of emissions that are otherwise exempt from stationary source permitting requirements are subject to General Conformity requirements. The General Conformity requirements do not apply in air quality areas that have always been designated as attainment or unclassifiable for the NAAQS, as CAA § 176(c)(5) limits applicability to nonattainment and maintenance areas.

3.4.2 EXISTING CONDITIONS

Climate. The general climate for the region surrounding Cannon AFB is arid or semi-arid, with light precipitation, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range (Western Regional Climate Center [WRCC] 2006a).

Winds at Cannon AFB are generally moderate in strength and persistent, with an annual average of 12 miles per hour (mph). All months maintain an average wind speed of between 10 and 14 mph, with a maximum occurring in April (WRCC 2006b). Winds are generally westerly from late fall through spring, and then switch to a more southerly direction during the summer and early fall months (WRCC 2006c). Wind speeds and direction can vary greatly on a shorter time-scale due to the effects of air mass frontal passages, severe storms, and interaction with local topography.

Winters in Curry County are cool and dry. January, on average, is the coldest month, and experiences the least precipitation. For the city of Clovis, approximately 8 miles east of Cannon AFB, average high and low temperatures for January are 53 degrees Fahrenheit (°F) and 23°F, and the average monthly precipitation is 0.35 inches. Conversely, summers are much warmer and wetter, with July being the warmest month, and August being the wettest. Average high and low temperatures for July are 97°F and 62°F, and the average recorded rainfall in August is 2.97 inches. The average annual precipitation in Clovis is 16.97 inches. Snow does occasionally fall during the winter months, with a peak average of 1.4 inches in the month of December. The annual average snowfall is 5.1 inches (WRCC 2006d).

Regional Air Quality. Federal regulations at 40 CFR 81 delineate certain AQCRs which were originally based upon population and topographic criteria closely approximating each air basin. The potential influence of emissions on regional air quality would typically be confined to the air basin in which the emissions occur. Therefore, the discussion includes the Pecos-Permian Basin Intrastate AQCR (AQCR 155) as described above in Section 3.4.1.

Attainment Status. The USEPA designates all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. A nonattainment designation generally means that a primary NAAQS has been exceeded more than once per year in a given area. Curry County and AQCR 155 are presently in attainment of all NAAQS and have always attained these standards, due to their general rural nature and lack of substantial emission sources.

PSD Class I Areas. Mandatory PSD Class I areas for the State of New Mexico are listed under 40 CFR 81.421. The nearest PSD Class I area is the Salt Creek Wilderness Area, located approximately 90 miles southwest of Cannon AFB.

Current Air Emissions. Air emissions at Cannon AFB occur from both stationary and mobile sources. Stationary sources at the installation include heating units, generators, engine testing (while engine is not attached to an aircraft), classified waste disintegration, fuel storage and transfer, paint and chemical usage, degreasers, woodworking activities, welding, fuel cell maintenance, abrasive blasting, pesticide application, small arms firing, open detonation of energetic materials, equipment leaks, and barrier engine emissions. The installation is considered to be a minor source under the CAA Amendments, due to the fact that its potential emissions from stationary sources are below the Title V thresholds for major sources. The mobile sources at Cannon AFB include (1) ground-based activities, such as on-road and off-road vehicles, aerospace ground equipment, aircraft trim and power checks and (2) aircraft flying operations, including landings and takeoffs and low approaches.

Table 3.4-2 summarizes the results of an emissions inventory for sources at Cannon AFB for calendar year 2004 (Air Quality Branch, Environmental Analysis Division, Air Force Institute for Operational Health 2005). Nitrogen oxides mainly include NO₂ and NO_x. Because volatile organic compounds (VOCs) and NO_x are precursors to the formation of O₃ in the atmosphere, control of these pollutants is the primary method of reducing O₃ concentrations in the atmosphere. The aircraft flying operations emissions in Table 3.4-2 were calculated using default Air Force combat aircraft time-in-mode data and emission factors (Air Force Institute for Environmental, Safety, and Occupational Health Risk Analysis 2003) and the aircraft trim check emissions were calculated using default number of tests per aircraft and time in mode values per test from the Air Force Air Conformity Applicability Model (ACAM) (Air Force Center for Environmental Excellence [AFCEE] 2005). Although Pb is also a criteria pollutant, it is often not quantified in this analysis because emissions of this pollutant are minimal at Cannon AFB.

TABLE 3.4-2. BASELINE EMISSIONS FOR CANNON AFB

Source	ANNUAL EMISSIONS (TONS PER YEAR)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Stationary ¹	37.98	47.94	30.09	0.78	1.94	1.94
Aircraft Flying Operations ²	7.34	154.40	199.05	6.52	12.07	11.97
Aircraft Engine Testing (Mobile) ³	42.31	70.22	70.18	3.25	4.07	4.04
Commuting ⁴	18.80	258.87	34.27	0.23	0.95	0.61

Notes: 1. 2004 Air Emissions Inventory (Air Quality Branch, Environmental Analysis Division, Air Force Institute for Operational Health 2005). PM_{2.5} assumed to be same as PM₁₀ since there was no determination of PM_{2.5} emissions in the Emissions Inventory.

2. Calculations based on a fleet of 60 F-16s flying a total of 23,105 sorties per year (DOPAA).

3. Calculations based on default total number of tests per aircraft and time in mode per test given by the U.S. Air Force Air Conformity Applicability Model (ACAM), using emission factors from the Air Force Institute for Environmental, Safety, and Occupational Health Risk Analysis. Since these tests are conducted while the engines are on the plane, these are considered mobile sources.

4. Calculated by assuming that all base personnel commute 20 miles round trip, 5 days a week, 50 weeks a year, with an average of 1.1 commuters per vehicle. Emission factors were generated from the USEPA's Mobile6 model, for average conditions at Cannon AFB, and assuming an average mix of vehicles.

VOC = volatile organic compound

3.4.3 ENVIRONMENTAL CONSEQUENCES

The proposed beddown of AFSOC assets would change emissions from Cannon AFB. Air pollutant emissions produced from each project alternative were quantitatively estimated, netted with base case operational emissions that will be removed from the AQCR, and then compared to the criteria identified below to determine their significance. Emission sources associated with the project alternatives would include combustive and/or fugitive dust (PM₁₀) emissions generated by construction or operational activities.

Air quality standards are based on federal, state, and local air pollution standards and regulations. Net emissions impacts would be potentially significant if they equaled or exceeded the PSD major source threshold for new non-listed sources or the major source thresholds for hazardous air pollutants. The PSD threshold for new non-listed major sources of regulated pollutants under the CAA is 250 TPY. New Mexico applies this preconstruction permitting threshold to all new stationary sources of regulated pollutants in attainment areas except for twenty-eight listed source categories, none of which are involved in this action (20.2.74.7 AF(2) and 20.2.74.501 NMAC). The major source thresholds for hazardous air pollutants are 25 TPY for aggregate hazardous air pollutants or 10 TPY for any single hazardous air pollutant (CAA § 112(a)(1)) (NMAQB 2006). This approach is conservative because these thresholds are designed to assess the potential for stationary sources to impact a localized area. However, almost all of the proposed emissions would occur from mobile sources that would spread impacts over a large portion of Cannon AFB and the surrounding area.

If emissions exceeded a significance threshold described above, further analysis of the emissions and their consequences would be performed to assess whether there was likelihood of a significant impact on air quality. The nature and extent of such an analysis would depend on the specific circumstances. The analysis could range from simply a more detailed and precise examination of the likely emitting activities and equipment, to air dispersion modeling

analyses. If project emissions were determined to increase ambient pollutant levels from below to above a national or state ambient air quality standard, these emissions would be significant.

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to impact air quality in a nonattainment or maintenance area must undergo a conformity analysis. A conformity analysis is not required in an attainment area. Since Curry County is currently an attainment area for all criteria air pollutants, the West Flightline Alternative does not require a conformity analysis.

As previously discussed, Section 169A of the CAA established the PSD regulations to protect air quality in regions that already meet the NAAQS. Certain national parks, monuments, and wilderness areas have been designated as PSD Class I areas, where appreciable deterioration in air quality is considered significant. The nearest PSD Class I area is the Salt Creek Wilderness Area, located approximately 90 miles southwest of Cannon AFB. Since the project site is so far from this Class I area, the West Flightline Alternative would not be expected to produce any significant air quality impacts upon it, unless net emissions exceeded a significance threshold.

3.4.3.1 WEST FLIGHTLINE ALTERNATIVE

The West Flightline Alternative would involve transfer of AFSOC aircraft to Cannon AFB. The fleet would be comprised of at least nine different types of aircraft (see Table 2.1-2). The West Flightline Alternative would also include the construction of new structures to support the different activities associated with AFSOC aircraft.

CONSTRUCTION EMISSIONS

Emissions during the construction period were quantified to determine the potential impacts on air quality in the project area. Calculations of VOCs, NO_x, CO, sulfur oxides (SO_x), and PM₁₀ emissions were performed for each year of construction with the use of emission factors from the USEPA's *MOBILE6.2* (USEPA 2006a) and *NONROAD2005* models (USEPA 2006b). Emissions produced during construction of new buildings include contributions from engine exhaust (i.e., construction equipment and material handling) and fugitive dust (e.g., from ground disturbance). Estimated total emissions that would occur from the annual construction activities under the West Flightline Alternative are presented in Table 3.4-3.

Review of the data in Table 3.4-3 show that the annual emissions of criteria pollutants, as well as the combined total emissions from six years of proposed construction activities, would produce emissions that remain well below the emission significance thresholds of 250 TPY. Additionally, the project construction contractor would comply with BMPs to minimize fugitive dust emissions during construction. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are BMPs that would minimize the amount of dust generated during construction. Using efficient practices and avoiding long periods where engines are running at idle also would reduce combustion emissions from construction equipment.

**TABLE 3.4-3. CONSTRUCTION EMISSIONS AT CANNON AFB -
WEST FLIGHTLINE ALTERNATIVE**

<i>Project Year</i>	TONS PER YEAR					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
2009	0.16	0.86	1.33	0.21	0.70	0.27
2010	0.10	0.51	0.91	0.14	1.19	0.33
2011	1.00	5.50	8.69	1.49	5.24	1.98
2012	0.15	0.84	1.34	0.24	0.85	0.32
2013	0.31	1.71	2.79	0.52	1.89	0.73
2014	0.06	0.32	0.53	0.10	0.38	0.15
All Years Totaled	1.77	9.74	15.58	2.71	10.26	3.77
Significance Thresholds	100	100	100	100	100	100

Emissions associated with construction of the West Flightline Alternative would increase ambient air pollutant concentrations on a localized and short-term basis. However, their relatively low magnitude would not result in any significant air quality impacts in Curry County or the Pecos-Permian Basin Intrastate AQCR (AQCR 155).

OPERATIONAL EMISSIONS

Upon completion of the West Flightline Alternative, air emissions at the Cannon AFB would change because the new aircraft would produce emissions at a different rate compared to the current primary assigned aircraft. Other base emissions, including contributions from stationary sources and commuting of personnel, are expected to increase as the operations increase with the addition of new aircraft and personnel. It is also possible that the installation or modification of any air emission sources, such as boilers and heaters, emergency generators, paint booths, degreasers, etc., may be subject to NMAQB permitting requirements.

Table 3.4-4 summarizes the estimated changes in aircraft emissions for the West Flightline Alternative. Factors used to estimate project aircraft emissions were obtained from the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003). Factors used to determine emissions from commuting vehicles were generated using the *MOBILE6* model (USEPA 2006a). The data in Table 3.4-4 show that the West Flightline Alternative would reduce emissions of all criteria pollutants from current levels at Cannon AFB. Due to the estimated decrease in emissions, the West Flightline Alternative would not produce any significant air quality impacts in Curry County and the AQCR.

**TABLE 3.4-4. CHANGE IN OPERATIONAL EMISSIONS AT CANNON AFB –
WEST FLIGHTLINE ALTERNATIVE**

Source	TONS PER YEAR (1)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Stationary	11.11	14.02	8.80	0.23	0.57	0.57
Aircraft Flying Operations	5.67	(113.44)	(172.76)	(3.39)	0.45	0.45
Aircraft Engine Testing (Mobile)	(40.87)	(62.91)	(47.74)	(1.32)	1.27	1.26
Commuting	5.50	75.72	10.03	0.07	0.28	0.18
Total Change	(18.59)	(86.61)	(201.68)	(4.41)	2.57	2.45
Significance Thresholds	100	100	100	100	100	100

Note: (1) Parentheses represent a reduction in emissions from current levels.

3.4.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

The East and West Airfield Alternative is essentially the same as the West Flightline Alternative except for construction location and a few facility differences. All operational emissions, including those from stationary sources, commuting, and aircraft operation would be the same as in the West Flightline Alternative.

CONSTRUCTION EMISSIONS

While the East and West Airfield Alternative proposes a different area of the base for development, most of the structures that would be built are the same as in the West Flightline Alternative. The few differences that do exist were applied to the emission source data and using the same calculation methods as outlined with the West Flightline Alternative, emissions were estimated for each year during the projected construction period. Estimated annual emissions that would occur from construction under the East and West Airfield Alternative are presented in Table 3.4-5. Review of these data show that the combined total emissions from seven years of proposed construction activities would produce emissions that remain well below the emission significance thresholds of 100 TPY.

**TABLE 3.4-5. CONSTRUCTION EMISSIONS AT CANNON AFB –
EAST AND WEST AIRFIELD ALTERNATIVE**

<i>Project Year</i>	EMISSIONS (TONS PER YEAR)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
2009	0.25	1.32	2.04	0.32	1.08	0.41
2010	0.10	0.51	0.91	0.14	1.19	0.33
2011	0.58	3.19	5.04	0.87	3.04	1.15
2012	0.23	1.29	2.06	0.37	1.31	0.50
2013	0.31	1.71	2.79	0.52	1.89	0.73
2014	0.06	0.32	0.53	0.10	0.38	0.15
Project Totals	1.52	8.34	13.36	2.33	8.89	3.26
Significance Thresholds	100	100	100	100	100	100

Emissions from construction of the East and West Airfield Alternative would increase ambient air pollutant concentrations on a localized and short-term basis. However, as with the West Flightline Alternative, their relatively low magnitude would not result in any significant air quality impacts in Curry County or the Pecos-Permian Basin Intrastate AQCR (AQCR 155).

OPERATIONAL EMISSIONS

Operational emissions produced from the East and West Airfield Alternative would be the same as those estimated for the West Flightline Alternative, and thus would not produce any significant air quality impacts in Curry County or the AQCR.

3.4.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, no construction emissions would occur and the installation's operational emissions would be identical to current baseline presented in Section 3.4.2 until the F-16 aircraft depart. After that, emissions would be reduced. The No Action Alternative would produce less than significant air quality impacts.

3.5 PHYSICAL RESOURCES

3.5.1 DEFINITION OF RESOURCE

Physical resources include a description of earth (topography, geology, and soils), water, and hazardous material and waste. Topography characterizes surface form of the landscape and provides a description of the physical setting. Geologic resources include subsurface and exposed rock. The inherent properties of local bedrock affect soil formation and properties, groundwater sources and availability, and terrain. Soils include particulate unconsolidated materials formed from in place the underlying bedrock or other parent material or transported from distant sources via wind and water. Soils play a critical role in the natural and human environment, affecting vegetation and habitat, water and air quality, and the success of the construction and stability of roads, buildings, and shallow excavations. Water resources include surface water, such as lakes, rivers, streams and wetlands and groundwater (subsurface hydrologic resources.) These resources may have scientific, historical, economic, ecological and recreational value.

Typically, issues relevant to water resources include the quality and quantity of downstream water bodies potentially affected and hazards associated with 100-year floodplains delineated in accordance with Executive Order (EO) 11988, *Floodplain Management*. EO 11988, *Floodplain Management*, requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains.

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Occupational Safety and Health Administration (OSHA); and the Emergency Planning and Community Right-to-Know Act (EPCRA). Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals. Hazardous waste is defined in the Resource Conservation and Recovery Act (RCRA) as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes, that could or do pose a substantial hazard to human health or the environment.

Waste may be classified as hazardous due to its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263.

The ROI for this resource is primarily Cannon AFB. However, descriptions of topography and geology are described in a regional context to depict the setting. Soils and water resource information provided is site-specific, focusing on the properties most likely to be affected or to have an effect on construction of the facilities planned under the West Flightline Alternative.

3.5.2 EXISTING CONDITIONS

3.5.2.1 EARTH RESOURCES

Cannon AFB is located within the Southern High Plains Major Land Resource Area on the western edge of the Great Plains. The topography of the base consists of nearly level landscape dominated by a southeastern downslope of 0-2 percent (Air Force 1997a, USDA Soil Conservation Service [SCS] 1980). The high point on the base is 4,330 feet; the low is 4,260 feet above sea level. The Southern High Plains is underlain by nearly horizontal sedimentary rocks that have been covered by alluvial and aeolian deposits (Air Force 2003a).

In general, the semi-arid climate of the region contributes to the development of thin topsoil with low organic content, underlain at relatively shallow depths by a leached clay-carbonate hardpan. The soils within major portions of the base contain caliche layers, and all have well-developed soil horizons or layers, indicating they formed in place over a long period of time. Soils in the project areas associated with the West Flightline Alternative are classified as Amarose fine sandy loam, 0-2 percent slope. Amarose soils are very deep, well-drained, moderately permeable soils that formed in calcareous loamy materials (Natural Resources Conservation Service [NRCS] 2004, Air Force 1997a). A secondarily deposited calcium carbonate horizon variably develops at depth of between 30 to 60 inches. Amarose soils formed in eolian (windborne) deposits from the Blackwater Draw Formation.

Soil physical and chemical characteristics determine their potential for wind and water erosion, and the soil's suitability for siting buildings, roads, and pipelines, which are important factors to consider when planning for construction and stabilization of disturbed areas. Table 3.5-1

summarizes the important soil hazards and limitations that should be taken into account during site planning in Amarose fine sandy loam.

**TABLE 3.5-1. AMAROSE FINE SANDY LOAM HAZARDS AND LIMITATIONS
FACILITY RELATED TO CONSTRUCTION**

HAZARD RATINGS		LIMITATIONS		
<i>Water Erosion</i>	<i>Wind Erosion</i>	<i>Roads</i>	<i>Shallow Excavations</i>	<i>Commercial Buildings</i>
Moderate	Moderate	Slight	Slight	Slight

Source: NRCS 1997

3.5.2.2 WATER RESOURCES

There are no major drainageways or perennial streams on Cannon AFB. No 100-year floodplains have been delineated on Cannon AFB. Surface water runoff on Cannon AFB is managed through a stormwater system consisting of a combination of swales, inlets, culverts, and pipes currently having adequate capacity to handle flows. Currently, stormwater discharges are managed in compliance with the National Pollutant Discharge Elimination System (NPDES) requirements for construction activity under a program administered by the USEPA. Cannon AFB has certification under an NPDES General Permit for Stormwater Discharges. Based on a recent (22 June 2006) review, Cannon AFB was determined to have no jurisdictional waters of the U.S. Water bodies and drainages within the Cannon AFB ROI are isolated and not subject to regulation under the Clean Water Act (CWA). Construction activities do not require site-specific stormwater pollution prevention plans or permitting under Section 404 of the CWA. See Section 3.6 for a further discussion of waters habitats.

The watershed in which Cannon AFB is located drains towards the Brazos River in Texas. However, little or no surface water reaches receiving waters from the High Plains in eastern New Mexico due to the low annual precipitation and high evaporation rates (Air Force 2003a). Surface waters at Cannon AFB are isolated from jurisdictional waters of the U.S.

The Ogallala Aquifer is the principal aquifer system underlying the region and provides the primary source of domestic water. It occurs chiefly in the Ogallala Formation, a thick geologic formation composed of late Miocene to early Pliocene clay, silt, sand, and gravel layers, sometimes cemented by calcium carbonate and silica with a caprock of caliche at the top (North Plains Groundwater District 2004). Regional groundwater levels have declined for the past 65 years with an average annual decline slightly over 2 feet. These declining regional water-level data likely indicate groundwater withdrawals from the resource exceeded recharge (U.S. Geological Survey [USGS] 2006). A long-term project to bring surface water via pipeline from Ute Reservoir to Curry and Roosevelt counties is under consideration for funding by the state.

3.5.2.3 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials. The majority of hazardous materials used by Air Force and contractor personnel at Cannon AFB are controlled through an Air Force pollution prevention process called the Pollution Prevention Program Plan (P2 Program Plan). This process provides centralized management of the procurement, handling, storage, and issuing of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials. The P2 Program Plan process includes review and approval by Air Force personnel to ensure users are aware of

exposure and safety risks. Base management plans further serve to ensure compliance with applicable federal, state, and local regulations.

Aircraft flight operations and maintenance, as well as installation maintenance, require the storage and use of many types of hazardous materials. These materials, such as flammable and combustible liquids, include acids, corrosives, caustics, glycols, compressed gases, aerosols, batteries, hydraulic fluids, solvents, paints, pesticides, herbicides, lubricants, fire retardants, photographic chemicals, alcohols, and sealants.

Hazardous Waste. Cannon AFB is a large-quantity hazardous waste generator, generating more than 2,200 pounds of hazardous waste per month. Hazardous wastes are generated from a variety of functions on base, including aircraft and vehicle operations and maintenance (hydraulic and lubricating oils and JP-8 jet fuels); medical and dental facilities; morale, welfare, and recreation; and security operations. These wastes include solvents, metal-contaminated spent acids, and sludge from wash racks. Cannon AFB recycles lubricating fluids, batteries, oil filters, absorbents with petroleum products and JP-8 grade fuel. Hazardous wastes generated are managed in accordance with the Cannon AFB Hazardous Waste Management Plan, Plan 32-2, dated 2006.

Generators of hazardous wastes are responsible for properly segregating, storing, characterizing, labeling, marking, packaging, and transferring all hazardous wastes for disposal from the initial accumulation point (IAP) to the established 90-day storage area according to federal, state, local, and Air Force regulations. There are approximately 96 IAPs located on base and 89 to 114 established waste streams; the present number may vary with changes in operational procedures and management practices. Approximately 12,000 pounds of hazardous wastes were disposed of in calendar year 2005 (personal communication, Wood 2006).

Cannon AFB closed their Hazardous Waste Storage facility, Building 226. The Part B storage building approved as "clean closed" by the New Mexico Environment Department (NMED) on September 19, 2003. Installation waste generators manage their respective waste generations in containers with a maximum quantity of 55 gallons, at or near the point of generation and under the control of the process operator. Full containers are removed from the accumulating area and transferred to the less-than-90-day interim storage on site. Later, the hazardous waste generation is shipped off site on a manifest to an approved Treatment Storage Disposal Facility permitted to accept the waste. Return signed and dated manifests complete the paperwork trail for all off-site waste shipments.

Cannon AFB has a Facility Response Plan, which addresses on-base storage locations and proper handling procedures of all hazardous materials to minimize potential spills and releases. The plan further outlines activities to be undertaken to minimize the adverse effects of a spill, including notification, containment, decontamination, and cleanup of spilled materials. The plan meets the Federal Spill Prevention Control and Countermeasures (SPCC) requirements.

Storage Tanks. There are currently 64 aboveground storage tanks (ASTs) located at Cannon AFB (personal communication, Smith 2006). No underground storage tanks (USTs) are located at Cannon AFB. The ASTs range in size and function from a 132-gallon diesel fuel tank used for an emergency generator to an 840,000-gallon fuel tank used for aircraft fuel storage.

Solid Waste Management. Solid waste generated on Cannon AFB is removed by contract services to either the Clovis Regional Landfill or the Cannon AFB Recycling Center. The

Cannon AFB Recycling Center is located in the southwest corner of the base, just east of Perimeter Road. In Fiscal Year (FY) 2005, Cannon AFB generated 13,998 tons of solid waste and diverted 299 tons to mulch. The base also generated 10,112 tons of construction and demolition debris and diverted 7,747 tons for recycling (personal communication, Madril 2006). Clovis Regional Landfill is a sanitary landfill, but also accepts construction and demolition waste. In 2006, this facility received 260 tons per day of wastes, excluding special wastes. The current disposal area has a remaining useful life of approximately 5 years and there are additional lands available for expansion with the approved landfill site (personal communication, Wang 2006).

Asbestos. Asbestos-containing materials (ACMs) are those materials that contain greater than 1 percent asbestos. Friable, finely divided, and powdered wastes containing greater than 1 percent asbestos are subject to regulation. Friable waste is one that can be reduced to a powder or dust under hand pressure when dry. Non-friable ACMs, such as floor tiles, are considered to be non-hazardous, except during removal and/or renovation, and are not subject to regulation.

An asbestos management plan provides guidance for the identification of ACMs and the management of asbestos wastes. An asbestos facility register is maintained by the base Civil Engineer. The design of building alteration projects and requests for self-help projects are reviewed to determine if ACMs are present in the proposed work area. ACM wastes are removed by contractor and disposed of in accordance with state and federal regulations.

RCRA/Defense Environmental Restoration Act (DERA). Cannon AFB underwent a RCRA Facility Assessment in 1987 as the result of an application for a RCRA Part B Permit to store hazardous waste and 128 Solid Waste Management Units (SWMUs) and 52 Areas of Concern (AOCs) were identified. Currently, there remain 44 SWMUs and 3 AOCs on Cannon AFB. Recently, 23 RCRA sites and 11 sites regulated under the DERA were categorized by NMED as No Further Action (NFA). The Cannon AFB Management Action Plan (Air Force 2004a) summarizes the current status of the base environmental programs, including and presents a comprehensive strategy for implementing actions necessary to protect human health and the environment. The Plan also identifies that the base is covered with a layer of unconsolidated alluvium deposits that overlie a 25- to 60-foot-thick layer of caliche. The caliche is underlain by unconsolidated silts, sands, and gravels up to depths of 400 feet below ground surface. Groundwater occurs at approximately 280 feet below ground surface and is part of the Ogallala Aquifer. Groundwater levels have been dropping at a rate of 2 feet per year as a result of pumping patterns during the last 40 years. Given these geologic and hydrologic conditions along with the lack of substantial precipitation soil and groundwater contamination is limited within Cannon AFB.

Construction and demolition to support the AFSOC beddown would take place at or near several Environmental Restoration Program (ERP) sites (SD-15, SS-18, SS-19 and ST-27) described below and near many of the remaining SWMUs. Waivers for construction on or near these sites or other RCRA sites will need to be submitted by AFSOC to the NMED.

ERP Site SD-15 is an Aerospace Ground Equipment (AGE) Drainage Ditch remaining after railroad tracks were removed in the late 1960s. This site originated on the northwest corner of Building 184 and ran parallel to the flightline sides of Buildings 186, 191, 192, and 193. In 1991, approximately 400 feet of the ditch nearest to Building 192 was filled and covered with concrete due to nearby construction. The ditch currently receives stormwater runoff from flightline operations and nearby roads. Sampling Investigations (SI) conducted in 1982 identified oil and grease contamination. A Remedial Investigation (RI) was conducted in 1992 and a Class 3

Permit Modification Request for NFA was submitted in September 2000. A Record of Decision (ROD)/Decision Document (DD) was submitted in 1996; this site is considered closed.

ERP Site SS-18 is a JP-4 Fuel Spill site that occurred on the south apron southwest of Building 120. Building 120 was moved to another location and a new facility constructed over the site. Approximately 400 gallons of JP-4 fuel spilled onto the apron from a broken fuel coupling on an aircraft fuel tank in 1980. A Draft Supplemental Assessment Report is being reviewed; four soil samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), and lead. All concentrations below current NMED residential soil screening levels (SSLs); and an NFA recommended. After NMED's approval of the Final Supplemental Assessment Report, the site will be removed from the permit when Cannon submits its next Class 3 Permit Modification Request.

ERP Site SS-19 is the site of two motor gasoline (MOGAS) spills (2,000 - 3,000 gallons) from overturned fuel trucks. These spills occurred in the early 1960s at the site location of Argentinia Avenue southeast of Building 444. A portion of this spill site is located under Argentinia Avenue. An SI was conducted in 1985; an RI was conducted in 1992; a Feasibility Study (FS) was conducted in 1996; and a ROD/DD was submitted in 1996 indicating NFA was needed. After NMED's approval of the Final Supplemental Assessment Report, the site will be removed from the permit when Cannon submits its next Class 3 Permit Modification Request.

ERP Site LF-25 is a concrete rubble pile covering approximately 30 acres adjacent to the perimeter road on the east area of the base. This site is located adjacent to the site for construction of the raw water distribution system. The rubble consists mainly of materials from demolished World War II era facilities (bricks, concrete blocks, and asphalt road and runway material). Two or more cut-and-burn landfill trenches were located under the rubble. In FY 2000, an abatement project removed all asbestos siding and concrete rubble and covered the site with topsoil. An RI was conducted in 1992; an FS was conducted in 1995, and a ROD submitted in 1996. Long-term monitoring continues and NFA will be requested for this site. This site is considered closed.

ERP Site ST-26 was originally constructed as the base gas station during World War II. The records are scanty for this location but original drawings do show that two USTs were originally planned to be installed. However, when the location was used as a solvent disposal site only one UST is mentioned. It could not be determined whether the second tank was removed or was not installed. When a new gas station was constructed around 1965, the facility was partially demolished and at least one UST of 20,000 gallons was left in place and used for waste solvent disposal. The location around the 20,000-gallon UST was identified as Facility 4028. The Aboveground Overflow Capacity Tank (SWMU 48b) was an adjacent 2,000-gallon tank that was brought in to provide overflow protection for the underground tank. These tanks were on the northeast lot at the corner of Torch Boulevard and Argentinia Boulevard. They were active as solvent disposal tanks from approximately 1965 to 1984. Prior to 1965, the 20,000-gallon tank was used as a fuel tank for the base gas station. A Resource Conservation and Recovery Act Facility Investigation (RFI) has been submitted to NMED and once comments are received further actions will be determined.

ERP Site ST-27 is a sump located just off the southern edge of the south ramp. The location for this old sump is now surrounded by concrete pavement or concrete pads on the north, east, and south. It is a 22-feet by 22-feet dirt and grass covered area between the telephone pole to the north and the new hazardous waste accumulation area to the south. The area was deliberately

left uncovered to facilitate future investigations; otherwise the hazardous waste accumulation facility would have been constructed over it. This sump was still in existence when the ERP and RFI programs started and was described as being located 120 feet west of Building 120. Building 120 along with Buildings 113, 114, 118, and 119 were moved to a new location on-base and the new small aircraft maintenance dock constructed over the old sites. The sump was self-contained and measured approximately 6 feet by 8 inches by 5 inches and was constructed in a 12-foot by 14-foot concrete pad.

During the construction of the small aircraft maintenance dock, the only thing found remaining was a French drain that was apparently constructed in the bottom of the sump. This French drain consisted of a gravel filled pit 1 foot wide and at least 5 feet long. The total length was not uncovered and the depth is unknown. The gravel was completely covered with black oily wastes and is now covered with up to 2 feet of clean soil. This oily gravel could be relocated by digging trenches east to west across the grassy area. The purpose of the sump, potential contaminants, and the date of construction are unknown; however, it apparently received drainage off the south ramp. NMED reviewed November 2004 NFA document and the site was removed from the permit on 31 December 2006.

3.5.3 ENVIRONMENTAL CONSEQUENCES

3.5.3.1 WEST FLIGHTLINE ALTERNATIVE

EARTH RESOURCES

Due to the great depth to bedrock in the locations of the proposed facilities, it is unlikely that potential impacts could occur to geologic resources. Under the West Flightline Alternative, newly constructed facilities and facility upgrades would disturb approximately 342 acres. Only a portion of the acreage disturbed would occur in any one year.

Due to the relatively flat terrain at Cannon AFB, little cut and fill would be needed to prepare the sites for facility construction. In any construction, the natural soil horizons would be disturbed if they have not already been disturbed from previous construction. There would be few hazards or limitations to construction of buildings or roads on the soil types at the locations of the proposed facilities. Potential secondary effects from surface-disturbing activities, such as increases in stormwater runoff or offsite sedimentation, would be minimized through the installation and maintenance of standard construction practices and landscaping. While soils would be changed by construction activities, the effects would be localized and would not result in significant secondary impacts to water resources because standard construction practices would be implemented.

WATER RESOURCES

At Cannon AFB, approximately 20 acres of additional impervious surface from new buildings and parking lots would increase stormwater runoff during precipitation events. Approximately 10 acres of new buildings and parking areas would be interspersed between existing base buildings and stormwater from these facilities would be handled with a combination of existing storm drains and newly installed infrastructure. Two projects, the Hot Cargo Pad and the CV-22 ramp, would make up the remaining 10 acres of new impervious surface. Stormwater flows from these two projects would generate a combined peak flow of 37.8 cubic feet per second (cfs) during a 25-year 24 hour storm event. These flows would be dispersed to reduce

the potential for erosion. At Cannon AFB, the flat terrain and permeable soils would allow much of the surface water to infiltrate before leaving the base.

Although no site-specific stormwater pollution plans are required for construction under the West Flightline Alternative, stormwater design and planning would identify standard construction practices appropriate for the site and soil type to be implemented during construction to minimize wind erosion and off-site sedimentation due to water erosion, and to keep increases in surface water runoff to a minimum. After construction has been completed, all disturbed areas would be stabilized with landscaping, most likely combinations of native plants and gravel ground cover, which would minimize erosion and improve infiltration of precipitation. BMPs would reflect Cannon AFB's long history of sound natural resource stewardship.

HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials. Construction and demolition of facilities to support the AFSOC beddown may require the use of hazardous materials by contractor personnel. In accordance with Cannon AFB Hazardous Materials Pharmacy (HAZMART) procedure, copies of Material Safety Data Sheets must be provided to the base contracting office (27 CONS) and maintained on the construction site. Project contractors would comply with federal, state, and local environmental laws and would employ affirmative procurement practices when economically and technically feasible.

All hazardous materials and construction debris generated by the proposed projects would be handled, stored and disposed of in accordance with federal state and local regulations and laws. Contractors will obtain permission from the base to store hazardous materials required to complete facility construction. Contractors will obtain appropriate storage cabinets for hazardous material storage.

Hazardous Waste. Contractor personnel may generate hazardous waste during construction. Storage and disposal of these wastes would be the responsibility of the site contractor. Generation of appreciable amounts of hazardous wastes from AFSOC projects is not anticipated. However, IAPs encountered in buildings scheduled for demolition would be relocated to the new locations associated with hazardous waste generation. Any soil suspected of contamination discovered during the construction or demolition process, would be tested and disposed of in accordance with proper regulations.

In the event of fuel spillage during construction, the contractor would be responsible for its containment, clean up, and related disposal costs. The contractor would have sufficient spill supplies readily available on the pumping vehicle and/or at the site to contain any spillage. In the event of a contractor related release, the contractor shall immediately notify the AFSOC CES/Environmental Management Office and take appropriate actions to correct its cause and prevent future occurrences.

Forward Area Refueling Points (FARP) will be adapted on existing flightline areas for training for contingency operations. FARP training will consist of passing fuel from one aircraft to another using fuel lines designed for such transfers. Operations safety and spill plans will be adapted for each site prior to the start of these training procedures.

ACMs have been identified in Buildings 12, 102, 206, 155, 622/622A, and 680 (personal communication, Hamilton 2006). Construction at these facilities may disturb ACMs, and if so,

then the following federal and state regulations must be followed if ACMs or lead-based paint are found in or near the demolition areas.

- **Asbestos Removal and Disposal.** Upon classification as friable or non-friable, all waste ACM should be disposed of in accordance with the New Mexico Solid Waste Management Regulations (20NMAC9.1), and transported in accordance with the New Mexico regulations governing Transportation of Hazardous Materials (20NMAC9.1 et seq.).
- **Lead-Based Paint Removal and Disposal.** The proposed project should comply with the U.S. Department of Labor, OSHA regulations, and with the USEPA regulations addressing Lead: Management and Disposal of Lead-Based Paint Debris (40 CFR Part 745).

Storage Tanks. Certain AFSOC projects may require the installation of ASTs to support proposed operations and new emergency power generators. These fuel tanks will be constructed and managed in accordance with existing Cannon AFB procedures.

Solid Waste Management. Demolition of the facilities would generate solid wastes consisting of concrete, brick, wood, structural steel, glass, and miscellaneous metal building components. These materials would be generated during a 5-year period from FY 2008 through FY 2014. Demolition contractors would be directed to mulch or recycle materials to the maximum extent possible, thereby reducing the amount of demolition debris disposed in landfills. Based on the Cannon AFB FY 2003 experience, approximately 48 percent of the demolition materials generated by the AFSOC projects would be recycled. Materials not suitable for recycling would be taken to a landfill permitted to handle construction debris wastes, such as the Cannon AFB Recycling Center and Clovis Regional Landfill. Construction of new facilities would also generate debris, and based on studies conducted by USEPA (USEPA 1998), construction during the FY 2008 through FY 2014 timeframe would average 1.6 tons per day. Disposal of these wastes at the Clovis landfill would increase the daily flow by less than 1 percent and would not have a significant impact to the operating life of the landfill. No significant environmental consequences would result from the implementation of the West Flightline Alternative.

RCRA/DERA. Construction and demolition associated with AFSOC projects would occur on or near ERP Sites SD-15, SS-18, SS-19, LF-25, ST-26 and ST-27 and in close proximity to a number of SWMUs. The base would request a waiver to construct on or near these sites. Any soil suspected of contamination would be disposed of in accordance with proper NMED regulations. Disposal of contaminated soil would be funded by this beddown project. Construction of the Hot Cargo pad would also require the closure and cleanup of the existing CATM range. This action would require the removal of lead from the soil and the recycling of the lead and would be coordinated with the NMED.

3.5.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

EARTH RESOURCES

Impacts analysis would be similar to the West Flightline Alternative. Under this alternative, approximately 284 additional acres would be disturbed. Due to the relatively flat terrain at Cannon AFB, little cut and fill would be needed to prepare the sites for facility construction. In any construction, the natural soil horizons would be disturbed if they have not already been disturbed from previous construction. There would be few hazards or limitations to

construction of buildings or roads on the soil types at the locations of the proposed facilities. Potential secondary effects from surface-disturbing activities, such as increases in stormwater runoff or off-site sedimentation, would be minimized through the installation and maintenance of standard construction practices and landscaping.

While soils would be changed by construction activities, the effects would be localized and would not result in significant secondary impacts to wind or water resources because standard construction practices would be implemented. No significant impacts to physical resources would result from the implementation of the East and West Airfield Alternative.

WATER RESOURCES

Under this alternative, approximately 150 acres of additional impervious surface from new buildings and parking would increase stormwater runoff during precipitation events. During a 25-year 24-hour storm event, it is anticipated that approximately 350 cfs of stormwater would be generated from the new impervious surface. This additional stormwater runoff would be managed by directing the stormwater to an area that would allow for the stormwater to infiltrate the permeable soils found on Cannon AFB.

Although no site-specific stormwater pollution plans are required for construction under this Alternative, project planning would identify standard construction practices appropriate for the site and soil type to be implemented during construction to minimize wind erosion and off-site sedimentation due to water erosion and to keep increases in surface water runoff to a minimum. After construction has been completed, all disturbed areas would be stabilized with landscaping, most likely combinations of native plants and gravel ground cover, which would minimize erosion and improve infiltration of precipitation. BMPs would reflect Cannon AFB's long history of sound natural resource stewardship. In compliance with the USEPA General Permit for Stormwater Discharges, this additional stormwater runoff would be managed to keep quantities to pre-development conditions where practicable. Even if additional stormwater runoff were generated, the improved storm drain system, constructed in conjunction with new facilities, would be designed to handle additional flows. At Cannon AFB, the flat terrain and permeable soils would cause much of the surface water to infiltrate before leaving the military properties.

HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials. Under this alternative, construction and demolition of facilities to support the AFSOC beddown would be slightly greater and may require the use of hazardous materials by contractor personnel. All hazardous materials, hazardous wastes, and storage tanks would be handled as described for the West Flightline Alternative.

Solid Waste Management. Demolition of the facilities would generate solid wastes consisting of concrete, brick, wood, structural steel, glass, and miscellaneous metal building components. These materials would be handled as described for the West Flightline Alternative.

RCRA/DERA. Under this alternative, construction and demolition would be as described for the West Flightline Alternative.

3.5.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. No construction or demolition would occur.

Physical resources would remain the same as current conditions. Management of hazardous wastes or materials would continue assuming Cannon AFB were managed in an enclave status.

3.6 BIOLOGICAL RESOURCES

The term "biological resources" refers to non-domestic organisms that may be found within and potentially affected by specified project areas on Cannon AFB. The biological resources category includes all native and introduced plant and animal species and the habitats, including wetlands, within which they occur. Functional groups of species that are linked by ecological processes within a defined area are referred to as ecological communities. These communities may be either terrestrial or aquatic.

Terrestrial communities consist of plant and animal species whose life history strategies include little or no aquatic component. In contrast, aquatic communities consist of plant and animal species whose dominant life history pattern features an aquatic component; the term also considers the water associated with these species. Most ecological communities are distinguished by a characteristic assemblage of dominant plant species. The spatial and functional portion of a community within which a species obtains its required resources (nutrients, water, shelter, space, temperature, etc.) is defined as its habitat. Within an ecological setting the quality and attributes of available habitat determine wildlife composition, diversity and abundance. Habitat requirements, species interactions and tolerance establish observed distribution and abundance patterns of individual species. For this reason, habitat type, quality, and area affected will provide the dominant perspective in establishing baseline conditions and assessing potential impacts.

Ecological communities and the species they support are presumed to have intrinsic value. They are sources of biological diversity, important for nutrient, water and atmospheric gas cycling, and are linked to regional and global ecosystem functions; they also provide aesthetic, recreational and socioeconomic values to society. This biological resources section focuses on animal species and vegetation types that typify or are important to the function of the ecosystem, are of special societal importance, or are listed as endangered or threatened under federal or state law or statute. These resources are organized into three major categories: (1) terrestrial ecological communities, including animals and plants, (2) wetlands, and (3) special-status species. As stated above, a habitat-level perspective will govern both descriptions of existing conditions and analyses. The following defines the wetland and special status species categories.

Wetlands are a special category of Waters of the U.S. and are subject to regulatory authority under Section 404 of the CWA and EO 11990, *Protection of Wetlands*. Jurisdictional wetlands are those defined by the U.S. Army Corps of Engineers (USACE) and USEPA as meeting all the criteria defined in the USACE's *Wetlands Delineation Manual* (Environmental Laboratory 1987) and fall under the jurisdiction of the USACE. Recent Supreme Court decisions and subsequent guidance have determined that isolated wetlands do not have jurisdictional status and are not subject to regulation under Section 404 of the CWA. On 22 June 2006, the USACE determined that Cannon AFB does not have any jurisdictional waters of the U.S.

Special-status species are defined as those plant and animal species listed as threatened, endangered or candidate for listing by the USFWS, as well as those species with comparable state levels of legal protection. The Endangered Species Act (ESA) protects federally listed threatened or endangered plant and animal species. Candidate species are species that USFWS

is considering for listing as federal threatened or endangered but for which a proposed rule has not yet been developed. Candidates do not benefit from legal protection under the ESA. The USFWS encourages federal agencies to consider candidate species in their planning process because they may be listed in the future and, more importantly, because current action may prevent future listing.

The New Mexico Wildlife Conservation Act (1978) provides for the listing of species at risk within the state as endangered or threatened. New Mexico Department of Game and Fish (NMDGF) maintains a list of endangered and threatened fish and animals. The New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) manages state-listed plants. Other states provide similar species conservation frameworks. Typically state and federal lists have considerable overlap, but occasionally a state may provide more protection than is required at the federal level.

REGULATORY SETTING FOR BIOLOGICAL RESOURCES

ENDANGERED SPECIES ACT

The ESA of 1973 (16 USC §§ 1531-1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened or endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require formal consultation with the USFWS under Section 7 of the Act.

The consultation requirements of Section 7 of the Act are to ensure that actions of Federal agencies will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats. Before initiating an action, the Air force must ask the USFWS to provide a list of threatened, endangered, proposed, and candidate species and designated critical habitats that may be present in the project area. If the USFWS answers that no species or critical habitats are present, then the Air Force has no further obligation under the consultation provisions of the Act, and "consultation" is concluded. If a species is present, then the Air Force must determine whether the project *may affect* a listed species. If so, further consultation is required. If the Air Force determines (and USFWS agrees) that the project *does not adversely affect* any listed species then the consultation (informal to this point) is concluded and the decision is put in writing. If the Air Force determines the project *may adversely affect* a listed species or designated critical habitat, "formal consultation" is required. Letters were sent to the appropriate USFWS offices informing them of the West Flightline Alternative and alternatives and requesting data regarding applicable protected species (Appendix C).

CLEAN WATER ACT

The CWA of 1977 (33 USC § 1251 *et seq.*) and the USEPA Stormwater General Permit regulate pollutant discharges that could affect aquatic life forms or human health and safety. Section 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Section 404 regulates development in streams and wetlands and requires a permit from the USACE for dredging and filling in wetlands. Based on a recent USACE determination (USACE 2006), inundated areas on either Cannon AFB or Melrose AFR are considered components of isolated drainages and not classified as jurisdictional waters of the U.S. No wetlands, currently defined by USACE, occur at either Cannon AFB or Melrose AFR.

MIGRATORY BIRD TREATY ACT (16 USC 703 ET SEQ.) AND EO 13186

The Migratory Bird Treaty Act (MBTA) prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). Taking, as defined by USFWS, does not include habitat destruction or alteration as long as these activities do not lead to the direct take of birds, nests, eggs or their parts. The MBTA governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for certain purposes, such as educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent overuse. Eighty-three percent of all native bird species are protected by MBTA. Section 315 of the FY 2003 National Defense Authorization Act (signed 2 December 2002) provided DoD a one-year exemption from the incidental take during "military readiness activities" and directed USFWS to develop a rule governing these activities.

The final rule (published in the *Federal Register* on 28 February 2007) became effective on 30 March 2007. It authorizes incidental take of migratory birds that may result from military readiness training and requires DoD:

- To assess the adverse effects of military readiness activities on migratory birds.
- To confer and cooperate with USFWS to develop appropriate and reasonable conservation measures to minimize, mitigate and identify significant adverse effects on a population of migratory bird species of concern.
- To monitor the effects of military readiness activities on migratory bird species of concern and conservation measures.

EO 13186 (effective January 10, 2001) outlines the responsibilities of federal agencies to protect migratory birds, in accordance with the MBTA, the Bald and Golden Eagle Protection Acts, the Fish and Wildlife Coordination Act, ESA, and NEPA. This order specifies the following:

- Established the USFWS as the lead for coordinating and implementing EO 13186;
- Requires federal agencies to incorporate migratory bird protection measures into their activities;
- Requires federal agencies to obtain permits from USFWS before any "take" occurs, even when the agency intent is not to kill or injure migratory birds; and
- Requires federal agencies to develop and implement a Memorandum of Understanding (MOU) with USFWS that promotes the conservation of migratory birds.

SIKES ACT (16 USC 670)

The Sikes Act requires military services to establish Integrated Natural Resources Management Plans (INRMPs) to conserve natural resources for their military installations unless the Secretary of the service concerned determines that in the absence of significant natural resources on a particular installation makes preparation of an INRMP inappropriate. The INRMPs include threatened and endangered species, other fish and wildlife resources, wetlands, migratory bird habitat and forest lands. INRMPs are developed in cooperation with the USFWS and state Fish and Wildlife agencies.

3.6.1 DEFINITION OF CANNON AFB BIOLOGICAL RESOURCES

Biological resource within the Cannon AFB ROI associated with the West Flightline Alternative include those wild species that reside or may occur in some transient fashion on base and may be affected by project related construction and operations. The definition includes plants, wildlife, and their habitats.

3.6.2 EXISTING CONDITIONS

The area of Cannon AFB lies within the Southwest Plateau and Plains Dry Steppe and Shrub Province ecoregion as defined by Bailey (1995). Prior to airfield construction, agricultural fields covered the area occupied by the base (Air Force 1997a). Agriculture is still the dominant land use surrounding the base. Lands within base boundaries are currently classified as Urban and Cultivated, although pre-settlement vegetation was Plains-Mesa Grassland (Dick-Peddie 1993). Only small areas of natural vegetation exist on base (DeBruin *et al.* 1995). Nearly the entire area of the base northwest of the runway/taxiway complex is full developed. In addition, large areas of the base on the southeast side are full developed. Biological surveys have defined four habitat types at Cannon AFB: improved/landscaped, semi-improved/mowed grassland, unimproved/disturbed grassland, and riparian/aquatic (USACE 1998). Landscaped habitats include lawns and planted areas within the fully developed portion of the base; the USACE (1998) provided a list of landscape plants at Cannon AFB. Semi-improved/mowed areas generally consist of lawn grasses and weeds, which are kept mowed to facilitate base training and enhance base aesthetics.

Unimproved/disturbed grasslands are not mowed and include Bermuda grass (*Cynodon dactylon*), windmill grass (*Chloris verticillata*), Johnsongrass (*Sorghum halapense*), silver bluestem (*Bothriochloa saccharoides*), common sunflower (*Helianthus annuus*) and ragweed (*Ambrosia psilostachya*) (USACE 1996). Because of the history of land use, dominance of exotic plant species, and the isolation and small size of remaining habitat patches, habitat quality at Cannon AFB is considered low.

Terrestrial wildlife at Cannon AFB generally consists of species associated with disturbed places, including species that benefit from the presence of humans. Such species include mourning dove (*Zenaida macroura*), great-tailed grackle (*Quiscalus mexicanus*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), and red fox (*Vulpes vulpes*) (USACE 1995, 1996). Ten to 15 pairs of Mississippi kites (*Ictinia mississippiensis*) regularly nest in trees on the base's golf course.

Aquatic habitats at Cannon AFB include seasonally inundated playas (4.74 acres), ponds and basins (25.59 acres), and 2,913 linear feet of intermittent streams and drainages (Air Force 1996a). Because of the isolated nature of drainages within the Cannon AFB ROI, USACE made a determination that no jurisdictional waters occur on base (USACE 2006). None of these surface water features are regulated or afforded special protection status under the CWA or require permitting under Section 404 prior to actions that may result in dredging or the placement of fill material in them.

The two isolated mesic habitats are the South Playa Lake (4.56 acres) and a small area (0.18 acres) on the golf course. The South Playa Lake receives much of its water as run-off from the nearby airfield and is only seasonally flooded wetland. The golf course area also receives run-off water from developed portions of the base.

Other inundated areas are the North Playa Lake, one man-made basin near the Ammunition Storage Area that is temporarily flooded, and four ponds on the golf course. The North Playa Lake, historically a natural playa (an isolated, undrained basin in which floodwaters accumulate during rainy periods and subsequently evaporate), receives continuous effluent from adjacent sewage lagoon and thus remains permanently inundated.

The USACE conducted a biological survey of the North Playa Lake in 1995 (USACE 1995). Both the North and South Playa lakes attract waterfowl during migration and in winter and provide important transient or seasonal habitat in an otherwise arid region. Thirty-two species of waterbirds utilize North Playa Lake habitats as residents or seasonal migrants. These include a variety of grebes, herons, ducks, geese, shorebirds, and gulls (USACE 1995). Upland bird species in the area are likely occasional visitors. Additionally, North Playa Lake supports barred tiger salamanders (*Ambystoma tigrinum*) and small numbers of Woodhouse's toads (*Bufo woodhousei*). Small mammal species identified in the area are among those habitat generalists typical of disturbance communities. No active large mammal burrows have been detected on Cannon AFB (USACE 1995.)

The USFWS provided a list of endangered, threatened, and candidate species, and species of concern for Curry County (USFWS 2006). The NMDGF, New Mexico Natural Heritage Program (NMNHP), and New Mexico Rare Plant Technical Council (NMRPTC) web sites provided state listings of species of special concern (NMRPTC 1999, NMDGF 2006a, NMNHP 2003). Due to the degree of development on Cannon AFB, there is little potential for occurrence of listed species or other species recognized as sensitive on sites that could be affected by construction of project facilities on Cannon AFB. Federally and state-listed and candidate endangered or threatened species potentially occurring on Cannon AFB are listed in Table 3.6-1.

The USFWS reported three federally protected species having the potential to occur in Curry County, along with one candidate species. Additionally, several species have a special status in New Mexico, with a number of these not ranked federally.

The black-footed ferret is a federally and state-listed endangered species historically associated with prairie dog colonies across the western prairies. The black-footed ferret (*Mustela nigripes*) has not been documented in the state since 1934; in 1991 it was considered extirpated from the state (NMDGF 2006a) and is not considered further in this EIS. The black-tailed prairie dog is known to occur at Cannon AFB, but its population has declined drastically across its range in the prairie states. Population declines are attributed to habitat loss and modification, poisoning, and disease (sylvatic plague) (USFWS 2000). It is currently a species of concern.

The interior least tern, a federally and state-listed endangered species, breeds at Bitter Lake National Wildlife Refuge, 153 kilometers southwest of Cannon AFB near Roswell. This small breeding colony typically consists of three to seven pairs (NMDGF 2006a). These birds often use playa lakes for foraging and have the potential to occur at playa basins in the ROI. To date, no interior least terns have been observed at Cannon AFB (Air Force 1998a).

The bald eagle, a federally and state-listed threatened species, is not known to nest in Curry County. It is a migratory species and is a common winter resident along the Pecos River. One winter roost site occurs at Sumner Lake (Air Force 2001a) 113 kilometers west of Cannon AFB. On Cannon AFB, only the North Playa Lake contains potential bald eagle habitat, but eagles have not been previously observed there (Air Force 1998a). However, because bald eagles are migratory, they have the potential to occur at the North Playa Lake during fall, winter, or spring.

TABLE 3.6-1. FEDERALLY AND STATE-LISTED THREATENED, ENDANGERED AND CANDIDATE SPECIES IDENTIFIED FOR CURRY COUNTY, NEW MEXICO AND HAVING POTENTIAL TO OCCUR AT CANNON AFB

<i>Common Name and Scientific Name</i>	<i>Status (Federal/State)¹</i>	<i>General Habitat Association</i>	<i>Likelihood of occurrence in the Cannon AFB Project Area</i>
Least tern (Interior Population), <i>Sterna antillarum</i>	E/E	Nest mainly on riverine sandbars or open sandy or gravel coastal beaches. May nest on dredge material. Long distance migrant.	No habitat present. Occurrence highly unlikely.
Bald eagle, <i>Haliaeetus leucocephalus</i>	T/T	Breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, that reflect the general availability of primary food sources including fish, waterfowl, and seabirds	Seasonal, incidental occurrence possible. No perching/roosting habitat present. Base not within riverine migration corridors.
Lesser prairie-chicken, <i>Tympanuchus pallidicinctus</i>	C/--	Mixed grass-dwarf shrub communities that occur on sandy soils; principally the sand sagebrush and bluestem. Year-round residents where they occur	No habitat present. Very low likelihood of occurrence.
Peregrine falcon, <i>Falco peregrinus</i>	-- ² /T	Bare rock/talus/scree, cliff, shrubland/chaparral, urban/edificarian, woodland - conifer, woodland - hardwood, woodland - mixed	No habitat present. Low likelihood of occurrence.
Baird's sparrow, <i>Ammodramus bairdii</i>	--/T	Forage among dense bunch grasses in northern prairie settings. Breed in ungrazed or lightly grazed mixed-grass prairie, wet meadows, local pockets of tallgrass prairie.	No foraging or breeding habitat present on base. Very low likelihood of incidental occurrence.
Bell's vireo, <i>Vireo bellii</i>	--/T	Dense brush, willow thickets, mesquite, streamside thickets, and scrub oak, in arid regions often near water, also adjoining uplands	No habitat present. Low likelihood of occurrence.

Notes: 1. Status: Federal/State E = Endangered, T = Threatened, C = Candidate, -- = not listed.

2. The peregrine falcon was delisted under the Federal Endangered Species Act in August 1999.

Sources: NMDGF 2006a, USFWS 2006.

In New Mexico, the lesser prairie-chicken inhabits prairies of sand bluestem and little bluestem grasses (*Bouteloua hallii* and *B. scoparium*), mixed with shinnery oak (*Quercus harvardii*) or sand sagebrush (*Artemisia filifolia*) (Giesen 1998). Population declines of prairie-chickens are due to habitat loss, degradation, and drought (Giesen 1998, NMDGF 2006b). There are several state-managed lesser prairie-chicken Conservation Areas in nearby Roosevelt County (Massey 2001). Lesser prairie-chickens have not been observed on Cannon AFB; no habitat is present.

Although the peregrine falcon was federally delisted in 1999, the State of New Mexico considers it a threatened species. Cliff nesting habitat is not present on base or in the vicinity. However, peregrines are migratory and could be rare transient visitors to Cannon AFB. A peregrine falcon was observed at North Playa Lake in spring 1997 (Air Force 1998a).

Baird's sparrows breed in the northern prairies and winter primarily in northern Mexico. They also may winter in New Mexico grasslands (NMDGF 2006a). One Baird's sparrow was observed in mixed grassland in the southeast part of Cannon AFB in spring 1997 (Air Force 1998a). It is likely a rare visitor to the ROI.

3.6.3 ENVIRONMENTAL CONSEQUENCES

Potential impacts to biological resources, including plants, wildlife and habitat is based on the following:

- Importance of the resource (i.e., legal, commercial, recreational, ecological, or scientific) of the resource;
- Proportion of the resource potentially affected relative to its occurrence in the region;
- Sensitivity of the resource to the Proposed Action's activities; and
- Duration of ecological ramifications.

Impacts to resources are significant if habitats of high concern are adversely affected over relatively large areas; if disturbances to small, essential habitats would lead to landscape-levels effects on the ecology; or if disturbances impact the abundance or distribution of federally or state-listed species. Permanent habitat loss and temporary disturbance due to construction are specific issues and concerns for biological resources. Habitat degradation caused by post-construction invasion of noxious weeds is also a consideration.

This section only discusses environmental consequences of construction and operations associated with the West Flightline Alternative and East and West Airfield Alternative at Cannon AFB. Environmental consequences associated with Melrose AFR and project-related airspaces are discussed in Sections 4.6.3 and 5.6.3, respectively.

3.6.3.1 WEST FLIGHTLINE ALTERNATIVE

Under the West Flightline Alternative, approximately 342 acres of land in current development would be converted to project-related uses. The area includes the current apron, taxiways, and associated buildings and hangars. Little vegetation or wildlife habitat is present in this area. Terrestrial communities affected by the West Flightline Alternative are mainly lawns, semi-improved/mowed grassland, and some unimproved/disturbed grassland surrounding buildings or pavement. Cannon AFB was developed on land in previous agricultural use; no intact native communities are present. Wildlife species affected by the loss or alteration of such

habitats would be those species inhabiting disturbed places or those typically associated with human habitation. Such species would only be temporarily displaced during construction and would ultimately re-establish home ranges, as before, within surrounding habitats. Re-vegetation, landscaping, and maintenance associated with proposed construction would minimize the establishment of invasive, non-native plant species and the proliferation of their seeds within soil seed banks.

No wetlands and other water bodies fall within the proposed construction area or adjacent to the proposed construction area. They would not be impacted by construction or operations associated with the West Flightline Alternative.

Under the West Flightline Alternative, the total number of Cannon AFB airfield operations would decrease by approximately 41 percent. Operations would shift from approximately 80 percent day to approximately 35 percent night (10:00 p.m. to 7:00 a.m.). Aircraft assets operating within the Cannon ROI would shift from primarily F-16 jet aircraft to predominantly a mix of large to medium-sized propeller-driven aircraft and tilt-rotor aircraft. These aircraft move more slowly and function in the vicinity of the airfield differently than current aircraft, primarily F-16s. Overall noise levels are expected to increase slightly under the West Flightline Alternative. Both the acoustical and visual characteristics associated with aircraft operations, as well as their temporal patterns, would also change under the West Flightline Alternative. Wildlife species, particularly waterfowl using the North Playa Lake, would experience a change in aircraft overflight patterns. However, because little wildlife habitat is present on base and resident and transient species occurring on base currently are habituated to intensive airfield operations, impacts to wildlife are expected to be negligible and less than significant.

No federally or state-listed species would be directly impacted by the West Flightline Alternative. All identified federally or state-listed species have little likelihood of occurrence at Cannon AFB, and, if present, would be more likely to occur as transients in open spaces peripheral to the project site and open water sources such as the sewage lagoons, North Playa Lake, and water impoundments associated with the base golf course. There is no critical habitat or essential resources for listed species present on Cannon AFB. Any disturbance effects would be minor or temporary and have no impact on species distribution or abundance. Impacts to biological resources of construction and operation of the West Flightline Alternative on Cannon AFB would be less than significant.

3.6.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

The East and West Airfield Alternative would use an additional portion of Cannon AFB for project-related facilities but is otherwise the same as the West Flightline Alternative. Under the East and West Airfield Alternative, approximately 284 additional acres in the southeast portion of the base would be completely developed through the construction of project-related buildings, taxiways, and aircraft parking areas. Terrestrial communities affected by the East and West Airfield Alternative are mainly semi-improved/mowed grassland, or unimproved/disturbed grassland. Cannon AFB was developed on previously cultivated land; no intact native communities are present. Little or no shrub component is present within the construction footprint, which is vegetated primarily by grasses and weedy species. Wildlife species affected by the loss or alteration of such habitats would be those species inhabiting disturbed places or those typically associated with human habitation. Such species would only be temporarily displaced during construction and ultimately re-establish home ranges within surrounding habitats, including disturbed grassland and semi-improved habitats. Re-

vegetation, landscaping and maintenance associated with proposed construction would minimize the establishment of invasive, non-native plant species and the proliferation of their seeds within soil seed banks.

No water bodies fall within the proposed construction or are in proximity to the proposed construction area. Thus, no water bodies would be impacted by construction or operations associated with the East and West Airfield Alternative.

Noise effects on biological resources under the East and West Airfield Alternative would be similar to those for the West Flightline Alternative.

No federally or state-listed species would be directly impacted by the East and West Airfield Alternative. All identified federally or state-listed species have little likelihood of occurrence at Cannon AFB, and, if present, would be more likely to occur as transients in the open spaces peripheral to the project site and open water sources such as North Playa Lake and water impoundments associated with the base golf course. There is no critical habitat and no essential resources for these species present on Cannon AFB. Any disturbance effects would be minor and temporary and have no impact on species distribution or abundance. Impacts to biological resources of construction and operation of the East and West Airfield Alternative on Cannon AFB would be less than significant.

3.6.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Construction projects would not take place as proposed. No training with AFSOC assets would occur. The 27 FW and its current complement of F-16s would be disestablished as previously planned. No impacts to biological resources on base are expected with the reduced activity of the No Action Alternative.

3.7 CULTURAL RESOURCES

3.7.1 DEFINITION OF RESOURCE

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include archaeological resources, historic architectural resources, and traditional resources. Archaeological resources are locations where prehistoric or historic activity measurably altered the earth or produced deposits of physical remains (e.g., arrowheads, bottles). Historic architectural resources include standing buildings and other structures of historic or aesthetic significance. Traditional resources are 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.

Historic properties (as defined in 36 CFR 60.4) are significant archaeological, architectural, or traditional resources eligible for listing, or listed in, the National Register of Historic Places (NRHP). Historic properties are evaluated for potential adverse impacts from an action, as are significant traditional resources identified by American Indian tribes or other groups. In 1999, the DoD promulgated its American Indian and Alaska Native Policy, which emphasize the importance of respecting and consulting with tribal governments on a government-to-government basis. The Policy requires an assessment, through consultation, of the effect of proposed DoD actions having the potential to significantly affect protected tribal resources,

tribal rights, and Indian lands before decisions are made by the services. The ROI for cultural resources consists of Cannon AFB.

The ROI for cultural resources on Cannon AFB consists of those portions of the base that will be directly affected by ground-disturbing activities. Regional history that encompasses Cannon AFB from 12,000 years ago to the 20th century is presented in Sections 4.7.1 and 5.7.1.

A modern military presence was established in the region during World War II with the opening of Clovis Army Air Base in 1942. It was selected as one of three sites, including Ephrata, Washington, and Salina, Kansas, for a "super-airdrome."

On December 24th, 1942, the 409th Base headquarters and Air Base Squadron arrived at Clovis Air Base followed by the arrival of the 16th Bombardment Operational Wing, which arrived in January of 1943. In April of 1943, the base was renamed Clovis Army Air Field. From early 1943 to late 1945, the airfield served as a bombardment training base. From June through December 1943, the 302nd Bombardment Group trained B-24 personnel. B-17 crews from the 25th, 497th, 498th, 499th, and 500th Bombardment Groups trained at the airfield from February to April 1944. From 1945 to 1946, the airfield was home to B-29 Bombardment Groups.

Following the end of the war, Clovis Army Airfield operations began to decrease. Coinciding with personnel shortages, bombardment training was no longer a primary focus for the base. In July of 1946, the airfield was placed on a reduced status with complete inactivation occurring in May of 1947.

Control of the airfield changed hands numerous times during its period of inactivation, which lasted until 1951. In August of 1947, the Strategic Air Command took control, changing the name of the airfield to Clovis Air Force Base in 1948 before handing it over to Air Training Command in April of 1950, who then handed it over to Tactical Air Command (TAC) in July of 1951. The 140th Fighter Bomber Wing (140 FBW), flying the P-51 "Mustang" and made up of Air National Guard elements from Colorado, Wyoming, and Utah, was called to active duty as the first TAC unit at Clovis AFB (Air Force 2004b). The 140 FBW returned to Air National Guard control in 1952, replaced by the 50th Fighter Bomber Wing. In 1957, Clovis Air Base became a permanent Air Force installation and was renamed Cannon AFB in honor of the former commander of Tactical Air Command, John Kenneth Cannon (Air Force 2004b). During the late 1950s and early 1960s, Cannon AFB personnel and planes were deployed throughout the world. Crews deployed to Berlin during the Berlin Wall Crisis, and a decade later, to Vietnam and Thailand during the conflict there. In 1965, the mission for Cannon AFB began to change, focusing more on training F-100 pilots and mechanics. In 1968, Cannon AFB added further training for Forward Air Controllers and Air Liaison Officers. With this, Cannon AFB became the largest replacement training wing in TAC. During the late 1960s, with the arrival of different F-111 variants, the primary mission for Cannon AFB began to once again change back into a tactical one. The current F-16 aircraft were based at Cannon AFB starting in 1995.

After the Persian Gulf War, the NMANG transitioned to flying the F-16 Fighting Falcon; in 1991 this was the only fighter squadron to fly the F-16 equipped with Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) pods.

3.7.2 EXISTING CONDITIONS ON CANNON AFB

In compliance with the NHPA, the Air Force has completed a Cultural Resources Management Plan (CRMP) for Cannon AFB and Melrose Range (ACC 2004a). The plan, developed in

consultation with the New Mexico State Historic Preservation Office (SHPO), summarizes cultural resources at the base and range, including NRHP-eligibility status; it also spells out a number of standard operating procedures; and it provides protocols for consultation between the Air Force and SHPO.

Although Cannon AFB occupies the location of an airfield dating to the 1920s, structures from that time were demolished during construction of the AFB, and no standing facilities remain from the pre-World War II era. Cannon AFB inventoried structures dating from the World War II and Cold War eras (ACC 2004a). Of the World War II era buildings still present, five may be eligible for the NRHP (Table 3.7-1). From the Cold War era (1946 through 1989), none of the 13 structures inventoried are NRHP-eligible (ACC 2004).

**TABLE 3.7-1. STRUCTURES THAT MAY BE ELIGIBLE
FOR THE NATIONAL REGISTER OF HISTORIC PLACES**

<i>Building number</i>	<i>Description</i>	<i>Construction Date/Era</i>
002	Flagpole	1943/World War II
2107	Concrete storage magazine	1943/World War II
2111	Storage shed	1943/World War II
2113	Storage shed	1943/World War II
2115	Storage shed	1943/World War II

Source: ACC 2004a.

Archaeological survey on Cannon AFB has identified three archaeological sites, two prehistoric, and one historic. None of these sites are considered eligible for the NRHP. No traditional cultural resources have been located on Cannon AFB, and no Native American groups have indicated areas of specific interest.

3.7.3 ENVIRONMENTAL CONSEQUENCES

Impact analysis for cultural resources focuses on assessing whether the West Flightline Alternative or alternatives have the potential to affect cultural resources that are eligible for listing in the NRHP or have traditional significance for American Indian groups. Under Section 106 of the National Historic Preservation Act (NHPA), the proponent of the action is responsible for determining whether any historic properties are located in the area; assessing whether the proposed undertaking would adversely affect the resources, and notifying the SHPO of any adverse effects. An adverse effect is any action that may directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP. If an adverse effect is identified, the federal agency consults with the SHPO and federally recognized American Indian tribes to develop measures to avoid, minimize, or mitigate the adverse effects of the undertaking.

Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activity and determining the exact location of cultural resources that could be affected. Indirect

impacts generally result from increases in population that can lead to increased use of an area and are harder to quantify.

At Cannon AFB, the West Flightline Alternative and East and West Airfield Alternative include changes in the aircraft inventory, an overall reduction in airfield operations (both approaches and departures, and closed patterns), additional vehicles, and a number of construction and renovation projects. In compliance with Section 106 of the NHPA and the CRMP, the Air Force has initiated consultation regarding the proposed AFSOC Assets Beddown (refer to Appendix C).

3.7.3.1 WEST FLIGHTLINE ALTERNATIVE

Twenty-four buildings will be directly affected by the West Flightline Alternative. Table 3.7-2 lists the facilities, their date of construction, and NRHP eligibility. Recent inventory and evaluation have determined that none of these buildings is eligible for the NRHP under any criteria (ACC 2004a).

New construction will occur under this action. Most or perhaps even all of the area has been previously disturbed by prior construction and other Air Force activities. Survey of Cannon AFB has located three sites that lie outside the area that will be directly affected by construction. None of the archaeological sites is eligible for the NRHP.

The addition of personnel has the potential to indirectly, adversely affect archaeological sites, if recreation or use of an area were to cause damage to a historic property. However, since no archaeological historic properties (i.e., no NRHP-eligible archaeological sites) are present on Cannon AFB, the population increase will have no effect. Furthermore, because the five structures on Cannon AFB that may be eligible for the NRHP (Table 3.7-1) achieved eligibility while associated with airfield operations and the associated noise, changes in the noise environment will have no effect on historic properties.

There is always the possibility that previously unknown or unrecorded resources could be lie underground, sometimes underneath existing development. In the unlikely event that previously unrecorded or unevaluated cultural resources are encountered during construction, Cannon AFB will manage these resources in accordance with the Cannon AFB CRMP (ACC 2004a), adhering to federal and state laws, as well as Air Force regulations.

3.7.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

The East and West Airfield Alternative for Cannon AFB differs from the West Flightline Alternative only in facilities development, and there would be no effects to historic properties under this alternative. Rather than concentrating on the west side of the runway, development would also occur on the east side. There would be some variation in the buildings experiencing additions and/or alterations. However, because these actions would not alter the five structures on Cannon AFB that may be eligible for the NRHP, there would still be no effect on known eligible historic properties. No archaeological sites have been identified in the area of the East and West Airfield Alternative. In the unlikely event that previously unrecorded or unevaluated cultural resources are encountered during construction, Cannon AFB will manage these resources in accordance with the Cannon AFB CRMP (ACC 2004a), adhering to federal and state laws, as well as Air Force regulations.

**TABLE 3.7-2. BUILDINGS INCLUDED WITH PROJECTS
UNDER THE WEST FLIGHTLINE ALTERNATIVE AT CANNON AFB**

<i>Building #</i>	<i>Current Function</i>	<i>Construction Date</i>	<i>NRHP eligibility</i>
012	Target intelligence training	1969	Not eligible
022	Shop, aircraft, general purpose	1992	Not eligible
102	Squadron Operations	1958	Not eligible
109	Maintenance Dock	1991	Not eligible
125	Maintenance Dock	1989	Not eligible
126	Maintenance Dock	1990	Not eligible
133	Munitions load crew training	1993	Not eligible
155	Headquarters, Group	1966	Not eligible
160	Warehouse Supplies and Equipment Base	1993	Not eligible
196	Maintenance Dock	1969	Not eligible
197	Maintenance Dock	1990	Not eligible
198	Squadron Operations	1991	Not eligible
199	Aircraft Corrosion Control	1992	Not eligible
206	Warehouse Supplies and Equipment Base	1969	Not eligible
208	Maintenance Dock, Small Aircraft	1995	Not eligible
622	Avionics Shop	1974	Not eligible
624	Warehouse Supplies and Equipment Base	1992	Not eligible
679	Electronic and Communication Maintenance Pod Shop and Storage	1992	Not eligible
680	Shop, Jet Engine inspection and maintenance	1965	Not eligible
684	Shop, Aircraft General Purpose	1991	Not eligible
780	Flight Simulator Training	1994	Not eligible
790	Flight Simulator Training	1967	Not eligible
2332	Shop, Aircraft General Purpose	1991	Not eligible
5123	Pad, Power Check with Suppressor	1988	Not eligible

NRHP Eligibility Source: ACC 2004

3.7.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. As long as Cannon AFB is managed as an enclave, the base would continue to manage any cultural resources that could be present in accordance with the 2004 CRMP.

3.8 LAND USE AND TRANSPORTATION

3.8.1 DEFINITION OF CANNON AFB LAND USE AND TRANSPORTATION

The attributes of Cannon AFB and nearby land use addressed in this analysis include general land use patterns, land ownership, land management plans, and applicable plans and ordinances. General land use patterns characterize the types of uses within a particular area including human land uses, (e.g., agricultural, residential, commercial, industrial, institutional, and recreational) or natural land uses (e.g., forests, refuges, and other open spaces). Land ownership is a categorization of land according to type of owner; the majority of land ownership in the region is private. Land use plans and ordinances, policies, and guidelines establish appropriate goals for future use or regulate allowed uses.

Transportation resources include the infrastructure required for the movement of people, materials, and goods. For this analysis, transportation resources include the road network.

The ROI for this resource consists of Cannon AFB, the land immediately surrounding it, and access routes to the base.

3.8.2 EXISTING CONDITIONS

Cannon AFB is located on 3,500 acres of federally owned land within Curry County, New Mexico. The city of Clovis, the county seat for Curry County, lies about 8 miles to the east of Cannon AFB. With a population of 32,667, it is the largest city within the support area of the Base. Curry County has a total land area of 900,905 acres with about 828,000 acres designated as farmland. The principal crops include corn, grain, sorghum, wheat, barley, oats, alfalfa, cotton, and various vegetables. In addition to farms used for crop growing, there are several large cattle ranches scattered throughout the area.

Cannon AFB is surrounded by agricultural, commercial, and residential land. There is virtually no off-base encroachment from the eastern, southern, or western agricultural land contiguous to the base. There is a sparsely populated residential and commercial development along U.S. Highway 60/84 northeast of the base, but no encroachment.

According to the General Plan, land uses within Cannon AFB are grouped for their functionality (Air Force 2002). In general, housing is located in the northern portion of the base; the airfield in the middle; and open space south of the flightline. The Air Force is currently revising the Base General Plan in anticipation of AFSOC assets beddown. Figure 3.8-1 represents the future land use map that is under consideration. In general, land uses addressed in the existing General Plan make recommendations for areas affected by both the potential for aircraft noise and aircraft accidents. Noise contours developed are used to describe noise exposure around the base and support compatible land use recommendations. Noise is one of the major factors used in determining appropriate land uses since elevated sound levels are incompatible with certain land uses. Figure 3.8-2 shows the existing noise contours at Cannon AFB. When noise levels exceed an L_{dn} of 65 dB, residential land uses are normally considered incompatible. Further, the percentage of persons highly annoyed by noise can increase by the varying noise levels.

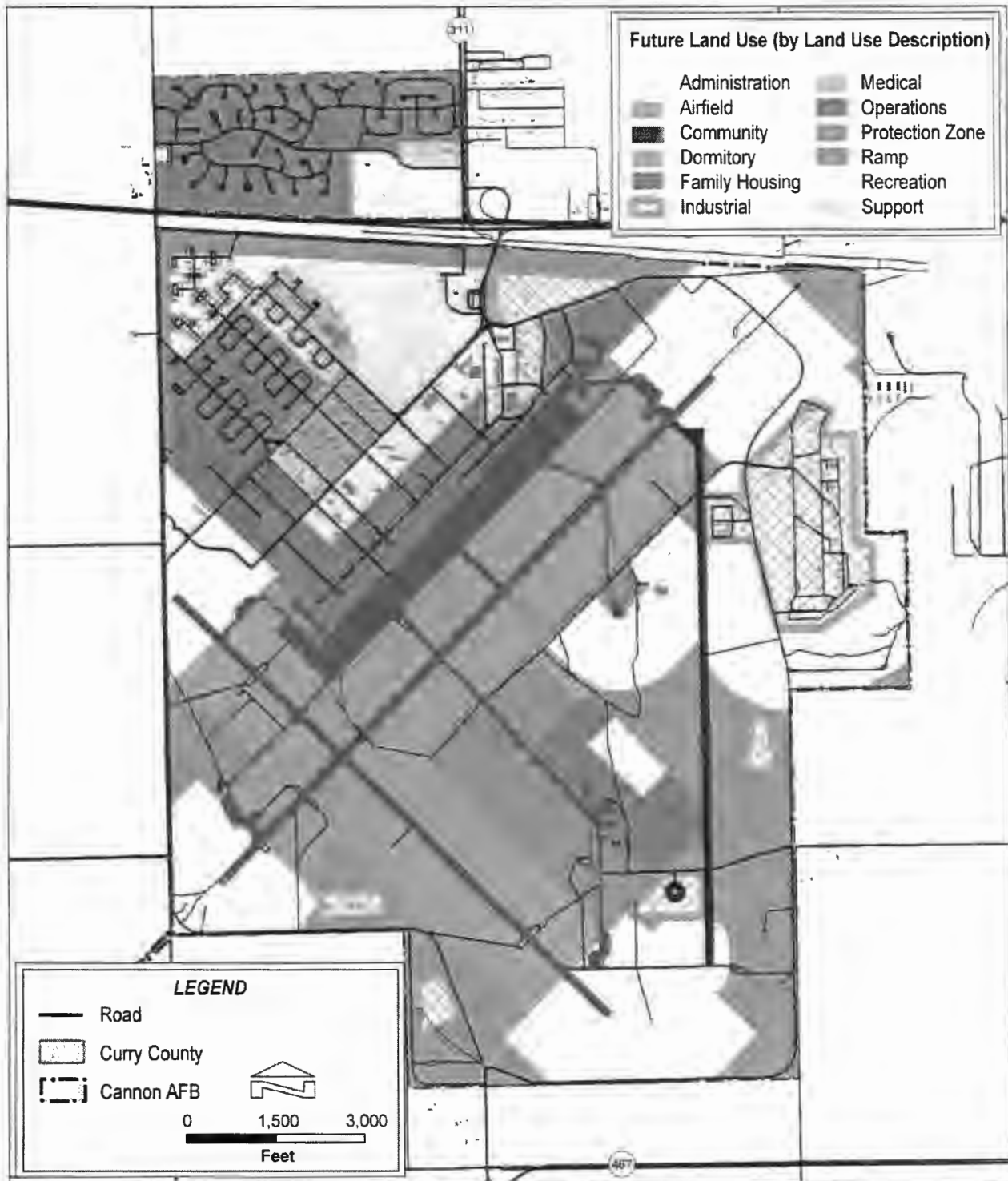


FIGURE 3.8-1. FUTURE LAND USE WITHIN CANNON AFB

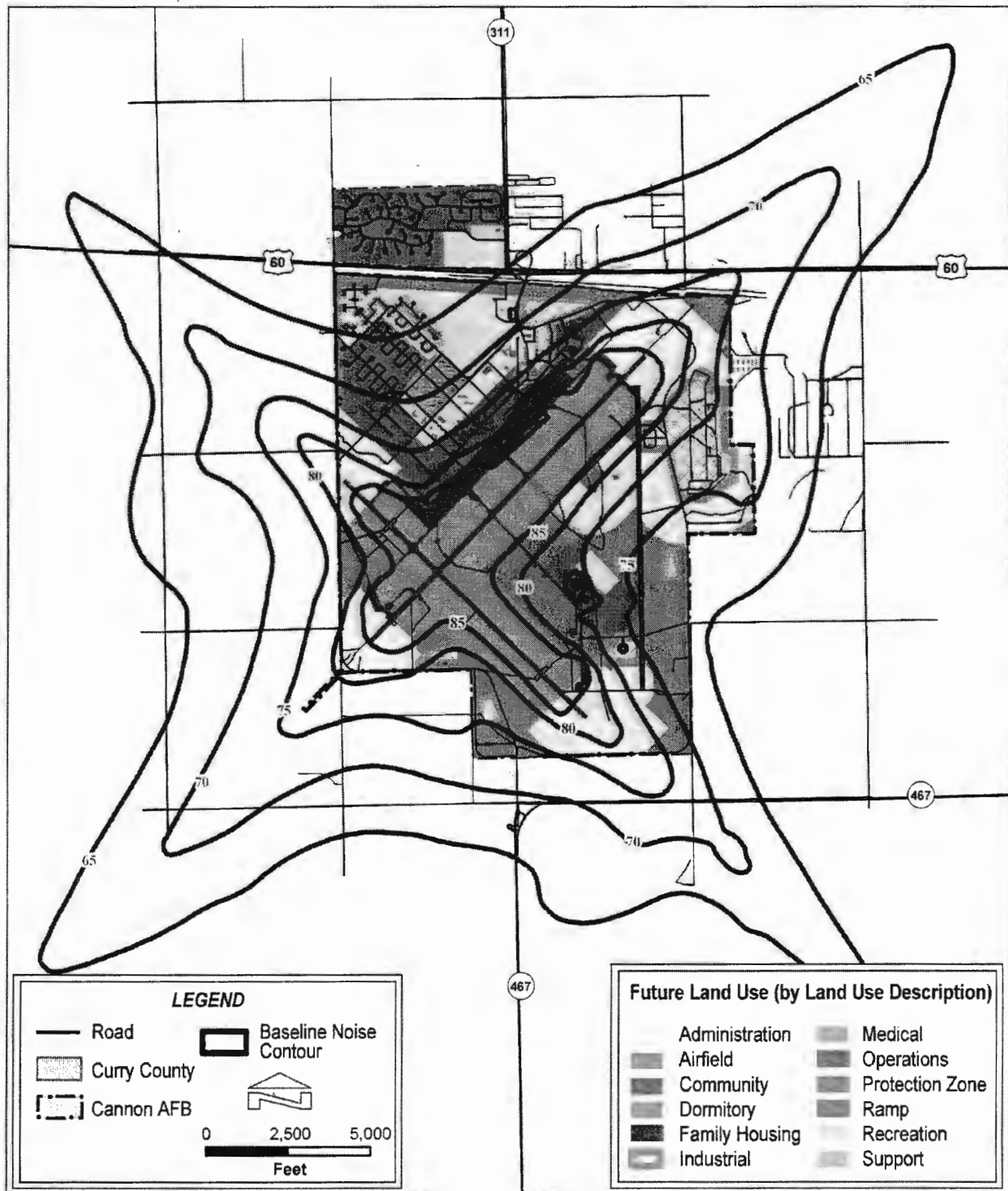


FIGURE 3.8-2. FUTURE LAND USE UNDER THE BASELINE ACTION NOISE CONTOUR

The Air Force has designated Air Installation Compatible Use Zones (AICUZs) around Cannon AFB to provide recommendations for compatible uses in areas subject to accident hazards. Airfield restrictions have been developed and placed on land use within APZs and runway CZs because of the increased risk of aircraft accidents within these areas. Cannon AFB has four CZs, one at each end of the runway (Figure 3.8-3). Cannon AFB has already acquired the property contained by the CZ areas off the end of Runways 04, 13, and 31, while much of Runway 22 CZ is owned and controlled by the Burlington Northern & Santa Fe Railroad. The local communities or county governments are responsible for adopting appropriate land use controls to prevent incompatible development. The property surrounding Cannon AFB airfield environs is managed and controlled by the Curry County Board of Commissioners. Curry County has no current zoning restrictions. In addition, Curry County has been purchasing restrictive easements for the property contained within the APZ. Restrictive easements limit the use of the property to compatible development. The restrictive easements also impose height restrictions on structures. Curry County does not have a comprehensive plan, but is currently working with the city of Clovis to prepare a plan for both jurisdictions (personal communication, Smith 2006).

Prime farmland is defined by 7 USC 4201 and CEQ 1508.27(b)(3) as those areas that contain the best combination of physical and chemical characteristics. Prime farmland is identified for resource conservation and growth management. Because Cannon AFB is not in agricultural production, no prime farmland is located on the installations. Because of New Mexico's arid climate in agricultural areas, no lands in New Mexico qualify as Prime Farmland unless irrigated with a dependable supply of irrigation water. The land surrounding Cannon AFB, while irrigated, could potentially qualify for prime agricultural land, but since construction would not occur outside of Cannon AFB boundaries, any prime farmland in the area would not be affected.

TRANSPORTATION

Primary access to Cannon AFB is provided on the north side of the base from U.S. Route 60. U.S. Route 60 is a four-lane divided highway between Clovis to the east and for a distance of approximately 4½ miles to the west of the base. U.S. Route 60 becomes a 2 lane rural highway 4½ miles west of the Cannon AFB Main Gate and connects to Interstate 25 roughly 200 miles to the west. At the base Main Gate, State Route 311 continues to the north. State Route 311 is a 2 lane rural highway. Approximately 3 miles to the east of the Main Gate, U.S. 60 intersects State Route 467. Approximately 13½ miles to the west of the Main Gate, U.S. 60 intersects State Route 224. The nearest Interstate (I-40) is about 50 miles south of Cannon AFB. I-40 traverses the state east-west through Albuquerque.

U.S. 60 has been assumed to function as a multilane arterial highway as defined by the *Highway Capacity Manual 2000* (Transportation Research Board 2000). Access to the south is provided by State Route 467. State Route 467 connects to U.S. 60 to the north and to U.S. 70, at Portales New Mexico to the south. State Route 467 has been assumed to function as a two lane collector (class II) rural highway as defined by the *Highway Capacity Manual 2000* (Transportation Research Board 2000).

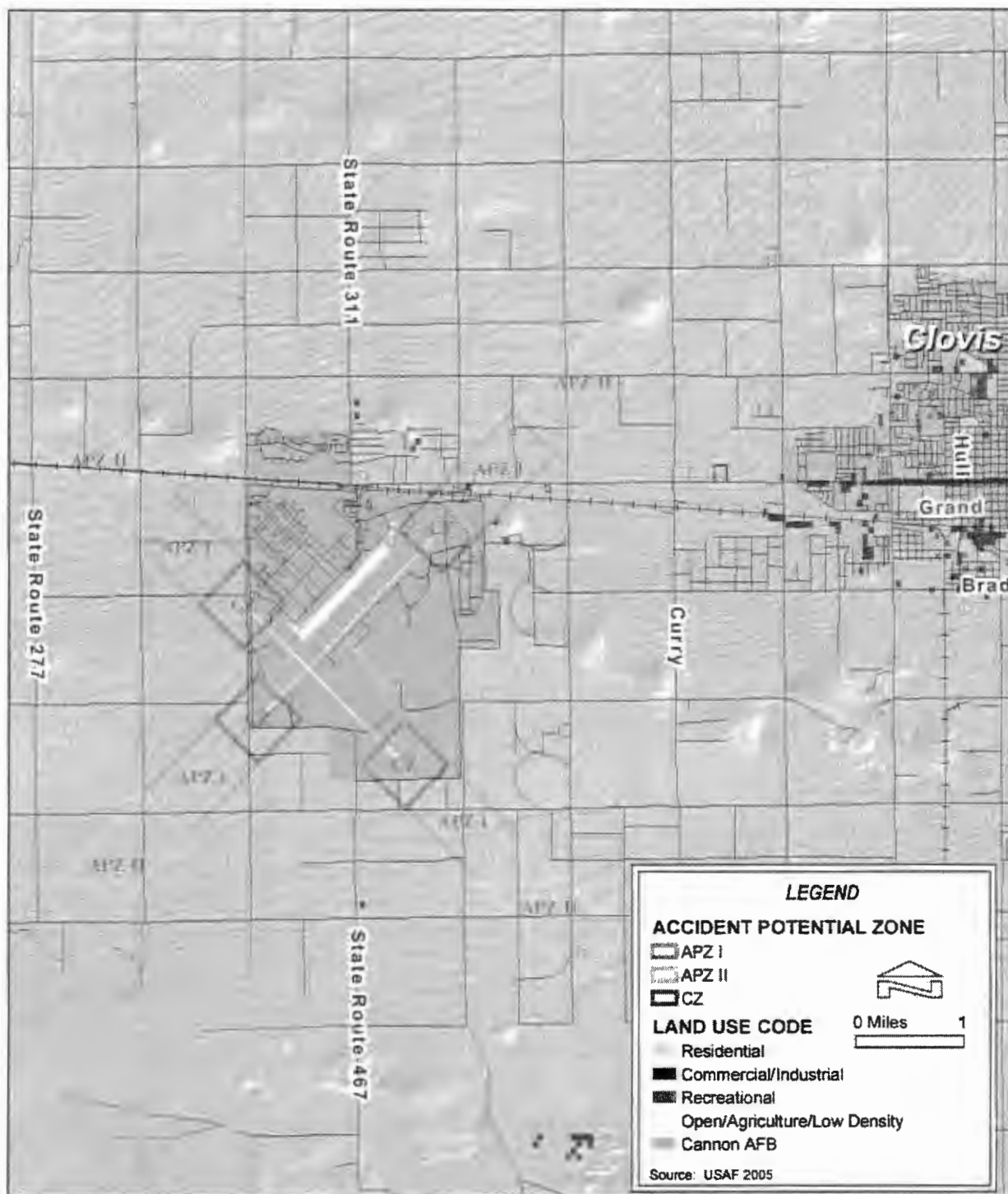


FIGURE 3.8-3. CURRENT LAND USE AROUND CANNON AFB

There are two gates that provide access to Cannon AFB: the Main Gate on U.S. 60 and the Portales Gate on State Route 467. The Main Gate is accessed by a partial clover leaf interchange for traffic westbound into the base from the direction of Clovis, and a diamond interchange for traffic leaving the base in the east bound direction. The observed traffic to the east of the base, between the Main Gate and Clovis, is approximately 3 times as large as the traffic observed to the west of the base Main Gate.

Using methods contained in *Trip Generation 7ed*, the peak traffic for the a.m. peak hour was estimated (Institute of Transportation Engineers 2003). With the existing base population of 4,467, the approximate number of peak hour (morning) trips is 1,021. This represents 982 vehicles at the Main Gate and 39 at the Portales Gate. With three lanes available at the Main Gate and one lane at the Portales Gate, the existing facilities are sufficient to pass the existing peak hour traffic into the base.

Traffic volume on routes surrounding Cannon AFB is low and the existing roadway level of service is high. Only one major transportation improvement in the vicinity of Cannon AFB has been identified, this improvement is a railroad overpass on State Route 467 (at milepost 16) that will be completed in spring 2007. This overpass may facilitate vehicular movement associated with the Portales Gate and support local users, shippers, and construction access to the base (personal communication, Kurtz 2006).

There are no fixed route public transit lines servicing Cannon AFB or Melrose AFR. Clovis Area Transit System provides curb-to-curb public transportation services on a reservation, demand-response basis. During exercises and air shows, Cannon AFB operates a set-route shuttle service with two to three buses. A small community airport provides Clovis with commuter service. The closest large commercial airports are the Rick Husband Amarillo International Airport (105 miles), Lubbock International Airport (107 miles), and Albuquerque International Sunport (217 miles).

3.8.3 ENVIRONMENTAL CONSEQUENCES

Land use impacts could be deemed significant if they would (1) be inconsistent or in non-compliance with applicable land use plans or policies; (2) preclude the viability of existing land use; (3) preclude continued use or occupation of an area; (4) be incompatible with adjacent land use to the extent that public health or safety is threatened.

As described in Chapter 2.0, the key elements of the proposal are facility construction, flight and training activities, and personnel changes. Established and recognized noise models have been applied to estimate the off base and on base noise conditions. These models are described in Appendix F. For the land use resource, consequences are associated with increases in noise due to a change in aircraft type and use. Potential effects to land use plans, land use patterns, and circulation due to construction or personnel increases are considered.

To assess potential environmental consequences associated with the transportation resource, increased utilization of the existing roadway system due to the potential increase of personnel is analyzed, as well as potential effects of construction activities. Anticipated impacts on the operational characteristics of those roadways, using levels of service (levels of congestion) and other metrics are identified. Consequences to the on base road network is also discussed. Potential impacts of the proposed alternatives on the existing base access facilities are also addressed.

3.8.3.1 WEST FLIGHTLINE ALTERNATIVE

Under the West Flightline Alternative, new facilities to house and maintain the AFSOC aircraft would be constructed. These facilities would involve construction and renovation projects implemented over the period from 2008 to 2013 (Table 2.1-3). The West Flightline development affects 342 acres consisting of the area covered by the construction footprints of the proposed facilities plus the surrounding lands where construction-related clearing and grading would occur.

The proposed aircraft and mission change, as well as facility construction, alteration, and demolition, would increase the intensity of land use within the base; however, the West Flightline Alternative would not introduce any new land uses at Cannon AFB, and would remain compatible with current uses at the base and the Base General Plan. The construction of new facilities would not occur in CZs or APZs. The construction would be consistent with the updated Base General Plan. None of the proposed new facilities would violate height restrictions around the runways (refer to Section 3.3, Safety, for a more detailed discussion of runway safety areas).

Noise from construction would be temporary and would take place only during daytime hours (see Section 3.2). Noise levels from these activities on adjacent properties would not exceed 65 A-weighted decibels (dBA). Aircraft noise would remain the dominant noise source in adjacent areas. Therefore, construction noise would cause minimal impacts to land uses.

The proposed beddown of AFSOC aircraft would affect land use in some areas beyond the airfield boundary. Aircraft noise is the primary source of these impacts. Figure 3.8-4 shows proposed noise contours, and Table 3.8-1 summarizes the acres affected by noise levels above 65 dBA on base and off base. The beddown of AFSOC aircraft would result in a different pattern for noise contours because different aircraft would be used and at different times of the day (and night). The FAA has developed noise exposure compatibility guidelines for various land use categories. An L_{dn} of 65 dBA is generally considered the threshold above which residential land uses (and other sensitive uses such as schools and hospitals) are not recommended.

**TABLE 3.8-1. BASELINE NOISE CONTOUR ACREAGE AT
CANNON AFB AIRFIELD AND VICINITY**

	NOISE CONTOUR (DNL)			
	65-70 dB	70-75 dB	75-80 dB	80 +dB
On Base	505 acres	691 acres	743 acres	1,375 acres
Off Base	3,828 acres	1,572 acres	463 acres	49 acres

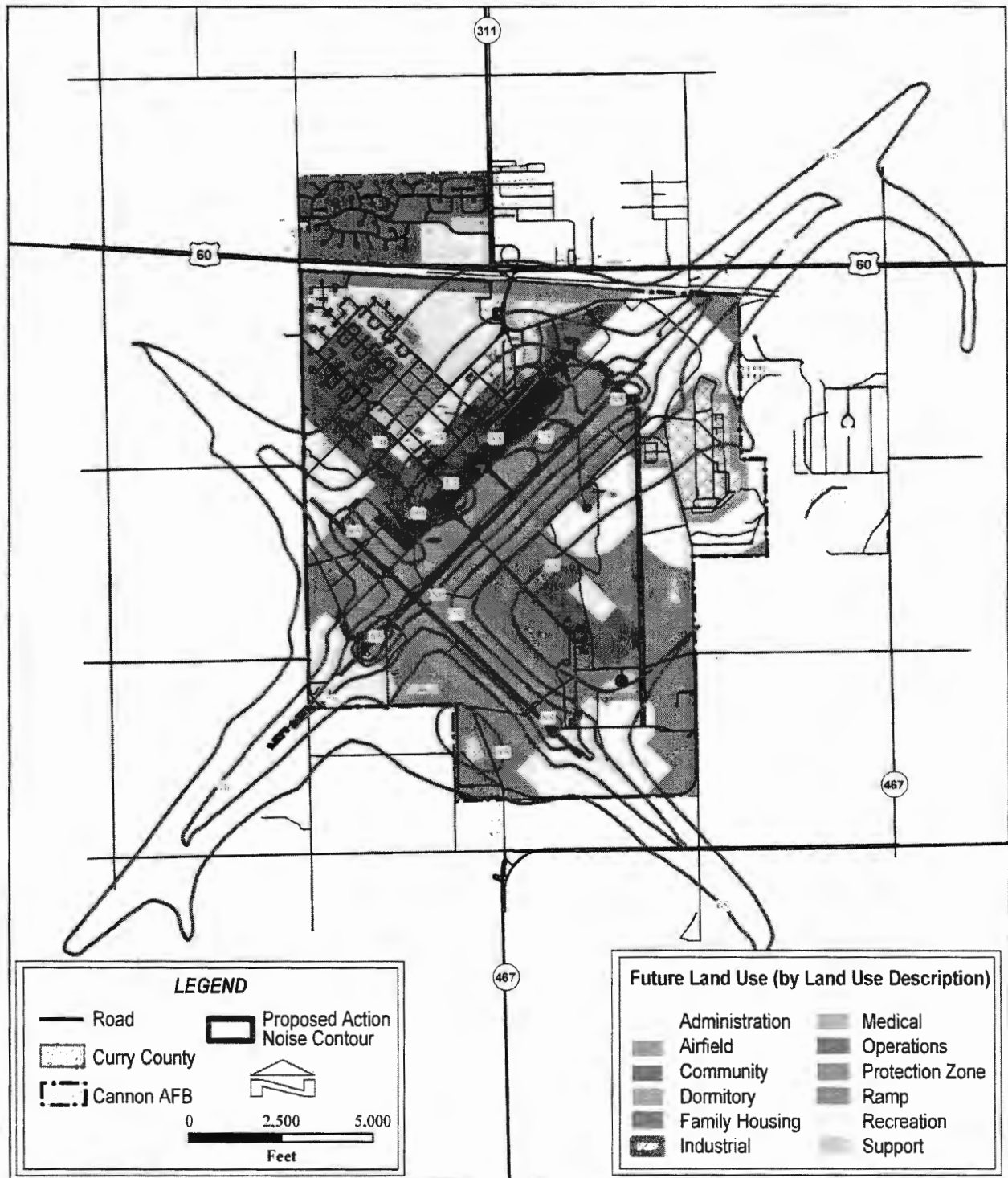


FIGURE 3.8-4. FUTURE LAND USE UNDER THE WEST FLIGHTLINE ALTERNATIVE NOISE CONTOUR

Table 3.8-2 shows that the total area affected by levels of 65 dBA or greater would increase on base from 505 acres to 992 acres. However, for all other noise contours the acreage affected would decrease. The greatest decrease of area affected would be off base in the 65 to 70 dB level where, under both alternatives, the area would decrease by 2,788 acres. At the 80 dB and above the area affected would decrease by 1,090 acres from baseline conditions. The 85 dB would no longer extend off base, decreasing the over all area affected by 49 acres. The changes in the noise environment are compatible with the existing land uses on and off base. The proposed noise contours fall within acceptable land uses on base. Off base, a greater area of the incompatible development would not fall into the 65 to 70 dB noise contour. Although this area would have a decrease in noise exposure, it is still exposed to average noise levels (DNL) above the 55 dB identified by the USEPA as being protective of the public health and welfare (USEPA 1974).

**TABLE 3.8-2. PROPOSED NOISE CONTOUR ACREAGE AT
CANNON AFB AIRFIELD AND VICINITY**

	NOISE CONTOUR (DNL)			
	65-70 dB	70-75 dB	75-80 dB	80 +dB
On Base	992 acres	679 acres	536 acres	283 acres
Off Base	1,048 acres	180 acres	2 acres	0 acre

Note: Acreage affected would be the same for both alternatives as aircraft use would not change under either alternative.

Under the West Flightline Alternative, additional personnel would be assigned to Cannon AFB (see Table 2.1-7). It is not anticipated that this increase would adversely affect local or regional land use.

Transportation resources may be affected by the proposed addition of 1,213 additional military and civilian personnel that would be permanently stationed at the base by 2010. The projected traffic volumes for 2010 and five years after that point, 2015, would operate in a safe and efficient manner at an acceptable Level of Service (LOS) on the adjacent public roadways. There may be some impact on the function of the Cannon AFB Main Gate that could be addressed with procedural changes or additional lanes. This section discusses peak hour trip generation, gate access, traffic volume, and LOS on adjacent U.S. 60 and State Route 467, and the roadway network on base.

Peak hour trip generation. The number of personnel added to the base can be used to estimate the increase in traffic to be expected. Transportation engineering generally determines the expected function of the roadway in the design peak hour. The expected design peak hour traffic expected to be generated by the AFSOC assets beddown was estimated using trip generation methods (Institute of Transportation Engineers 2003). The expected traffic can vary depending on the time of the day and week. Traffic volumes are typically analyzed for the expected greatest level of traffic occurring on either morning weekday, evening weekday, Saturday or Sunday time period. The results of this calculation are shown in the Table 3.8-3.

TABLE 3.8-3. ANTICIPATED PEAK HOUR TRIP GENERATION FOR AFSOC ASSETS BEDDOWN AT CANNON AFB

<i>Time Period</i>	<i>Total Trips</i>	<i>Entering</i>	<i>Exiting</i>
Weekday a.m.	485	427	58
Weekday p.m.	363	134	337
Saturday	315	157	158
Sunday	218	109	109

The weekday peak morning hour would be the largest expected impact, since entering traffic would be slowed by the requirements of security for base access and would impact both the base access gates and the principal public roads.

It has been assumed that construction associated with the AFSOC assets beddown would start in the year 2007 and that construction would be complete by the year 2013. Traffic analyses were conducted for the year 2010 when the majority of AFSOC personnel would be assigned to Cannon AFB and for the year, 2015 after all construction is completed.

Gate Access. Cannon AFB has two gates - the Main Gate exiting onto U.S. 60 and the Portales Gate exiting onto State Route 467. Based on recent gate counts (presented in Table 3.8-4), approximately 96 percent of existing base traffic uses the Main Gate (personal communication, Neiman 2006). The new traffic was assumed to be prorated between the two base access points in the same proportion as the existing traffic, as depicted on Table 3.8-4.

TABLE 3.8-4. EXPECTED PEAK HOUR NUMBER OF VEHICLES ENTERING THE BASE

EXPECTED GATE USE - AM PEAK HOUR IS PEAK FOR GATE USAGE				
	<i>Population</i>	<i>Peak Hour Trips</i>	<i>ENTERING</i>	
			<i>Main Gate</i>	<i>Portales Gate</i>
Existing	4,467	1,021	982	39
Proposed	5,680	1,506	1,446	60

The capacity of an access gate is directly related to the type of processing or force protection condition being used. Checkpoint design capacity is approximately:

- 400 - 600 vehicles/hour/lane (use 500) for decal-only check.
- 300 - 400 vehicles/hour /lane (use 350) for identification and decal check.
- 400 - 600 vehicles/hour/lane (use 500) for identification and decal check using tandem processing.

It would likely be desirable to implement processes to alleviate congestion at the Main Gate, including:

- The use of tandem processing in the peak a.m. hour.
- The addition of additional lanes or gates.
- The use of staggered start times for shifts at the base.

With one lane available at the Portales Gate, the existing facilities would be expected to be sufficient to pass both the existing condition and the West Flightline Alternative traffic.

Traffic Volume. Traffic counts on U.S. Route 60 were obtained from the New Mexico Department of Transportation (personal communication, Pena 2006). Average Annual Daily Traffic (AADT) was available for the years 2003, 2004, and 2005. The measured traffic volume in 2005 was then projected to the years 2010 and 2015. A traffic growth rate of 3 percent was calculated between the years 2003 and 2004 and an anticipated traffic growth rate of 3 percent was used in the model. As depicted on Table 3.8-5, the anticipated traffic caused by the proposal was added to the expected traffic with and without the proposed increase in personnel in years 2010 and 2015.

**TABLE 3.8-5. EXPECTED PEAK HOUR TRAFFIC (VEHICLES PER HOUR)
ON U.S. ROUTE 60**

	<i>Baseline¹</i>	<i>With AFSOC Assets</i>
2005 Peak Hour Heavy Direction	767	
2005 Peak Hour Light Direction	192	
2010 Peak Hour Heavy Direction	889	1,293
2010 Peak Hour Light Direction	222	278
2015 Peak Hour Heavy Direction	1,030	1,439
2015 Peak Hour Light Direction	258	313

Notes: 1. Assumes current AADT of 3,833 vehicles per day.

Source: Personal communication, Pena 2006.

No traffic count data is available for State Route 467, so the highest volume of traffic needed to yield LOS A service on this roadway has been assumed. Table 3.8-6 depicts expected peak hour traffic on State Route 467.

**TABLE 3.8-6. EXPECTED PEAK HOUR TRAFFIC (VEHICLES PER HOUR)
ON STATE ROUTE 467**

	<i>Baseline</i>	<i>With AFSOC Assets</i>
2005 Peak Hour	456	
2010 Peak Hour	529	589
2015 Peak Hour	613	673

VPH - Vehicles Per Hour

Level of Service. Generally the desired LOS for arterial roadways is LOS C or better, although in urban areas LOS D or even E is sometimes acceptable. The *Highway Capacity Manual* (Transportation Research Board 2000) discusses the LOS determination characteristics of arterial multilane roadways, as well as two lane highways. U.S. Route 60 is a multiple lane highway

and State Route 467 is assumed to be a class II or collector roadway. Table 3.8-7 summarizes LOS definitions for multiple lane and two lane highways.

TABLE 3.8-7. LEVEL OF SERVICE DEFINITIONS

<i>Level of Service</i>	<i>Multiple Lane Highways</i>	<i>Two Lane Highways</i>
A	Free flowing traffic at average travel speeds, a density of less than 11 passenger cars per mile per lane and vehicles are relatively unimpeded in their ability to maneuver within the traffic stream	Highest quality of traffic service, with motorists able to travel at their desired speed and with little restriction on their ability to pass slower traffic. Percent time following is 40 percent or less.
B	Reasonably unimpeded operation at average travel speeds, a density of between 11 and 18 passenger cars per mile per lane. Ability to maneuver within the traffic stream is only slightly restricted and most drivers find operation of the highway not stressful.	Condition where the drivers have some restrictions on their speed of travel and ability to change lanes to pass, but still represents comfortable and relatively low stress driving conditions. Percent time following is between 40 and 55 percent.
C	Stable operations; however, the ability to maneuver and change lanes is more restricted than in LOS B, and with a density of between 18 and 26 passenger cars per mile per lane. Most drivers find the operation of the highway somewhat stressful.	Condition of stable traffic flow that has significant restrictions on the ability of motorists to travel at their desired speed and to change lanes to pass. LOS C is somewhat stressful for most drivers. Percent time following is between 55 and 70 percent.
D	Borders the range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to high volumes of traffic and has a density of between 26 and 35 passenger cars per mile per lane. Most drivers find the operation of the highway stressful.	Unstable traffic flow. Drivers are restricted into slow moving platoons and disruptions in the traffic flow can cause significant congestion. There is little or no opportunity to pass slower moving traffic. Most drivers find LOS D stressful. Percent time following is between 70 and 85 percent or less.
E	Characterized by significant delays. LOS E has a density of between 35 and 45 passenger cars per mile per lane. Most drivers find the operation of the highway very stressful.	Highest volume of traffic that can move on the roadway without a complete shut down. Most drivers find LOS E very stressful. Percent time following is greater than 85 percent.
F	Characterized by low traffic flow at low speeds. LOS F has a density of greater than 45 passenger cars per mile per lane. Almost all drivers find the operation of the highway very stressful. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.	Heavily congested flow with traffic demand exceeding capacity. Traffic flows are slow and discontinuous.

A LOS analysis assessing the consequences of the increased volume associated with the AFSOC assets beddown was performed. Presently, the operation of U.S. 60 is at an acceptable level of LOS A. The additional volume would reduce the LOS of U.S. 60 to LOS B (refer to Table 3.8-8). LOS B would be an acceptable LOS for a roadway of this type. State Route 467 is at an acceptable LOS B and the proposed increase in volume is not expected to change the expected LOS. LOS B would be an acceptable LOS for a roadway of this type.

TABLE 3.8-8. EXPECTED ROADWAY LOS FOR U.S. HIGHWAY 60

	2010		2015	
	HD	LD	HD	LD
Baseline	LOS A	LOS A	LOS A	LOS A
West Flightline Alternative	LOS B	LOS A	LOS B	LOS A

HD - Direction of heavier traffic

LD - Direction of lighter traffic

Road network on base. The volume of traffic would also increase within the existing Cannon AFB roadway system. It is possible that some existing transportation facilities within the base may require rehabilitation or upgrades to support the increase in traffic. Typical road improvements would include roadway widening, pavement strength improvements, intersection improvements, and signage.

Any new construction would be expected to provide for internal roadway networks; parking; pedestrian access to adjoining buildings and transit stops; sidewalks and sidewalk curb ramps at all crosswalks to accommodate persons with disabilities, bicyclists, and pedestrians. Right-of-way and geometric design of the parking lots and local road systems would be expected to be designed to acceptable engineering standards. New permanent and temporary facilities would be expected to be designed to current engineering standards.

3.8.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

Under the East and West Airfield Alternative, the transfer of aircraft and equipment to Cannon AFB would be as described in Section 2.1.1. Manpower authorizations would also be the same as under the West Flightline Alternative. The East and West Airfield Alternative differs in the approach to facility development. The East and West Airfield Alternative affects an additional 284 acres. Table 2.1-5 presents facilities development under this alternative.

Similar to the West Flightline Alternative, the proposed aircraft and mission change, as well as facility construction, alteration, and demolition would increase the intensity of land use within the base; but would not introduce any new land uses at Cannon AFB, and would remain compatible with current uses at the base. New facilities would not violate height restrictions around the runway. Both the siting and use of new munitions storage facilities would be constructed in accordance with Air Force regulations to ensure that new QD arcs are compatible with ongoing activities and land uses on the base (refer to Section 3.3, Safety, for a more detailed discussion of runway safety areas and explosive safety).

The noise analysis would be the same as under the West Flightline Alternative. Figure 3.8-2 shows the existing noise contours at Cannon AFB. Table 3.8-2 presents acreages affected by the proposed noise contours. As presented, the change in the noise environment would not affect

land uses on or off base. Portions of the 65 dBA noise contour already affect this area and with the change in the noise contours, a lesser area would be affected.

Other aspects of this alternative (such as construction, personnel increase, and transportation) are identical to the West Flightline Alternative and therefore anticipated effects would be the same as described in Section 3.8.3.1.

3.8.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. The F-16s would depart by FY 2008. If Cannon remained an enclave, future land uses proposed in the Cannon General Plan would not occur. Land ownership under this alternative would remain the same. Noise levels would decrease around the flightline; however, because Cannon AFB does not have conflicting land uses now nor would have in regards to the AFSOC beddown, then no impact would be expected. The general land use patterns would remain the same. The transportation network would experience less traffic volume than presently.

3.9 SOCIOECONOMICS

3.9.1 DEFINITION OF RESOURCE

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and regional industries. Changes to these fundamental components can influence other community resources such as housing availability, utility capabilities and public services.

Cannon AFB is situated in the high plains of eastern New Mexico, 7 miles east of the city of Clovis. Socioeconomic activities associated with the base are concentrated in Curry and Roosevelt counties, which, in addition to the base itself, comprise the ROI for this analysis.

3.9.2 EXISTING CONDITIONS

3.9.2.1 POPULATION AND HOUSING

CANNON AFB

Cannon AFB supports a workforce population of 4,467 personnel, including 275 officers, 3,142 enlisted personnel, 730 civilian employees, and 320 contract employees. There are an estimated 4,437 dependents associated with base personnel, resulting in a total Cannon AFB-related population of 8,904 persons.

Military family housing at Cannon AFB includes 1,644 units (Cannon AFB 2006a). Family housing consists of six separate housing areas in four separate locations. There are 683 family housing units actually situated on base, 611 units across U.S. Highway 60/84 adjacent to the base, and an additional 250 and 150 units of government leased housing in the cities of Clovis and Portales, respectively. Cannon AFB has 12 dormitories accommodating up to 723 unaccompanied enlisted personnel. Temporary quarters provide an additional 99 bed spaces on base.

Curry and Roosevelt counties, which comprise the ROI, provide nearly all the housing and education support services for Cannon AFB. Cannon AFB houses 11.4 percent of the

population associated with base operation. Clovis houses 83.8 percent, Portales houses 4.2 percent, and the remaining 0.6 percent are housed at other locations.

CURRY AND ROOSEVELT COUNTIES

The estimated 2005 population in the ROI was 65,176 persons, reflecting growth of 3.3 percent since 2000. The 2000 Census established the ROI population at 63,062 persons, an increase of approximately 7 percent from the 1990 population of 58,909 (U.S. Census Bureau 2000a). Of the 33 counties in New Mexico, Curry ranks 12th with a population of 46,059 persons and Roosevelt ranks 22nd with a population of 19,117 persons. Almost 75 percent of the ROI population resides in the city of Clovis, which includes most Cannon AFB residents. The population of Clovis was 33,357 persons in 2005, 7.7 percent more than the 1990 population of 30,954. The population of Portales, the population center in Roosevelt County, was 11,295 persons in 2005 compared to 10,690 persons in 1990.

According to the 2000 Census, there were 23,405 households in the ROI with an average household size of 2.62 persons. Population density in the state averages 15.0 persons per square mile (U.S. Census Bureau 2000b). Curry County has a higher density, 32.0 persons per square mile; this is due to the population center of Clovis, which has 1,458.9 persons per square mile. The population density of Roosevelt County, in which Melrose AFB is located, is 7.4 persons per square mile, with a majority of the people concentrated in the city of Portales.

Detailed information describing the housing contained in the region is presented in the 2000 U.S. Census of Population and Housing. This is the most comprehensive source of information describing the housing stock in the ROI. In 2000, there were 19,212 housing units in Curry County and 7,746 housing units in Roosevelt County. Of the total number of housing units, 12.7 percent in Curry County and 15.1 percent in Roosevelt County were mobile homes (U.S. Census Bureau 2001).

The vacancy rates for the two counties were 12.7 and 14.3 percent, respectively. In 2000, there were 2,446 vacant housing units in Curry County and 1,107 vacant units in Roosevelt. The vacancy rate for rental housing is about twice the homeowner vacancy rate. Owner-occupied housing accounts for 60 percent of all housing units in the ROI; rental units comprise the remaining 40 percent. Some of these vacant units are assumed to be substandard.

Between 2000 and 2005, housing units in Curry County increased by a total of 1.2 percent and in Roosevelt County increased by a total of 1.8 percent. The number of new units constructed between 2000 and 2004 were 235 in Curry County and 471 in Roosevelt County.

3.9.2.2 ECONOMIC ACTIVITY

CANNON AFB

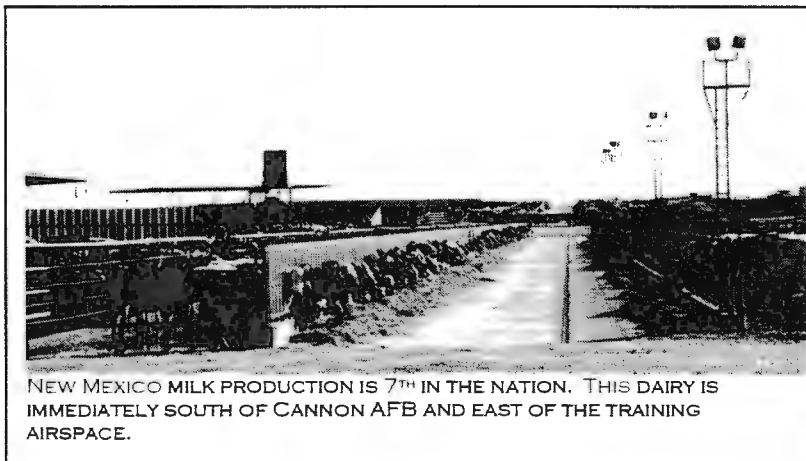
The total annual economic impact generated by Cannon AFB in FY 2003 was estimated at \$211.2 million (Cannon AFB 2006b). Military and civilian payroll totaled \$116.2 million. Contracts and purchases of goods and services amounted to \$41.4 million annually.

CURRY AND ROOSEVELT COUNTIES

A number of factors have influenced economic activity and employment in New Mexico in recent years, contributing overall to moderate growth despite some industry-specific declines. Since the early 1990s, New Mexico's numerous U.S. military sites and related enterprises have experienced reduced federal defense spending, resulting in a loss of more than 8,500 jobs in the

past decade (University of New Mexico 2001). The mining and manufacturing sectors, particularly copper and potash mining and textile manufacturing, declined during the 1990s, losing hundreds of relatively high-wage jobs. High-tech manufacturing, on the other hand, has shown significant growth since 1990. Employment in this sector, which contributed an estimated 30,000 total jobs in 2000, has helped offset federal job losses during the same period.

The 1990s were a period of expansion for the ranching industry in New Mexico, particularly dairy operations. Agriculture, food processing and food-related industries together employ over 100,000 people in New Mexico and contribute \$2 billion in annual crop and livestock sales (New Mexico Department of Agriculture 2004). Milk production in New Mexico has



NEW MEXICO MILK PRODUCTION IS 7TH IN THE NATION. THIS DAIRY IS IMMEDIATELY SOUTH OF CANNON AFB AND EAST OF THE TRAINING AIRSPACE.

increased 400 percent since 1990, ranking the state 7th in the nation in milk production, 5th in the nation in production per cow, and first in the nation in herd size (New Mexico State University 2004). The dairy industry has noticeably grown in the past decade in Chaves, Curry, and Roosevelt counties.

Additional industry trends in recent years include the influx of call centers to the state, due to favorable legislation, and the growth of the gaming industry, particularly Native American-owned casinos. By 2000, these two industries contributed 12,000 and 6,000 jobs, respectively (University of New Mexico 2001). There also were substantial job gains in the retail sector due to the proliferation of superstores across the state. While job growth was moderate overall, the losses in relatively high-paying federal, mining, and manufacturing jobs compared to the gains in high-tech manufacturing and relatively low-paying call center, gaming, and retail jobs resulted in slow growth in the state's average wage level.

The economy of the specific region comprised of Curry and Roosevelt counties is supported by a combination of government, services, and agricultural employment. The civilian labor force in the ROI amounted to 30,864 persons in 2005 (University of New Mexico Bureau of Business and Economic Research 2006). Over time, employment in the region has experienced increases and decreases. The total number of employed persons was 26,513 in 1980, increasing to 28,945 workers in 1990 (U.S. Census Bureau 2000a). Total employment in the ROI decreased to 24,433 workers in 2000, and increased again to 29,530 jobs in 2005. The 2000 Census identified approximately 2,700 employees in construction, extraction, and maintenance occupations. The unemployment rate, following national trends, rose to 7.2 percent in 2000, up from 6.0 percent in the early 1990s, but has since fallen to 4.3 percent in 2005. Unemployed persons in the ROI numbered 1,334 in 2005.

3.9.2.3 EDUCATION

A variety of public and private schools provide education to Clovis and Roosevelt counties. In 2000, there were 14,704 students aged 3 and over. The estimated Cannon AFB dependent population enrolled in school amounts to 2,546 students, comprising 17.3 percent of the ROI

student population. Table 3.9-1 presents the number of students by grade level in the two counties, and the estimated student population associated with Cannon AFB personnel.

TABLE 3.9-1. STUDENTS IN ROI

<i>School</i>	<i>Curry County</i>	<i>Roosevelt County</i>	<i>Cannon AFB</i>
Preschool	850	308	159
Kindergarten	770	344	153
Elementary (1-8)	6,152	2378	1,166
High School (9-12)	2,885	1017	533
Total	10,657	4,047	2,011

Source: U.S. Bureau of Census 2000a

There are eight public school districts serving the ROI population surrounding Cannon AFB, with a total enrollment of 12,744 students in the 2005-2006 school year (see Table 3.9-2). Public school enrollment accounts for 85 percent of the student population, with the remaining students attending private schools or homeschooled. Student-teacher ratios in the two county school districts range from 9.5 in Elida Municipal Schools to 16.1 in Clovis Municipal Schools. The average school in the ROI has 303 enrolled students and 20 teachers.

Approximately 95 percent of students associated with Cannon AFB personnel attend schools in Curry County. The majority of these dependents attend Clovis schools, which is by far the largest district in the ROI with over 8,305 students enrolled in the district's 18 schools.

TABLE 3.9-2. PUBLIC SCHOOLS DATA FOR CURRY AND ROOSEVELT COUNTIES (2005-2006)

	<i>Enrollment</i>	<i>Schools</i>	<i>Student-Teacher Ratio</i>
Curry County			
Clovis Municipal Schools	8,305	18	16.1
Grady Municipal Schools	147	3	9.7
Melrose Public Schools	248	3	11.2
Texico Municipal Schools	526	3	14.8
Roosevelt County			
Dora Consolidated Schools	231	2	10.5
Elida Municipal Schools	141	2	9.5
Floyd Municipal Schools	253	3	11.9
Portales Municipal Schools	2,893	8	15.6
ROI Total	12,744	42	15.3

Source: New Mexico Public Education Department 2006

3.9.2.4 INFRASTRUCTURE

Potable Water. Cannon AFB obtains potable water for the base distribution system from five wells with a production capacity of 2.8 million gallons per day (MGD). For the years 2005 and 2006, average daily demand equaled 0.90 MGD. Wells 2, 3, 8, and 12 pump water to treatment

plant number 1, where water is chlorinated before it enters a 271,000-gallon above-ground tank. Four boost pumps at the main water plant can deliver water to the main distribution system at a capacity of 5,300 gallons per minute. Well 7 delivers water to treatment plant 2, where it is chlorinated and stored in a 50,000-gallon underground tank. Two booster pumps at this location deliver water to the distribution system. A sixth well, Well 5, delivers water directly to the distribution system after being chlorinated.

There are a total of six potable water storage tanks with a total capacity of 871,000 gallons of water. There are three non-potable wells that are used for golf course irrigation, to fill the fountain pond, and for fire support and training.

Potable water is provided to the city of Clovis by New Mexico American Water, a privately owned company. The system operated by New Mexico American Water includes approximately 45 groundwater wells, a distribution and pumping system, and 10.65 million gallons of potable water storage facilities. The average daily demand for the system ranges from 6.5 to 7.0 MGD with summer peak demands increasing to 11 MGD (personal communication, Wright 2007).

The city of Portales currently derives its supply of potable water from two wellfields that consist of approximately 30 wells. These wells meet the current average daily demand of 3.8 MGD from the approximately 5,800 customers in the city and surrounding area. Summer daily demands of 6.0 MGD can be met from the wells that have a maximum production capability of 6.8 MGD and storage that equals 9.25 million gallons (personal communication, Howell 2007).

Water levels in the existing wells for both systems continue to decline between 1 to 2.7 feet per year as a result of regional dependency on groundwater by both municipal and agricultural users. New Mexico American Water is adding six new wells to their system to maintain production capacity and the city of Portales is adding 1.2 MGD of capacity with three new wells in 2007. The city of Portales also has adopted a comprehensive Water Conservation Plan that provides numerous conservation measures to its customers to assist in reducing water consumption. Both water systems would utilize surface water provided from the Ute Reservoir pipeline when it becomes available after 2020.

Wastewater System. The on-base wastewater treatment plant has a maximum design flow of 1.13 MGD. For the years 2005 and 2006, average daily flows equaled 0.47 MGD. The plant consists of a new grit and grease collection device, influent pump station with emergency generator, sequence batch reactors, aerobic digester, chlorine contact chamber, sludge drying beds, and a composting area. The plant was modified in early 2007 to include a grit and grease collection system. The grit and grease collection system entrance works facility is a stand alone system and replaces the existing entrance works system. The existing entrance works will remain intact and can be utilized as required. A new manhole with two 24-inch knife gate valves is located at the front end of the grit and grease collection device; these valves can be operated to allow flow into the existing entrance works facility, or into the grit and grease system. The preferred method of operation will utilize the grit and grease collection system, but the old entrance works will remain to be utilized as a backup option when required for emergency use, or maintenance operations. The waste water collection system consists of approximately 228,000 linear feet of piping. Main and secondary lines range from 4 to 24 inches in diameter. Lines are constructed from concrete or asbestos cement, vitrified clay, polyvinyl chloride (PVC), high-density polyethylene, and castor ductile iron piping.

Storm Sewer. Stormwater runoff on base is conveyed through a drainage system consisting of culverts, storm sewers, and ditches. Stormwater flows are generally to the south and east. Flightline runoff is conveyed through storm sewer at both ends, southwest and northeast, and allowed to enter natural watercourses. Stormwater at the southwest end of the flightline flows through four sewers ranging in size from 27-inch to 48-inch and outlets to a depression with no outlet. At the northeast end of the flightline stormwater is routed through a pair of storm sewers, size unknown, before being outlet to a natural watercourse near the small arms range.

Electrical Distribution. Cannon AFB receives electrical power from Xcel Energy. A 115 kilovolt transmission circuit terminates in the 25 megawatt base substation on Arcadia Street. This transmission line can be energized from either of two Xcel substations: the Clovis substation located east of the base, or the Blackwater Draw substation located south of the base. Source selection is made at an Xcel switching station on SR 60/84. Base demand in FY 2005 was approximately 55,400 megawatt hours, which equaled about 58 percent of capacity.

Natural Gas. Public Service of New Mexico provides natural gas to Cannon AFB via pipeline to a substation 1 mile north of the base. From the substation, Cannon AFB owns the pipeline and underground natural gas distribution lines ranging from 1 to 6 inches in diameter. Currently, there are no natural gas lines running to the south side of the flightline. In FY 2005, the base consumed about 244,220 cubic feet.

3.9.3 ENVIRONMENTAL CONSEQUENCES

Personnel changes at Cannon AFB as well as expenditures for facility construction, operations, and maintenance will be major factors in the socioeconomic character of Curry and, to a lesser extent, Roosevelt counties. Table 3.9-3 presents the personnel changes projected for the years 2006 through a steady state of 2010. No Action is included in the table to reflect base status under the Base Realignment and Closure (BRAC) 2005 directive.

TABLE 3.9-3. PROJECTED CANNON AFB MANPOWER AUTHORIZATIONS

	<i>No Action</i>	<i>FY 2006</i>	<i>FY 2007</i>	<i>FY 2008¹</i>	<i>FY 2009¹</i>	<i>FY 2010¹</i>
Officer	11	275	190	439	702	755
Enlisted	105	3,142	2,171	2,743	4,020	4,185
Civilian ¹	34	730	505	407	417	420
Contractor	0	320	320	320	320	320
Total	150	4,467	3,186	3,909	5,459	5,680

Note: 1. These numbers apply to both action alternatives.

Existing demographic and economic characteristics in Curry and Roosevelt counties were analyzed to assess the potential socioeconomic impacts of the proposed AFSOC beddown. The beddown, described in detail in Chapter 2.0, involves two factors that may affect socioeconomic resources: personnel changes and facility renovation and construction. Socioeconomic impacts would occur if changes associated with the beddown of AFSOC assets substantially affected demand for housing or community services, such as schools, or substantially affect the region's economy.

During scoping, commenters noted that Air Force personnel and their families at Cannon AFB are very involved in the community. Persons associated with Cannon AFB regularly volunteer for community activities. Concern was expressed that a drawdown could affect volunteer

organizations in Clovis and Portales. As noted in Table 3.9-3, there is a projected reduction in base personnel between 2006 and 2008. During this period, there could be fewer Air Force-related personnel volunteering for community service activities. In 2009, personnel numbers are projected to be back to 2006 levels. The personnel numbers suggest a short-term reduction in available volunteers followed by an increase. There could be a short-term one to two-year effect, but there is not likely to be any long-term negative effect on volunteers from Cannon AFB who support the communities. Under the No Action Alternative, from Table 3.9-3, there would be a substantial reduction in Air Force personnel and an anticipated substantial reduction in local volunteers.

3.9.3.1 WEST FLIGHTLINE ALTERNATIVE

The beddown of AFSOC assets would have construction-related and personnel-related consequences. Each is addressed separately, followed by a combined consequences discussion.

CONSTRUCTION-RELATED CONSEQUENCES

Facility modifications under the West Flightline Alternative would include renovation, construction, or infrastructure improvement projects implemented over a 5-year period. Table 3.9-4 presents the annual expenditures projected at Cannon AFB to support the transfer of AFSOC assets under the West Flightline Alternative. The proposed construction activity would generate a number of direct construction-related jobs and additional secondary jobs through the multiplier effect of regional purchases (indirect effect) and payroll spending (induced effect), as depicted in Table 3.9-5. Construction activity also would contribute to regional economic output and regional household income (as related to increased employment levels). These potential effects would be temporary, however, lasting only for the duration of the construction activity.

TABLE 3.9-4. PROPOSED CONSTRUCTION, RENOVATION, AND O&M (FY2007 \$M)

<i>Fiscal Year</i>	<i>AFSOC Construction/ Renovation</i>	<i>AFSOC O&M (Request)</i>	<i>Cannon Other</i>	<i>Area II (Utilities)</i>
2008	9	146	0	1
2009	9	92	0	3
2010	15	73	20	5
2011	163	70	34	0
2012	41	77	30	0
2013	73	72	12	0

TABLE 3.9-5. ANNUAL CONSTRUCTION-RELATED SOCIOECONOMIC EFFECTS

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Economic Effects (Annual Total)						
Employment (jobs)						
Direct	1,976	1,300	1,401	3,424	1,888	2,009
Indirect	332	221	239	558	313	330
Induced	481	320	346	827	458	486
TOTAL	2,789	1,841	1,986	4,809	2,659	2,825
Payroll (\$thousands)						
Direct	\$63,568	\$42,135	\$45,612	\$109,594	\$60,546	\$64,349
Indirect	\$8,188	\$5,504	\$6,011	\$13,797	\$7,708	\$8,141
Induced	\$11,572	\$7,685	\$8,330	\$19,894	\$11,005	\$11,688
TOTAL	\$83,328	\$55,324	\$59,953	\$143,285	\$79,259	\$84,178
Output (\$thousands)						
Direct	\$156,000	\$104,000	\$113,000	\$267,000	\$148,000	\$157,000
Indirect	\$22,260	\$15,000	\$16,406	\$37,451	\$20,934	\$22,103
Induced	\$37,676	\$25,022	\$27,121	\$64,773	\$35,832	\$38,054
TOTAL	\$215,936	\$144,022	\$156,527	\$369,224	\$204,766	\$217,157
Demographic Effects (Cumulative Increase from FY07)						
Population (persons)	2,916	3,301	3,924	7,444	8,000	8,295
Housing (units)	1,395	1,579	1,877	3,560	3,826	3,967
School Enrollment (students)	567	642	763	1,447	1,555	1,612

Total employment (equal to the sum of direct, indirect, and induced employment) related to construction activity under the West Flightline Alternative would vary from an estimated 2,789 jobs in 2008 to 2,825 jobs in 2013 (see Table 3.9-5). Employment levels would fluctuate over the 6-year construction period, peaking at 4,809 jobs in 2011. At the peak, there would be demand for 3,424 direct workers likely to be involved in construction or related fields.

Construction and renovation projects under the West Flightline Alternative would represent an increase in annual economic activity generated by Cannon AFB in the local area and region. Increased demand for construction personnel and construction materials has the potential to increase short-term costs for local construction projects.

The two-county construction industry would not be expected to accommodate the labor demand of the proposed projects. The anticipated increase in regional economic activity associated with the Cannon AFB construction projects would likely have two effects with regard to the local workforce. First, labor force participation within the region would likely increase in response to enhanced job prospects. Second, laborers outside the region could be motivated to relocate (i.e., in-migrate) to the region.

Depending on the flow of funding, the demand for labor could be cyclical or intermittent, and could generate both relocation into the area by construction workers and their families (i.e., in-migration) and weekly commuting from communities outside the ROI. Because the supply of

existing skilled laborers in the region would be insufficient to meet anticipated demand, it is assumed that a significant portion of the workforce would come from outside the area. It is assumed that roughly half of the needed laborers would relocate (i.e., in-migrate) to the area during 2008, the initial construction year. Population in-migration would fluctuate over the next 5 years in accordance with the varying level of base-related construction activity. After 2013, the final construction year, construction-related socioeconomic effects would come to an end.

The estimated population in-migration and associated increase in housing demand and school enrollments are presented at the bottom of Table 3.9-5. Estimates of these demographic effects are based on the assumed migration ratios, described in the previous paragraph, and family size and student data from the U.S. Census. The broader socioeconomic consequences of these anticipated effects will be discussed in detail below under Combined Consequences.

OPERATIONS-RELATED CONSEQUENCES

For the purpose of this analysis, personnel numbers represent Air Force manpower authorizations rather than actual persons. Actual personnel are often between 80 and 90 percent of authorized personnel. As with expenditures, personnel changes under the West Flightline Alternative not only result in direct employment effects, but also result in payroll-related induced effects. Indirect effects are related to business-to-business activity rather than household spending; therefore, no indirect effects would be anticipated with regard to personnel changes at Cannon AFB.

Economic and demographic effects associated with personnel changes under the West Flightline Alternative are presented in Table 3.9-6. Also included are the anticipated socioeconomic effects under No Action, which are discussed below in the relevant No Action section. The baseline year for the analysis is FY 2006, for which current personnel levels at Cannon AFB (i.e., direct jobs) and associated socioeconomic conditions are presented. Transition of the base under the West Flightline Alternative initially would yield a decline in the employment level during 2007 and 2008, as current personnel are re-assigned prior to and concurrent with the arrival of AFSOC personnel. By FY 2010, the proposed steady-state personnel level would be achieved and projected to remain stable at 5,680 base personnel.

TABLE 3.9-6. ANNUAL PERSONNEL-RELATED SOCIOECONOMIC EFFECTS

	No Action	West Flightline Alternative					
		FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Economic Effects (Annual Totals)							
Employment (jobs)							
Direct	150	4,467	3,186	3,909	5,459	5,680	5,680
Indirect/Induced	89	2,569	1,811	2,134	2,930	3,044	3,044
TOTAL	239	7,036	4,997	6,043	8,389	8,724	8,724
Payroll (\$thousands)							
Direct	\$10,899	\$381,712	\$266,458	\$315,637	\$436,595	\$453,952	\$453,952
Indirect/Induced	\$1,725	\$61,986	\$43,741	\$51,526	\$70,675	\$73,423	\$73,423
TOTAL	\$12,624	\$443,698	\$310,199	\$367,163	\$507,270	\$527,375	\$527,375
Output (\$thousands)							
Direct	\$11,640	\$419,886	\$297,345	\$350,460	\$480,029	\$498,615	\$498,615
Indirect/Induced	\$3,326	\$201,284	\$141,887	\$167,232	\$229,569	\$238,514	\$238,514
TOTAL	\$14,966	\$621,170	\$439,232	\$517,692	\$709,598	\$737,129	\$737,129
Total Demographic Effects							
Population (persons)	300	8,904	6,360	7,842	10,943	11,392	11,392
Housing (units)	150	4,467	3,186	3,909	5,459	5,680	5,680
School Enrollment (students)	68	2,011	1,430	1,802	2,544	2,652	2,652

Estimated annual population effects and associated housing demand and school enrollments are presented at the bottom of Table 3.9-6. These demographic effects related to proposed personnel changes are based on current family size data at Cannon AFB, student population ratios in Curry and Roosevelt counties, and the assumption of one household per employed person. In 2000, there were 1.05 jobs per household in the ROI. The early transition period would result in a population decline in fiscal year 2007, and associated reduction in the demand for housing and number of enrolled students in area schools. Personnel levels will grow, however, from 2008 to 2010, expanding the population, housing demand, and student enrollment to planned stable levels in 2011 and after. The broader socioeconomic consequences of these anticipated effects will be discussed in detail below under Combined Consequences.

COMBINED CONSEQUENCES

The combined socioeconomic effects of construction activity and personnel changes associated with the proposed AFSOC transition at Cannon AFB are presented in Table 3.9-7.

Employment. Total employment declines by an estimated 2,039 total jobs in 2007 and then begins a steady increase in job creation through 2011. Employment drops back somewhat in 2012 and 2013 as the peak construction period concludes. By 2014, construction activity would be complete and long-term employment levels would stand at the anticipated stable level associated with Cannon AFB personnel. The projected 2014 employment levels are 5,680 direct jobs and 3,044 indirect and induced jobs, yielding a total long-term employment level of 8,724 jobs and an overall increase of 1,688 jobs over total baseline (FY 2006) employment of 7,036 jobs.

3.9-7. COMBINED SOCIOECONOMIC EFFECTS OF WEST FLIGHTLINE ALTERNATIVE

FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY2013	FY2014	Total Change
Economic Effects (Annual Totals)									
4,467	3,186	5,885	6,759	7,081	9,104	7,568	7,689	5,680	1,213
47	47	379	268	286	605	360	377	47	0
2,522	1,764	2,568	3,203	3,343	3,824	3,455	3,483	2,997	475
7,036	4,997	8,832	10,230	10,710	13,533	11,383	11,549	8,724	1,688
\$381,712	\$266,458	\$379,205	\$478,730	\$499,564	\$563,546	\$514,498	\$518,301	\$453,952	\$72,240
\$1,310	\$1,310	\$9,498	\$6,814	\$7,321	\$15,107	\$9,018	\$9,451	\$1,310	\$0
\$60,676	\$42,431	\$61,788	\$77,050	\$80,443	\$92,007	\$83,118	\$83,801	\$72,113	\$11,437
\$443,698	\$310,199	\$450,491	\$562,594	\$587,328	\$670,660	\$606,634	\$611,553	\$527,375	\$83,677
\$419,886	\$297,345	\$506,460	\$584,029	\$611,615	\$765,615	\$646,615	\$655,615	\$498,615	\$78,729
\$3,757	\$3,757	\$26,017	\$18,757	\$20,163	\$41,208	\$24,691	\$25,860	\$3,757	\$0
\$197,527	\$138,130	\$201,151	\$250,834	\$261,878	\$299,530	\$270,589	\$272,811	\$234,757	\$37,230
\$621,170	\$439,232	\$733,628	\$853,620	\$893,656	\$1,106,353	\$941,895	\$954,286	\$737,129	\$115,959
Demographic Effects (Net Annual Change)									
0	-2,544	4,398	3,486	1,072	3,520	556	295	0	10,784
0	-1,281	2,118	1,734	519	1,683	266	141	0	5,180
0	-581	939	816	229	684	108	57	0	2,253

Population. Although the construction activity is anticipated to take place over a period of 6 years and then come to an end, the multi-year nature of the employment opportunities generated would be likely to induce a percentage of relocation of workers and their families from larger urban areas outside the region. The anticipated in-migration of new residents would experience two highs, the first in 2008 when AFSOC personnel begin arriving at Cannon AFB, and the second in 2011 during the peak construction year (see Table 3.9-7). Consequently, population change in the region would be expected to fluctuate over the period from 2007 to 2013. The long-term anticipated increase in regional population would be an estimated 10,784 persons.

Housing. The overall anticipated increase in personnel assigned to Cannon AFB would be expected to require 1,213 housing units. In addition, the relocation of secondary workers and their families to the region would generate demand for 3,967 housing units, bringing the total increase in long-term housing demand to 5,180 units (see Table 3.9-7). There were over 3,200 housing units estimated to be vacant in Curry and Roosevelt in 2005; however, the quality of these units is unknown, as is the number of seasonal or recreational homes that may be included in that number. By assuming 50 percent of the vacant units are available for lease or purchase and are of suitable condition for occupancy, it is estimated that 1,600 housing units would be available in the ROI, resulting in a potential shortfall of 3,580 housing units.

Cannon AFB has entered into a housing privatization effort that could result in the demolition and replacement of 1,248 homes. Economic activity associated with this demolition and construction could add \$50 million per year for 2 years in FY 2010 and FY 2011. Although such construction is frequently accomplished by large corporations with a transient workforce, the stimulation would place increased pressure on available temporary housing and rental housing. It is likely that demand for additional housing would exceed supply in the short term.

Education. Incoming AFSOC personnel and relocating construction and other workers would bring their families with them, including their school-age children. The estimated number of potential school enrollments associated with the beddown of AFSOC assets would follow the same trend as population and housing, an initial decline in 2007 as the base transition begins, followed by two highs in 2008 and 2011 (see Table 3.9-7). The long-term change in school enrollments is expected to be 2,253 students, representing an increase of 15 percent in the ROI student population. It is estimated that 60 percent of the new students would be of elementary school age, 25 percent high school, and the remaining 15 percent pre-school and kindergarten.

Based on current school size and student-teacher ratios, it is anticipated that more classroom space and teachers could be needed to accommodate the anticipated increase in student population. Based on past residence choices, an estimated 95 percent of the Cannon-related population and 70 percent of the secondary population would reside in Curry County and attend the four county school districts, primarily Clovis. The remaining 5 percent of the Cannon population and 30 percent of the secondary population would be expected to reside in Roosevelt County and attend area schools there, primarily Portales.

Utilities and Infrastructure. The West Flightline Alternative includes construction of infrastructure improvements to support both the infill development and new facilities on Cannon AFB. Water and sewer lines to the base are adequate to meet current and projected demand. Water treatment for the existing and new population would need to be improved to meet personnel and equipment water demands. As a result of growth associated with the beddown of AFSOC assets at Cannon AFB, average daily demands have the potential to

increase by 1.8 MGD by FY 2013. This additional demand would be split among the cities of Clovis and Portales and the bases water system depending on the housing locations chosen by AFSOC personnel. With this gradual increase in potable water demand over the next five years, all three existing systems would be able to plan for, and accommodate this increase with minimal effects of the level of service provided to the systems customers.

3.9.3.2 EAST AND WEST AIRFIELD PREFERRED ALTERNATIVE

Economic and demographic effects under the East and West Airfield Alternative would be comparable to those anticipated under the West Flightline Alternative, but construction expenditures are somewhat higher under the East and West Airfield Alternative from 2010 to 2013, resulting in marginally higher socioeconomic effects during those years (see Table 3.9-8). The general nature of the consequences related to employment, population, housing, and education would be similar to those described under the West Flightline Alternative. The primary difference would be in utility requirements. Development across the base on the east side (East Side Development Area) would include a number of new facilities, as well as a large aircraft-parking ramp, which would require considerable lighting power. The connected transformer load for the new facilities could exceed the capacity of a 4,160-volt feeder. A new 115 kilovolt - 12.47 kilovolt base substation would be needed near the property line east of the Development Area. Sanitary sewer lines, water lines, and a new storm sewer would be required under the East and West Airfield Alternative. A new 14,500-foot gas line also would be required.

3.9.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Table 3.9-9 presents the socioeconomic effects related to 2006 baseline Cannon AFB activity, the effects associated with projected enclave status, and the resulting change in socioeconomic effects. The overall loss of 6,797 jobs would consist of 4,317 Cannon AFB positions plus 2,480 indirect and induced jobs. A loss of 2,480 jobs in Curry and Roosevelt counties would be expected to raise the current unemployment rate of 4.3 percent by almost triple to a projected 12.3 percent.

As military families were relocated and base housing was maintained as full as possible, the off-base housing vacancy rate would be expected to exceed 25 percent, more than double the vacancy rates experienced in 2000. This would tend to depress the housing market and substantially reduce the value of the existing housing stock.

Schools would face an expected decline in enrollment amounting to 1,943 students, as presented at the bottom of Table 3.9-9. This enrollment decline, representing almost 13 percent of the existing student population, would place pressure on districts to reduce budgets, possibly cutback the number of schools and increase the commute distances of remaining students.

As a result of these anticipated consequences, No Action would be projected to create a substantial socioeconomic effect upon the overall economy of primarily Curry County and secondarily, Roosevelt County.

COMBINED SOCIOECONOMIC EFFECTS OF THE EAST AND WEST AIRFIELD ALTERNATIVE

FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY2013	FY2014	Overall Change
Economic Effects (Annual Totals)									
4,467	3,186	5,885	6,759	7,391	9,745	7,887	8,009	5,680	1,213
47	47	379	268	339	709	413	430	47	0
2,522	1,764	2,568	3,203	3,420	3,979	3,532	3,560	2,997	475
7,036	4,997	8,832	10,230	11,150	14,433	11,832	11,999	8,724	1,688
\$381,712	\$266,458	\$379,205	\$478,730	\$509,655	\$584,069	\$524,725	\$528,548	\$453,952	\$72,240
\$1,310	\$1,310	\$9,498	\$6,814	\$8,651	\$17,691	\$10,320	\$10,747	\$1,310	\$0
\$60,676	\$42,431	\$61,788	\$77,050	\$82,286	\$95,732	\$84,977	\$85,662	\$72,113	\$11,437
\$443,698	\$310,199	\$450,491	\$562,594	\$600,592	\$697,492	\$620,022	\$624,957	\$527,375	\$83,677
\$419,886	\$297,345	\$506,460	\$584,029	\$636,615	\$815,615	\$671,615	\$680,615	\$498,615	\$78,729
\$3,757	\$3,757	\$26,017	\$18,757	\$23,793	\$48,221	\$28,227	\$29,380	\$3,757	\$0
\$197,527	\$138,130	\$201,151	\$250,834	\$267,878	\$311,660	\$276,642	\$278,871	\$234,757	\$37,230
\$621,170	\$439,232	\$733,628	\$853,620	\$928,286	\$1,175,496	\$976,484	\$988,865	\$737,129	\$115,959
Demographic Effects (Net Annual Change)									
0	-2,544	4,398	3,486	1,210	4,178	650	342	0	11,721
0	-1,281	2,118	1,734	585	1,998	311	164	0	5,628
0	-581	939	816	256	812	126	67	0	2,435

TABLE 3.9-9. SOCIOECONOMIC EFFECTS OF NO ACTION

	FY 2006	No Action	Change
Economic Effects			
Employment (jobs)			
Direct	4,467	150	-4,317
Indirect/Induced	2,569	89	-2,480
TOTAL	7,036	239	-6,797
Payroll (\$thousands)			
Direct	\$381,712	\$10,899	-\$370,813
Indirect/Induced	\$61,986	\$1,725	-\$60,261
TOTAL	\$443,698	\$12,624	-\$431,074
Output (\$thousands)			
Direct	\$419,886	\$11,640	-\$408,246
Indirect/Induced	\$201,284	\$3,326	-\$197,958
TOTAL	\$621,170	\$14,966	-\$606,204
Demographic Effects			
Population (persons)	8,904	300	-8,604
Housing (units)	4,467	150	-4,317
School enrollments (students)	2,011	68	-1,943

3.10 ENVIRONMENTAL JUSTICE

3.10.1 DEFINITION OF RESOURCE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to the extent permitted by law and appropriate, and consistent with the agency's mission, (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

For purposes of this analysis, minority, low-income, and youth populations are defined as follows:

- *Minority Population*: Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.
- *Low-Income Population*: Persons living below the poverty level.
- *Youth Population*: Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the U.S. Bureau of the Census. Total and minority population figures are based on recent demographic data released from Census 2000 (U.S. Census Bureau 2000a). The census does not report minority population, per se, but reports population by race and by ethnic origin. This data was used to estimate minority populations potentially affected by implementation of the West Flightline Alternative. Low-income and youth population figures were also drawn from the Census 2000 Profile of General Demographic Characteristics (U.S. Census Bureau 2000a).

Environmental justice analysis applies to adverse environmental impacts. Potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the human population are anticipated, otherwise no analysis is required. The same is true for analysis of special risks to children, which would be driven by adverse environmental impacts. If adverse impacts are not anticipated, no special risk to children analysis is required. Environmental factors assessed in relation to determination of environmental justice concerns often include air quality, safety, hazardous materials, and noise. In the event that adverse environmental impacts to the human population were anticipated, the effects would be identified and the impact footprint would be mapped for the specified ROI.

3.10.2 EXISTING CONDITIONS

Disadvantaged groups within the ROI, including low-income and minority communities, are specifically considered in order to assess the potential for disproportionate occurrence of impacts (see Table 3.10-1). Based on 2000 Census data, the incidence of persons and families in Clovis and Roosevelt counties with incomes below the poverty level was just slightly higher than state levels (U.S. Census Bureau 2000a). In the ROI during 2000, 20.0 percent of persons

and 25.3 percent of children were living below the poverty level, compared to 18.4 percent of persons and 24.7 percent of children in the State of New Mexico as a whole.

Minority persons represent 40.1 percent of the Clovis and Roosevelt county populations. Hispanic or Latino persons account for most of the minority population in the ROI, representing 31.2 percent of the ROI population and 77.8 percent of the minority population. By comparison, minority persons represent 55.3 percent of the state population, with Hispanic or Latino persons accounting for 76.1 percent of the state minority population. The youth population, which includes children under the age of 18, accounts for 28.0 percent of the ROI population, compared to 28.0 percent at the state level.

TABLE 3.10-1. 2000 POPULATION AND ENVIRONMENTAL JUSTICE DATA

Area	Population	MINORITY PERSONS		PERSONS BELOW POVERTY		CHILDREN UNDER 18	
		Number	Percent	Number	Percent	Number	Percent
Curry County	45,044	18,583	41.3	8,327	19.0	13,561	30.1
Roosevelt County	18,018	6,719	37.3	3,928	22.7	5,060	28.1
State of New Mexico	1,819,046	1,005,551	55.3	328,933	18.4	508,574	28.0
Total ROI	63,062	25,302	40.1	12,255	20.0	18,621	29.5

Notes: 1. The U.S. Census calculates percent low-income for individual counties based on total county populations that differ slightly from the county populations reported in the first column.

2. Population figures for each category are from different reporting years as described in the previous section. Therefore, except for minority population, the percentage figures are not based on the total population presented in this table but from the relevant data year.

Source: U.S. Census Bureau 2000a

3.10.3 ENVIRONMENTAL CONSEQUENCES

No disproportionately high or adverse impacts to minority or low-income populations are expected. In addition, there are no known concentrated AOCs where children might be subject to special health or safety risks. In order to address the possibility of environmental justice concerns, potential health and safety factors were analyzed to determine whether any disproportionately high or adverse human health or environmental impacts could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. The analyses conducted for air quality, safety, hazardous materials, and noise indicate that no adverse environmental impacts to the human population are anticipated under the West Flightline Alternative or the East and West Airfield Alternative. As a result, no disproportionate environmental justice impacts would occur, nor would there be any special health or safety risks to children. With regard specifically to noise, changes in noise contours associated with the West Flightline Alternative or East and West Airfield Alternative are not expected to affect populations to the north of the base.

The economic stimulation associated with the AFSOC beddown (see Section 3.10.2) would be expected to benefit all residents including minority and low-income as the regional economy expanded. There is no projected disproportionate effect upon children although some classroom crowding could occur if economic expansion and growth exceeded school capacity.

Growth related pressures could place some strain on schools, but this effect is not projected to have any long-term impact upon children.

3.10.4 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. This Alternative could result in substantial economic downturn in Curry and, to a lesser extent, Roosevelt counties. During times of economic hardship, minority and low-income populations may face a more difficult time due to increasing unemployment and greater competition for the few remaining jobs. Children can be affected by loss of family income and a reduction in basic services associated with a declining economic area.

These demographic and employment factors suggest the No Action Alternative has the potential to disproportionately impact minority and low-income job seekers and could have a secondary impact upon children.

4.0 MELROSE AIR FORCE RANGE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and potential environmental consequences at Melrose Air Force Range (AFR) and associated Restricted Areas (R-5104 and R-5105), which are depicted on Figure 2.2-1. In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 32 Code of Federal Regulations (CFR) Part 989, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. The affected environment is described for ten resource topics: Airspace Management, Noise, Safety, Air Quality, Physical Resources (including Hazardous Materials and Waste), Biological Resources, Cultural Resources, Land Use and Ranching (including Transportation), Socioeconomics and Environmental Justice. These resources are extensively interrelated and consequently, each resource topic relies upon the findings of relevant other analyses. For example, noise analyses are reflected in the analysis of land use, socioeconomics, and biological resources.

The sections for each resource topic begin with an introduction that defines the resources addressed in the section, defines key terms as necessary and describes the region of influence (ROI) within which the effects from an alternative action are anticipated to occur. The ROI varies from resource to resource, but in general, effects are expected to be concentrated on the range under the Restricted Airspace. Section 3.0 describes primary reasons why the ROI might differ among resources.

Following the introduction for each resource topic, information is presented about existing environmental conditions in the ROI. This information provides a frame of reference about conditions that prevail currently or existed in the recent past. Applicable laws and regulations for each resource are presented in Appendix D.

For each resource, the Two-Target Preferred Alternative, Three-Target Alternative, and No Action Alternative, described in Section 2.2, are assessed for their potential to impact the natural and human environment. In some instances a brief methodology is provided to explain how the analysis of impacts was conducted and to describe what would constitute a significant impact.

The impacts described in this section represent a best estimation of the consequences of training Air Force Special Operations Command (AFSOC) and associated assets at Melrose AFR. The impact analysis for each alternative includes direct and indirect, as well as short-term and long-term impacts. The impacts of each alternative are compared against the baseline conditions. Cumulative impacts and irreversible and irretrievable commitment of resources are described in Chapter 6.0.

4.1 AIRSPACE MANAGEMENT

4.1.1 DEFINITION OF RESOURCE

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (U.S.) and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace

needed to ensure safety in the takeoff and landing of aircraft, as defined in Federal Aviation Administration (FAA) Order 7400.2E (49 USC). This navigable airspace is a limited natural resource that Congress has charged the FAA to administer in the public interest as necessary to ensure the safety of aircraft and its efficient use (FAA Order 7400.2E 2000).

The FAA has designated four types of airspace above the U.S. They are Controlled Airspace, Special Use Airspace (SUA), Other Airspace, and Uncontrolled airspace. Controlled airspace is designated around Melrose AFR to support military operations at the range.

The ROI for airspace management are those airspace units that support operations at the Melrose Bombing, Gunnery, and Electronic Combat Range complex, known as Melrose AFR.

4.1.2 EXISTING CONDITIONS

Restricted airspaces, R-5104A, R-5104B, and R-5105, support training activities on Melrose AFR (see Figure 4.1-1). R-5104A, which overlies Melrose AFR and extends from surface up to but not including 18,000 feet above mean sea level (MSL), provides maneuvering area for air-to-ground activities. R-5104B extends from FL180 to FL230. Currently Cannon Air Force Base (AFB)-based F-16s account for 60 percent of the 3,720 sortie-operations conducted within the R-5104A/B areas. Approximately 23 percent of the sortie-operations are conducted during environmental night (10:00 p.m. to 7:00 a.m.). R-5105 abuts R-5104A directly to the north, but does not overlie the range and must be activated concurrently with R-5104A for air-to-ground training. R-5105 extends from surface up to 10,000 feet above MSL. Cannon AFB-based F-16s account for 100 percent of the 1,470 sortie-operations conducted within the R-5105 area. Each Restricted Area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. A Restricted Area is airspace designated under 14 CFR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated "joint-use" and IFR/VFR operations in the area may be authorized by the controlling Air Traffic Control (ATC) facility when it is not being utilized by the using agency (Pilot/Controller Glossary [P/CG] 2004). This airspace is described in Table 4.1-1.



The Taiban Military Operations Area (MOA), immediately to the west of the restricted airspace, is often scheduled with the restricted airspace to support training on Melrose AFR.

4.1.3 ENVIRONMENTAL CONSEQUENCES

4.1.3.1 TWO-TARGET ALTERNATIVE

Airspace management would remain unchanged from current conditions for the existing restricted airspaces and scheduling issues associated with the joint military-civil use of the airspace in its current configuration would continue. Airspace use would change to support live-fire training by AFSOC aircraft. Approximately 40 percent of the training activity would occur between 10:00 p.m. and 7:00 a.m. The introduction of a 50-acre landing zone (LZ)/drop zone (DZ) would result in increased air-to-ground activity on Melrose AFR. Management of Melrose AFR would also continue as under current conditions.

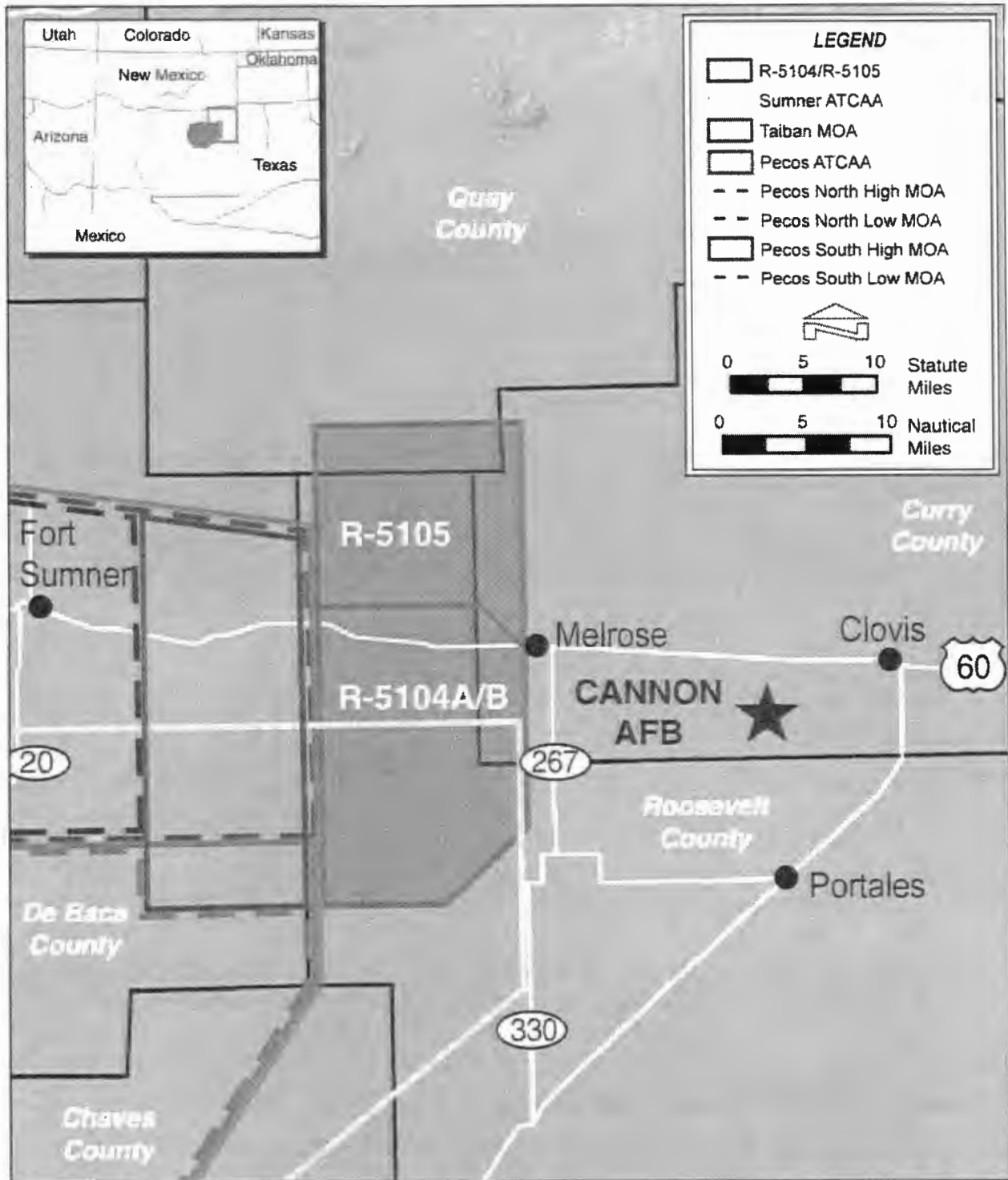


FIGURE 4.1-1. AIRSPACE ASSOCIATED WITH MELROSE AFR

TABLE 4.1-1. RESTRICTED AREA IDENTIFICATION AND DESCRIPTION

Airspace	ALTITUDES		PUBLISHED HOURS OF USE		Controlling ARTCC
	Minimum	Maximum	From	To	
R-5104A	Surface	UTBNI 18,000 MSL	8:00 a.m. (Mon-Fri)	Midnight (Mon-Fri)	Albuquerque
R-5104B	18,000 MSL	23,000 MSL	As requested in conjunction with R-5104A		Albuquerque
R-5105	Surface	10,000 MSL	8:00 a.m. (Mon-Fri)	Midnight (Mon-Fri)	Albuquerque

Notes: 1. UTBNI = Up to but not including.

2. MSL = mean sea level

Source: Air Force 2000b, Department of Defense (DoD) 2003.

The proposed Certificate of Waiver or Authorization (COA) would specify a corridor to be established to connect the Cannon Class D airspace with R-5104 by traversing the Class E airspace between Cannon AFB and Melrose AFR to provide for predator unmanned aerial system (UAS) launch and training. This corridor would be parallel to, and south of, Highway 60 and would extend approximately 20 miles at an operating altitude from 10,000 to 16,000 feet MSL.

During the scoping and public comment periods, commenters expressed concern with potential UAS operations outside of the restricted airspace associated with Melrose AFR. A limited COA between Cannon AFB and Melrose AFR to provide for launch and control of UAS between the two locations could affect civil aviation transit of the area between Cannon AFB and Melrose AFR. AFSOC proposes establishing a transit area between Cannon AFB and the restricted airspace associated with Melrose AFR. The Predator UAS is only authorized to fly in the National Airspace System under a Certificate of Waiver or Authorization (COA) issued by the Federal Aviation Administration (FAA). Compliance with the COA is mandatory and would be expected to establish an equivalent level of safety to the "see and avoid" requirements of FAR 91.113. Some general aviation pilots may be reluctant to traverse a COA potentially occupied by a UAS.

General aviation transiting the airspace between Cannon AFB and Melrose AFR could avoid COA airspace when it was potentially occupied by a UAS. Avoidance could be accomplished by flying above or below the COA airspace. Commercial activity in this area is at altitudes above those proposed for UAS transit and are not expected to be affected by such a corridor.

4.1.3.2 THREE-TARGET ALTERNATIVE

Under the Three-Target Alternative, aircraft operations and day/night proportion of training would be as described for the Two-Target Alternative. Environmental consequences associated with airspace management would be identical to those identified under the Two-Target Alternative.

4.1.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no movement of AFSOC assets to Cannon AFB and no Cannon-based AFSOC training would occur in the airspace associated with Melrose AFR. There would be continued use of the airspace and range by aircraft from New

Mexico Air National Guard (NMANG) and by other transient users. Total range use would decline with the deactivation of the 27th Fighter Wing (27 FW).

4.2 NOISE

4.2.1 DEFINITION OF RESOURCE

The ROI for Melrose AFR includes the range and the restricted areas (R-5104 and R-5105). A general discussion of the noise metrics used for noise modeling is provided in Section 3.2.1 and a more thorough explanation is provided in Appendix F.

Aircraft operations within restricted airspace generate noise levels different from community noise environments. Aircraft operations at airfields tend to be continuous or patterned, while sortie-operations in training airspace are sporadic. Noise from military overflights also differs from community noise due to the low altitude and turning characteristics of military aircraft maneuvers. High-speed military aircraft can exhibit a rate of increase in sound level (onset rate) of more than 150 decibels (dB) per second. Table 4.2-1 presents the sound level (in dB) for a variety of aircraft types. A 10 dB difference is perceived as a doubling of sound, thus an F-16A is perceived as approximately twice as loud as a C-130 under takeoff power and approximately three times as loud as a CV-22 flying at a comparable altitude (see Table 4.2-1). The Day-Night Average Sound Level (L_{dn}) metric is adjusted to account for the surprise or startle effect of the onset rate of aircraft noise on humans with an adjustment of up to 11 dB added to the normal Sound Exposure Level (SEL). The adjusted L_{dn} averaged over the busiest month period is designated as Onset Rate Adjusted Day-Night Average Sound Level (L_{dnmr}). Figure 4.2-1 depicts baseline aircraft noise levels under Restricted Airspace and the Taiban MOA. Baseline noise levels calculated for Melrose AFR were L_{dnmr} 48 to 51 dB. These baseline noise levels result from current aircraft training.

TABLE 4.2-1. SOUND EXPOSURE LEVEL (SEL) IN DECIBELS UNDER THE FLIGHT TRACK FOR AIRCRAFT AT VARIOUS ALTITUDES IN THE AIRSPACE¹

Aircraft	Configuration ¹	Power	Airspeed (KIAS)	300 feet AGL	500 feet AGL	1,000 feet AGL	2,000 feet AGL	5,000 feet AGL	10,000 feet AGL
F-15C	Mid-speed training route	81% NC	520	116	112	107	101	91	80
F-22A ²	Cruise power	70% ETR	520	120	114	108	101	89	77
F-16A	Mid-speed training route	87% NC	450	110	107	101	95	85	74
C-130H	Takeoff power	850 CTIT	180	99	95	90	84	76	68
V-22B ³	Airplane mode	0 deg. nacelle	210	94	91	87	82	73	65
B-1B	Training route	101 RPM	550	116	112	107	101	92	82

Notes: 1. Used SEL_Calc program for fixed-wing aircraft noise calculations and assumed standard acoustical conditions.

2. Projected based on F-22A composite aircraft.

3. Used Rotorcraft Noise Model for V-22 noise calculations.

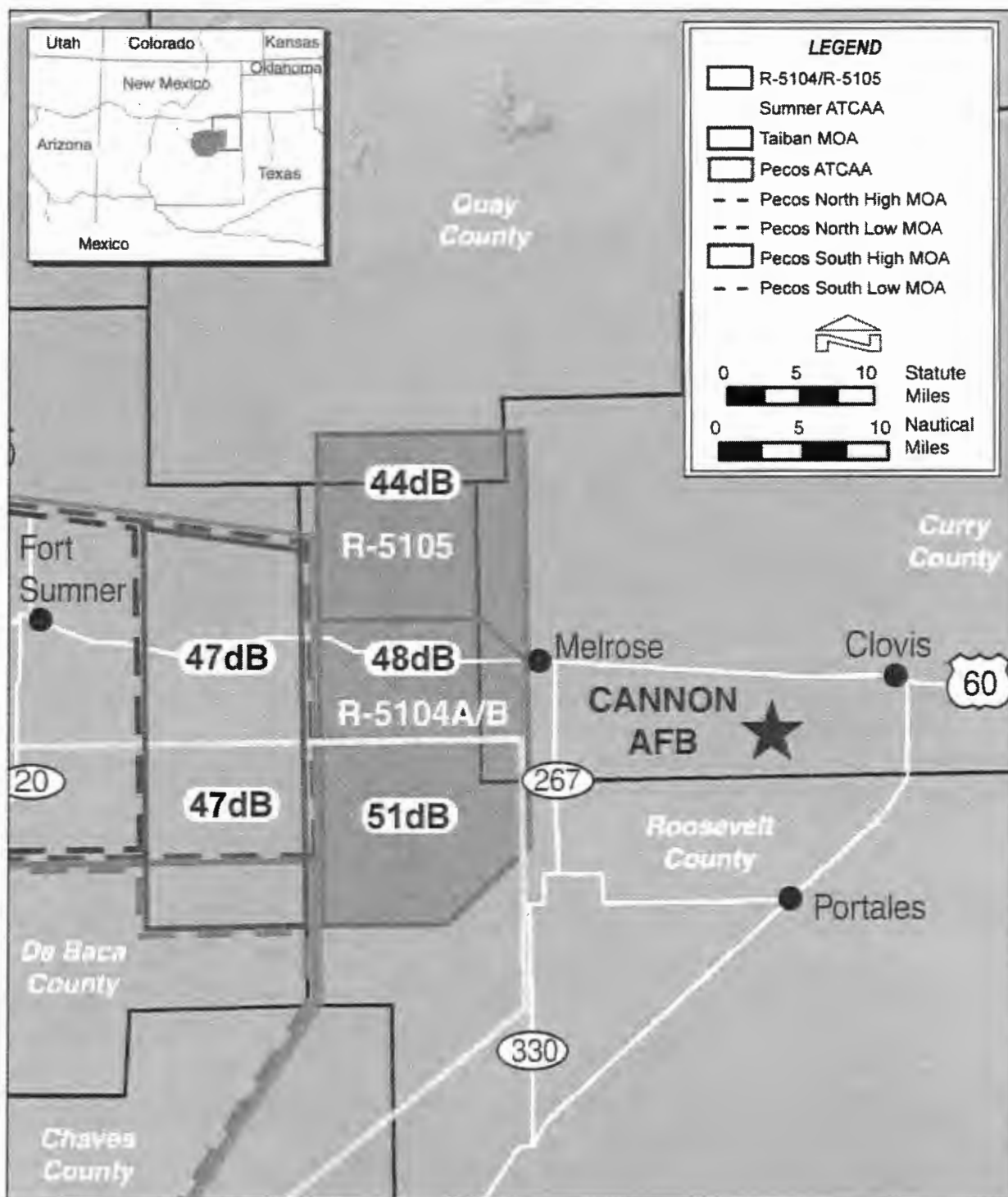


FIGURE 4.2-1. BASELINE AIRCRAFT NOISE LEVELS IN L_{DNMR} UNDER RESTRICTED AIRSPACE AND TAIBAN MOA

Source: Air Force 2006

Noise levels resulting from aircraft operating in the restricted airspace were calculated with the U.S. Air Force (Air Force) noise modeling program Military Operating Area and Range Noise Model (MR_NMAP). Resultant noise levels were based on the number of sortie-operations, time of day the sortie-operations occurred, altitudes of the aircraft during the sortie-operations, engine power setting, and airspeed. The noise assessment included all local and transient aircraft.

Noise at Melrose AFR would also include impulse noise from munitions being fired and from blast noise. Blast noise contours were developed using the Department of Defense's (DoD's) BNOISE program to describe noise produced by munitions use on Melrose AFR. BNOISE Version 2, used in this study, is a collection of computer programs that together can produce C-weighted Day-Night Average Sound Level (CDNL). CDNL is defined in units of C-weighted decibels (dBC) and is the metric used to define high-energy impulsive noise.

Impulse noise produced by artillery fire and detonation of air-to-ground or ground-to-ground live ammunition is analyzed differently than noise sources produced by aircraft engines. This is because of the higher energy created at low frequencies by these blasts. The low-frequency component can induce structural vibrations, which may generate additional annoyance to people beyond the audibility of the sound created by the blast.

The definition of CDNL is similar to L_{dn} except that C-scale is used to weigh the impulsive sound levels. Results of surveys related to community annoyance to A-weighted L_{dn} and CDNL found that an L_{dn} of 65 dBA equates to the same percentage of annoyance (approximately 15 percent) as a CDNL of 62 dBC (Table 4.2-2).

TABLE 4.2-2. NOISE ZONE DEFINITIONS

<i>Criteria</i>	NOISE ZONE		
	<i>I</i>	<i>II</i>	<i>III</i>
A-Weighted Average Noise Levels (Continuous Noise)	< 65 dBA	65 - 75 dBA	> 75 dBA
C-Weighted Average Noise Levels (Impulsive Noise)	< 62 dBC	62 - 70 dBC	> 70 dBC
Percent of Population Highly Annoyed	<15%	15% - 39%	>39%

Key: < = less than. > = greater than.

dBA = decibels (A-weighted).

dBC = decibels (C-weighted).

Source: U.S. Army Center for Health Promotion and Preventive Medicine 2005.

Impulse noise from munitions can consist of three components: the firing of the projectile from the weapon, the ballistic wave from the projectile traveling through the air, and the detonation of the projectile, if it contains a high-explosive (HE) charge. When a projectile containing HE material is fired from an aircraft, the noise resulting from the firing, the projectile traveling through the air, and the detonation of the projectile are calculated. An HE projectile that strikes the ground would have detonation. If the projectile is non-HE, only the noise resulting from the firing of the projectile is calculated.

Similar to NOISEMAP, the BNOISE2 computer program processes files to generate a grid file that is a collection of noise levels at equally spaced points. The NMPLLOT program uses the "grid" file to draw contours of equal CDNL for overlay onto land use maps.

4.2.2 EXISTING CONDITIONS

As noted during scoping, a number of ranches and other residences are located under the restricted airspace and the Taiban MOA. These residences are currently subject to overflight by training aircraft entering or exiting Melrose AFR. Figure 4.2-1 depicts baseline aircraft noise levels under Restricted Airspace and the Taiban MOA. Baseline noise levels calculated for Melrose AFR were L_{dnmr} 48 to 51 dB. Training aircraft from Cannon AFB, NMANG, and transient users of the range account for the aircraft activities in the Melrose AFR restricted airspace. The average operational parameters reflect the noise modeling of the F-16 aircraft, whose contributions to the noise environment are dominant. Other aircraft that use the range infrequently include A-10s, F-15s, F/A-18s, F-22As, German Air Force Tornados, B-1Bs, B-52s, C-130s, and various helicopters (Air Force 2006).

4.2.3 ENVIRONMENTAL CONSEQUENCES

4.2.3.1 TWO-TARGET ALTERNATIVE

Under the Two-Target Alternative, noise levels on Melrose AFR and associated Restricted Areas would change from baseline conditions as depicted in Table 4.2-1. This is largely attributed to the different array of aircraft that would be based at Cannon AFB, including the AC-130H, MC-130H/P/W, CV-22, C-47, UH-1, and Predator UAS. The range and restricted airspace would experience a substantial reduction in F-16 training as the 27 FW is disestablished. The range would continue to see activity from B-1B bombers based at Dyess AFB, the 150th NMANG F-16s, and other transient users including A-10s, F-15s, F/A-18s, F-22As, German Air Force Tornados, B-52s, C-130s, and various helicopters (Air Force 2006).

The majority of the projected AFSOC training aircraft would be C-130 variants and CV-22s. The currently dominant aircraft training in the airspace is the F-16. Comparing the SEL in dB demonstrates that a jet F-16 is approximately twice as loud as a turboprop C-130 and approximately three times as loud as a CV-22 flying at a comparable altitude (see Table 4.2-1). SEL is measured on a logarithmic scale and noise levels are perceived as doubling with approximately a 10 dB increase (see Appendix F). AFSOC aircraft would spend more time training at lower altitudes and more time training after 10:00 p.m. when there is a 10 dB noise penalty added.

Figure 4.2-2 presents aircraft noise levels under the Restricted Airspace and Taiban MOA that would result from AFSOC training aircraft. Noise levels in these areas would noticeably increase. While AFSOC aircraft have lower noise levels than F-16 aircraft, AFSOC aircraft fly longer sorties at lower altitudes, and more after 10:00 p.m. at night. This results in an increase in noise levels that could be noticed by residents under, or in proximity to, the airspace. The 58 dB L_{dnmr} noise levels represent the use of training airspace as much as possible before 10 p.m. The estimated noise levels are below the 65 dB level normally viewed by FAA as a level of potentially significant noise. Nevertheless, residents within the area affected would notice the increased noise and could be annoyed by aircraft noise in the airspace.

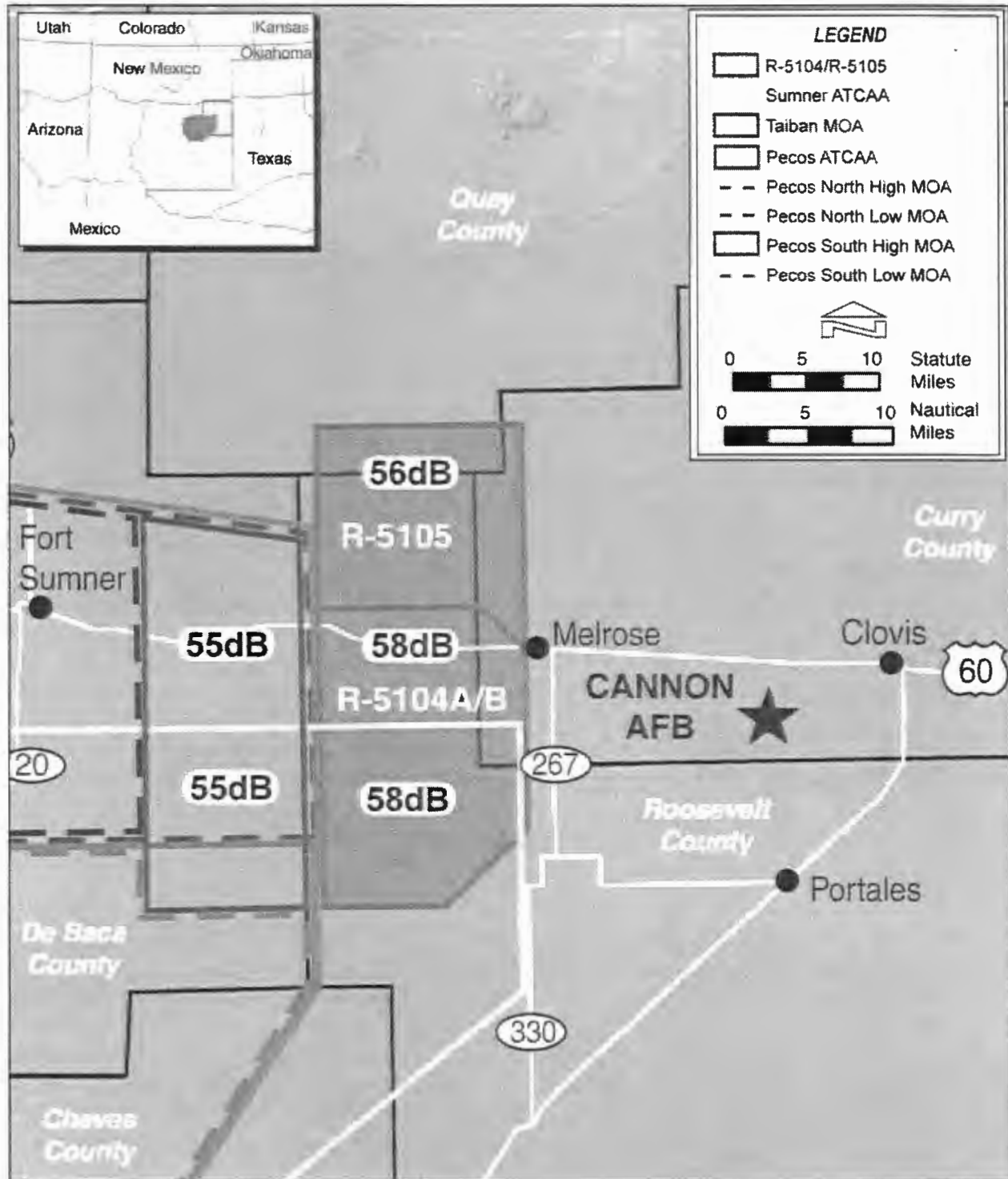


FIGURE 4.2-2. TWO-TARGET ALTERNATIVE AIRCRAFT NOISE LEVELS IN L_{DNMR} UNDER RESTRICTED AIRSPACE AND TAIBAN MOA

Impulse noise from AFSOC munitions use on Melrose AFR would consist of delivery of 105 millimeter (mm) howitzer HE and a variety of smaller ordnance. Impulse noise was estimated using the BNOISE model. Impulse noise produced by artillery fire and detonation of air-to-ground or ground-to-ground live ammunition is analyzed differently from non-impulse noise (see Appendix F).

The 30 mm, 40 mm, and 105 mm ammunition is fired from the air by AC-130 gunships. The 105 mm howitzer is the weapon with the greatest impulse noise. Because of its size, the firings of 105 mm rounds are expected to dominate the noise environment. Using the munitions data presented in Chapter 2.0, the BNOISE2 computer program was used to calculate the noise exposure for the ranges. The 62 dBC contour equates to the A-weighted 65 dB contour.

The projected 2,500 rounds of 105 mm HE and fragmentary (frag) munitions plus 12,500 rounds of 105 mm inert munitions are projected to create a 62 dBC contour as presented in Figure 4.2-3. The 62 dBC contour would be nearly entirely contained within the range. A 62 dBC noise level is approximately comparable to an L_{dn} 65 noise level and is a noise level used to address the potential for significant impacts.

The 62 dBC contour extends approximately 2.5 miles from the center of the HE target areas presented in Chapter 2.0. All CDNL 62 contours would be contained within approximately 1 mile of the boundaries of Melrose AFR, resulting in below Noise Zone I impacts to off-range property proximate to the range (see Table 4.2-2).

Experience with 105 mm training at Eglin AFB demonstrates that off-range property within approximately 6 miles of the orbiting gunship could experience a "rap-rap-rap" impulse sound comparable to knock on a wooden door when the 105 mm are fired and feel a vibration comparable to distant thunder when the HE shells struck the earth. Such impulse noises would not be expected to cause damage to a structure or its contents. The 62 dBC contour would remain nearly entirely on the range and would not produce significant impacts to residences outside the range. Nevertheless, such impulsive noises could cause annoyance to residents when the noise was heard or felt, especially during night hours after 10 p.m. A review of Figure 4.2-3 demonstrates one residence within 4.2 miles of the northeast 1-kilometer target box and one residence within 4.3 miles of the southwest target box. An estimated seven residences are within 5.2 miles of the boundary of a target box.

Animals generally avoid specific impact areas that can be viewed as a threat. Animals also generally demonstrate an ability to habituate to noise levels not perceived as a threat. Scoping commenters expressed concerns about effects of impulse noise on range cattle during times when they are in an enclosed area. Penned cattle, approximately 3 or more miles from the impact area, would not likely be affected by HE rounds due to the reduced noise and vibration beyond those distances. Five cases of penned range cattle suffering damage or loss within a 14-year period have been attributed to jet aircraft low-level overflight (Air Force 2006). A startle effect could occur to penned cattle in close proximity to live fire on the Melrose AFR, although impacts would not be expected beyond 3 miles from the target location.

The expanded small arms range would be used for a variety of munitions that could result in noise levels heard off-range. This small arms noise could result in annoyance to residents east of the range but would not be at levels potentially causing a significant impact.

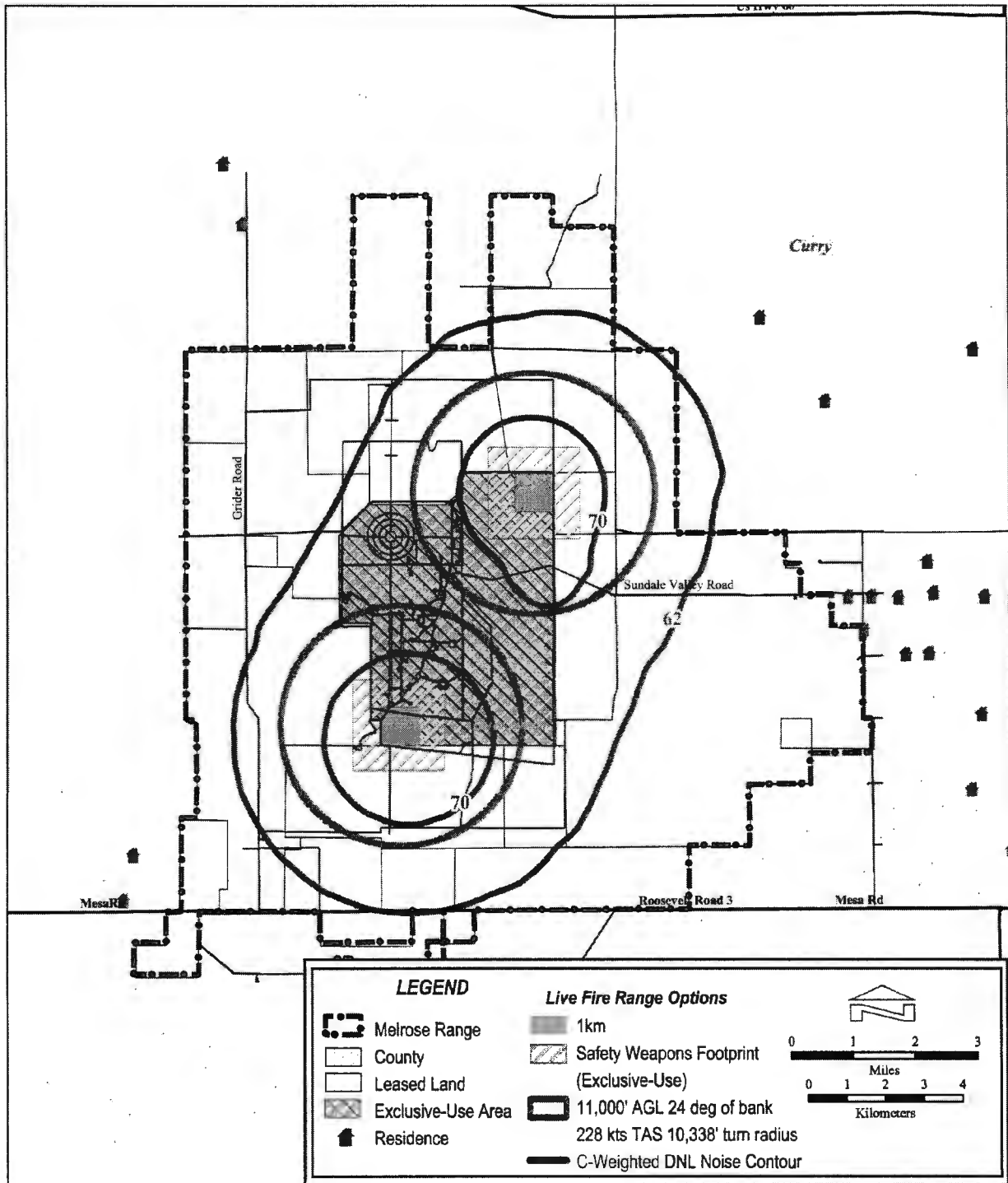


FIGURE 4.2-3. IMPULSE NOISE MAP FOR THE TWO-TARGET ALTERNATIVE ON MELROSE AFR

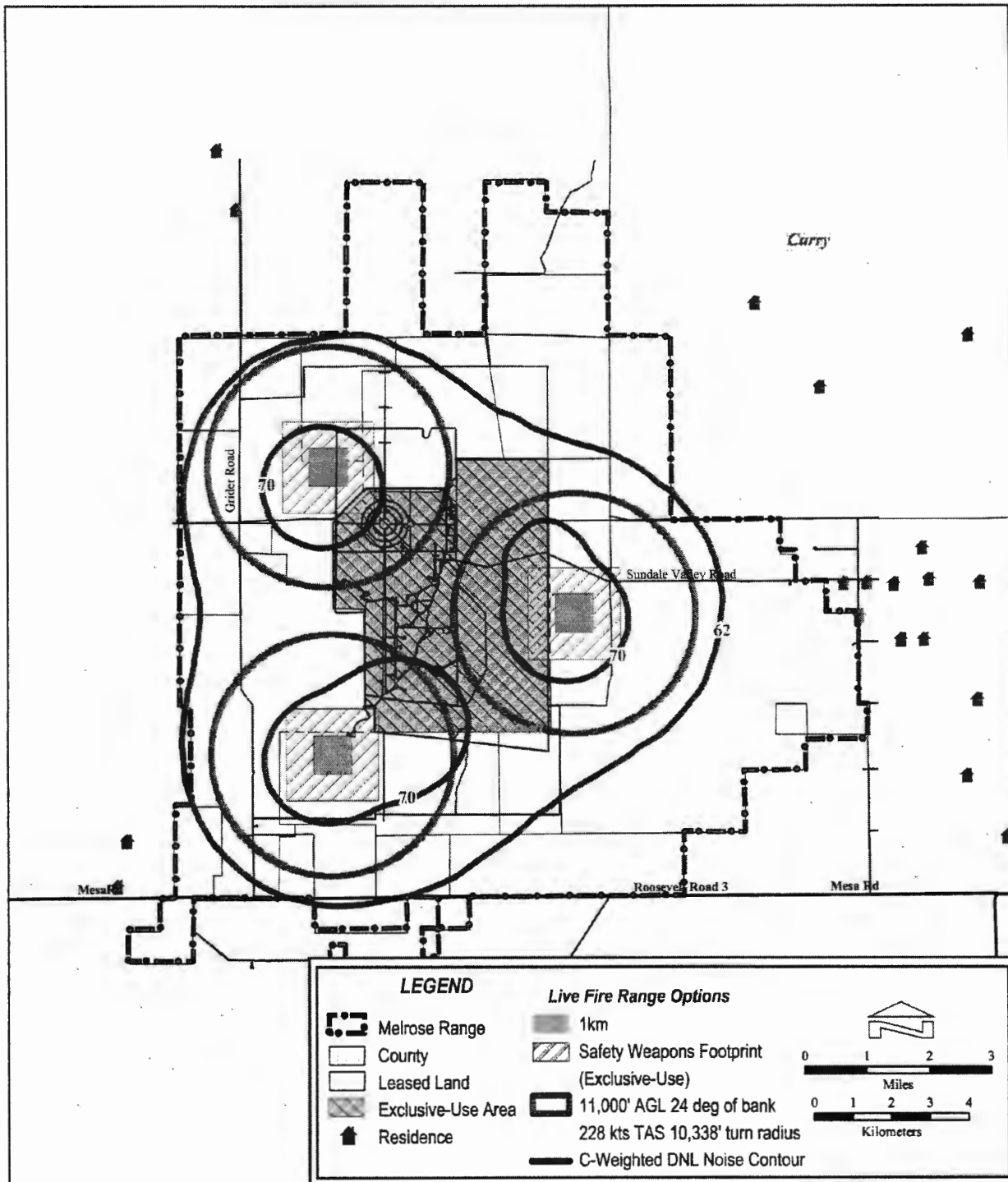


FIGURE 4.2-4. IMPULSE NOISE MAP FOR THE THREE-TARGET ALTERNATIVE ON MELROSE AFR

Range management involves the development and implementation of those processes and procedures required to ensure that Air Force ranges are planned, operated, and managed in a safe manner. The focus of range management is on ensuring the safe, effective, and efficient operation of Air Force ranges. The overall purpose of range management is to balance the military's need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on the environment and surrounding communities (Air Force 2001c, 2001d, 2001e).

4.3.2 EXISTING CONDITIONS

4.3.2.1 GROUND SAFETY

Melrose AFR is currently managed in accordance with requirements and procedures prescribed in Air Force Instruction (AFI) 13-212, Volumes 1, 2, and 3. Specific direction on different range activities is contained in AFI 13-212, Volume 1, *Range Planning and Operations*, Volume 2, *Range Construction and Maintenance*, and Volume 3, *SAFE-RANGE Program Methodology* (Air Force 2001c, 2001d, 2001e). Cannon AFB's Supplement to AFI 13-212 also assigns responsibilities and provides detailed processes and procedures to the range control officer (RCO) regarding range scheduling, maintenance, explosive ordnance disposal, range decontamination and debris disposal, entry into, operations within, and exit from the airspace directly supporting range operations (Cannon AFB 2000).

These instructions address a wide range of ground safety considerations that include land ownership and control, weapons employment safety, range scheduling, range maintenance, explosive ordnance disposal (EOD), range decontamination and debris disposal, and environmental stewardship of the range.

The Cannon AFB Fire Department provides an on-site fire response and suppression capability on Melrose AFR. Fire Department response units are on site any time the range is active. While the assigned fire suppression equipment has proven to be adequate, large earth-moving equipment, which is on site to support range operations, is also available for fire suppression requirements. In addition, the Cannon AFB Fire Department is a party to mutual aid support agreements with city and volunteer fire departments near the base and Melrose AFR. Cannon AFB would continue mutual aid support agreements and other assistance to local communities, and receive support as required. As in the past, Cannon AFB would work with non-military fire departments to alert private citizens about the potential for injury should they handle or disturb aircraft or munitions debris. These agreements reduce human health risks and risks from wildfires. The base commander would continue to direct the base fire department to assist in any local or regional fire emergency.

New Mexico normally experiences two fire seasons annually that correspond to the two driest times of the year. The worst of the two seasons is usually the windy spring season when the state receives almost no rain, live vegetation is starved for moisture, and strong dry winds occur. Fires during this season are most often caused by human activity or lightning from dry thunderstorms (thunderstorms with little or no rain). The second fire season usually begins with another dry period during the fall, when many grasses and other small plants begin to die and dry out, providing ready fuel for fire. Atmospheric moisture levels are reduced and dry thunderstorms again become a fire threat (New Mexico State University 2000). Based on the records kept by the New Mexico's Forestry Division for the years 1996-2000, the state had an

annual average of 792 wildfires which consumed approximately 153,700 acres per year on state and private lands.

The Melrose AFR senior fire official consults daily with the RCO to evaluate regional fire risk. They monitor weather and fire conditions from resources available on the Southwest Area Fire Intelligence website and provide recommendations to operations personnel. These recommendations address the need to alter flight operations and, if the risk is excessive as determined on a situational basis, impose restrictions on range operations. These restrictions could range from limiting the type of ordnance used to the complete curtailment of ordnance use. Prior to flight operations, aircrews review and adhere to fire restrictions regarding the use of ordnance on the range.

Melrose AFR has experienced fires resulting from spotting charges and flares. On November 30, 2005, a training munition released by a B-1B aircraft at Melrose AFR started a fire that burned 26,000 acres of grazing and farmland and damaged or destroyed privately owned structures, fencing, wells, livestock, animal feed, and crops. In general, fires that have occurred on the range tend to be small and remain contained within the target impact areas, which are generally devoid of vegetation or are surrounded by firebreaks. In addition to on-site fire spotting and fire suppression capabilities, fire risk on the range can be managed by controlled burning and development and maintenance of fire breaks. Fire risk is reduced by suspending the use of heat- and spark-producing ordnance when fire risk is elevated (Air Force 1997b). The Air Force follows established procedures for claims in the event that an Air Force-caused fire should occur and subsequently damage farmlands, livestock, or infrastructure. Cannon AFB, with cooperation from the U.S. Forest Service, has developed a Wildland Fire Management Plan that establishes policy, procedures and responsibilities for Wildland Fire Management and also outlines procedures, controls, and duties specific to Fire Suppression Operations at Cannon AFB. This document complies with National Fire Protection Association (NFPA) Standard 1051, *Standard for Wildland Fire Fighter Professional Qualifications*, NFPA Standard 1143, *Standard for Wildland Fire Management*, NFPA 1144, *Standard for Protection of Life and Property from Wildfire*, AFI 32-2001, *The Fire Protection Operations and Fire Prevention Program*, and AFI 32-7064 *Integrated Natural Resources Management Chapter 12 Wildland Fire Management* requirements. Implementation of this plan will provide for projected equipment and manpower increase to (3) engines, (1) tender and (1) command/control vehicle, and 9 personnel covering 24/7 operations. The range contractor provides grader support. Also, since the 2005 Melrose AFR fire, Cannon AFB has implemented the following additional measures:

- Installed new dedicated radio frequency/repeater for emergency response.
- Created and implemented a fire condition Risk Analysis/Decision Matrix.
- Installed new fire danger weather sensor which integrates real time weather with fire conditions.
- Purchased new wildland response vehicle for both off-road and on-road responses.
- Firefighters are all certified to National Wildland Coordinating Group/NFPA requirements.
- Trained mutual aid fire departments in National Incident Management system process.

A "Weapon's Safety Footprint," and its extent and configuration, is a ground safety consideration. When an air-to-ground weapon containing high explosives (live ordnance) detonates, the radius of

blast damage and fragmentation of the weapon's case must be considered. When a training (inert) air-to-ground weapon impacts on or near the target, different concerns exist. The inert weapon may have a spotting charge that sets off a shotgun-sized charge with smoke to mark where the bomb struck. If the ordnance does not detonate, it may skid, bounce, or burrow under the ground for some distance from the point of impact, coming to rest at some distance from that point. The military has analyzed extensive historic data and continues to incorporate weapons safety data into safety programs. Melrose AFR currently meets safety requirements in accordance with AFI 13-212.

Range operations require that the surface area encompassing the weapon safety footprints be protected by purchase, lease, or other restriction to ensure the safety of personnel, structures, and the public from expended rockets, missiles, or target debris (Air Force 2001c). The lands associated with the Melrose AFR Complex meet these requirements.

White phosphorus rockets typically used in Combat Search and Rescue (CSAR) mission training and defensive training flares are the only live ordnance currently approved for use on Melrose AFR. No other air-launched live, HE, or other ordnance is currently used on Melrose AFR. AFI 13-212 safety requirements address all ordnance currently delivered on Melrose AFR. Specific operational limitations and constraints for current use of the range have been documented in detailed range operating procedures. These operational parameters are unique to targets, aircraft, ordnance used, and delivery profiles employed under the auspices of Air Combat Command (ACC). All aircrew using the range must be knowledgeable of and comply with all requirements specified in these operating procedures (Cannon AFB 2000). These parameters will change under AFSOC's Cannon Addendum to AFI 13-212, subsequent to issuance of the Air Force's Record of Decision (ROD).

4.3.2.2 FLIGHT SAFETY

Baseline conditions for flight safety issues presented in Section 3.3.2.2 is applicable to flight safety issues that would be encountered at Melrose AFR.

4.3.2.3 EXPLOSIVE SAFETY

Cannon AFB controls, maintains, and stores all ordnance and munitions required for mission training. Ordnance is handled and stored in accordance with Air Force explosive safety directives (AFI 91-201), and all munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data. Ample storage facilities exist and all facilities are approved for the ordnance stored.

Current training does not have aircraft loaded with any ordnance configured with HE warheads. Inert training bombs and several different types of rockets are delivered on Melrose AFR, as well as training projectiles fired from the F-16's 20 mm cannon.

Ordnance expenditure 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, are equipped with mechanisms that preclude release or firing without activation of an electronic arming circuit.

System malfunctions or material failures could result in either an accidental release of ordnance or the release of a dud component that fails to operate properly. Studies have shown that the probability of such an accidental release occurring, the probability of it occurring where person or property could be affected, and the possibility of injury to a person or damage to property on the ground is so infinitesimally small that the risk associated with the occurrence can be essentially discounted (Air Force 1999).

RR-188 chaff and M-206 or equivalent flares have been assessed for use in the airspace adjacent to Melrose AFR (Pecos MOAs, Taiban MOA, and Pecos and Sumner Air Traffic Control Assigned Airspace [ATCAAs]). Within the restricted airspace associated with Melrose AFR, other types of flares and ordnance can be deployed. RR-188 chaff may also be used along the northern portions of VR-100/VR-125 (Air Force 2001a). Use is governed by detailed operating procedures to ensure safety.

Chaff consists of small fibers of aluminum-coated mica packed into approximately 4-ounce bundles. Chaff is ejected from an aircraft to reflect radar signals. When ejected, chaff forms a brief electronic "cloud" that temporarily masks the aircraft from radar detection. Although chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (Air Force 1997b). RR-188 chaff is specifically designed to not interfere with FAA radars. Refer to Appendix A for more details on the characteristics of chaff.

Defensive flares consist of small pellets 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 to mislead heat-sensitive or heat-seeking targeting systems and decoy them away from the aircraft. The M-206 flare is essentially a pellet of magnesium that ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds. The M-206 flare burns up within approximately 400 feet from release point (Air Force 1997b; Appendix B). Flare use in the Cannon AFB airspace outside of restricted airspace is governed by a minimum release altitude restriction of 2,000 feet above ground level (AGL) and is limited by fire risk conditions to minimize fire risk. Refer to Appendix B for more details on the characteristics of M-206 flares.

4.3.3 ENVIRONMENTAL CONSEQUENCES

Live ordnance projected to be used on Melrose AFR as part of AFSOC training include 30 mm, 40 mm, and 105 mm HE rounds from AC-130 gunships. Use of these munitions would require establishment of new targets and new range operational and safety procedures as well as establishment of new safety zones for these targets. An expanded small arms range would require operational and safety procedures to protect personnel operating on the range.

4.3.3.1 TWO-TARGET ALTERNATIVE

GROUND SAFETY

The uses of Melrose AFR for live fire, including HE rounds, and increased use of inert munitions training activities have the potential to increase the frequency of fires. In addition, as a result of the unique way that CV-22s can turn their engines to "helicopter" mode on landing, engine exhaust could ignite dry grasses in potential LZs. These LZs would need to be cleared of vegetation and/or treated to reduce the risk of fire. As part of the program to upgrade facilities at Melrose AFR, AFSOC has included plans for expanded fire control capabilities at the range. This action along with adoption of increased firebreaks and enhanced fire management practices would improve the fire management efforts on Melrose AFR.

Range managers are required to assess risks associated with weapons employment and establish mission parameters that minimize potential safety hazards. Specific weapon safety footprints must be assessed against each intended target to ensure that they can be safely employed (Air Force 2001c). These assessments have been accomplished by 27 FW staff and allowable ordnance delivery profiles have been documented in Cannon AFB Supplement 1 to

AFI 13-212 (Cannon AFB 2000). Although remote, there is always the possibility that ordnance could significantly miss a target, either through human error or equipment malfunction. However, a more likely possibility is that ordnance would impact the ground, and then bounce, slide, or tumble along the ground, sometimes for extended distances. Based on extensive data collection and analyses, weapons safety footprints have been developed that describe (at a 95 percent confidence level) the geographic area that will contain 99.99 percent of delivered ordnance and its associated debris. These footprints are specific to ordnance type, aircraft type, and delivery methods and profiles.

A variety of safety footprints have been calculated for proposed Melrose AFR targets. The approximate 1 kilometer square target area used for 105 mm, 30 mm, and 40 mm rounds would require a safety footprint that extends out beyond the box by an additional 2,296 feet. This safety box is depicted on Figure 2.2-2.

A 10,338 foot diameter circle describes the gunship orbit for the highest altitude from which firing could occur. Gunship firing at the ground targets would be within this orbit. For safety reasons, lands within this orbit would be restricted access lands during firing to protect any activities on the ground from accidentally dropped objects. Figure 2.2-2 presents the orbit for the highest altitude gunship training.

Special Operations Forces (SOF) conducting ground training and involved in insertion/extraction exercises would not use areas where unexploded ordnance (UXO) are known to be present. Training operations will be conducted in accordance with Melrose AFR operational instruction (AFI 13-212V1 Cannon Air Force Base Addenda A-A) and AFSOC safety procedures. Training of AFSOC personnel will require use of small arms, smoke devices, simulated and live explosives, and flares. A listing of these devices is shown in Table 2.2-4.

SOF personnel would use the variety of weapons on the expanded small arms range. Ground safety would dictate scheduling of air-to-ground use of specific targets to avoid users of the small arms range, and safety would dictate scheduling of the service of existing air-to-ground targets consistent with small arms training.

FLIGHT SAFETY

The Two-Target Alternative would add additional low-altitude flights in the Restricted Areas that support operations at Melrose AFR. However, the aircraft involved in training are multi-engine, train with more than one pilot, and possess radar and other flight control and navigation systems to enhance the low level capabilities of the aircraft. Aircraft mishap rates for the C-130 models that will fly the majority of the low-level flights have a very low mishap rate (less than 1 Class A mishap per 100,000 flight hours). This is not expected to increase with the implementation of the AFSOC beddown and training and no significant adverse environmental consequences are anticipated. Flight safety for CV-22 and other aircraft is presented in Section 3.3.2.2.

EXPLOSIVE SAFETY

AFSOC training would generally occur within the 60,010 acres that constitute Melrose AFR. The existing Air Force Instruction (AFI) 13-212, Volume 1 and 2 would be updated with a new AFSOC supplement to reflect AFSOC's new role as range manager, subsequent to transfer of the range from ACC. The AFSOC Cannon Local Range Supplement will be developed to reflect the more substantive range changes that are the subject of this EIS, subsequent to issuance of the Air Force's Record of Decision (ROD). The AFSOC Cannon Local Range Supplement would

incorporate revised operating instruction based on the existing AFI supplement, AFI 13-212 Volume 1 Cannon AFB *Melrose Weapons Range* (refer to Appendix G).

A new AFSOC supplement to the operating instruction (AFI 13-212) would address issues such as, but not limited to:

- Continuing direct control over all range targets;
- Ensuring targets are thoroughly cleaned of potential environmental hazards before being sited on range;
- Maximizing the use of hard targets, such as metal plates and surplus tanks, to minimize generation of wastes and target residue;
- Establishing scheduled range maintenance and periodic clean-ups of the range in accordance with AFI 13-212;
- Ensuring that all personnel receive required explosive ordnance briefings and safety training.

Military aircraft are currently authorized to use RR-188 chaff (or equivalent), a variety of defensive flares in Restricted Areas (R-5104, R-5105), and M-206 (or equivalent) defensive flares in Taiban MOA, Sumner ATCAA, and in the Pecos MOA/ATCAA. Flares expended over Melrose AFR would be in accordance with AFI 11-214. Flare use in MOAs is currently authorized above 2,000 feet AGL under conditions not designated at, or above, high fire risk.

Use of training flares where approved within Cannon AFB-managed airspace would continue to be incorporated by AC/MC-130 and CV-22 aircraft with the following management practices:

- The minimum altitude for flare release in SUA will continue to be 2,000 feet AGL (flares burn out after falling approximately 400 feet).
- When the National Fire Danger Rating System indicates high fire conditions or above, the minimum altitude for flare release would be raised to 5,000 feet AGL.
- Cooperation with local agencies for mutual aid response to fires will continue.

AFSOC training would increase the use of chaff and flares in restricted airspace and the total annual chaff and flare use by Cannon AFB-based aircraft would decrease from current use.

4.3.3.2 THREE-TARGET ALTERNATIVE

GROUND AND FLIGHT SAFETY

Implementation of the Three-Target Alternative would have consequences comparable to those described for the Two-Target Alternative in the amount of ordnance expended or sortie-operations conducted at Melrose AFR. The primary difference between this alternative and the Two-Target Alternative would be the addition of three target areas for AC-130 gunships. Under this alternative, three target areas would be established within the existing range boundaries. Consequences and management actions to provide for ground safety would be as described in the Two-Target Alternative.

The eastern approximate 1-kilometer square target of the Three-Target Alternative is less than 500 feet from the proposed small arms range. The safety footprint extends out 2,256 feet beyond the approximate 1-kilometer square target area and overlaps many of the small arms range

firing points and some of the potential small arms range targets. The Three-Target Alternative could result in a UXO safety risk to personnel using the small arms range following use of the eastern target for live-fire training with HE munitions. An EOD safety team sweep of the small arms range prior to use could be required after the eastern target was used for HE training.

EXPLOSIVE SAFETY

As noted under the Two-Target Alternative discussion, the existing AFI 13-212, Volume 1 and 2 would be updated with a new AFSOC supplement to address the use of live ammunition and the range residue associated with this change in use. The potential for fires originating from live-fire training or the release of inert ordnance would be greater than under existing conditions. Chaff and flare use would be as described for the Two-Target Alternative. With the placement of additional fire management resources at Melrose AFR and observance of expanded fire management practices, the risk that fire would leave the boundary of the range would be expected to diminish.

4.3.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, no beddown of AFSOC assets would occur at Cannon AFB and no Cannon-based AFSOC training would occur at Melrose AFR at this time. Safety risks on Melrose AFR would be somewhat reduced without the contribution of the 27 FW F-16 aircraft due to the BRAC directive to disestablish the 27 FW. Continued use of Melrose AFR by transient aircraft, including the NMANG F-16s, would continue the requirement for existing safety measures on the range.

4.4 AIR QUALITY

4.4.1 DEFINITION OF RESOURCE

This section discusses air quality considerations and conditions in the area around Melrose AFR including portions of Curry, Quay, De Baca, and Roosevelt counties in the State of New Mexico. The definition of the Melrose AFR air quality regulations are identical to those presented in Section 3.4.1 for the Cannon AFB project region.

4.4.2 EXISTING CONDITIONS

The definition of the Melrose AFR regional air quality and attainment status are the same as those presented in Section 3.4.2 for the Cannon AFB project region.

Climate. The general climate for the region surrounding Melrose AFR is arid or semi-arid, with light precipitation, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range (Western Regional Climate Center [WRCC] 2006a).

Winds at Cannon AFB, approximately 25 miles northeast of the Melrose AFR are generally moderate in strength and persistent, with an annual average of 12 miles per hour (mph). All months maintain an average wind speed of between 10 and 14 mph, with a maximum occurring in April (WRCC 2006b). Winds generally come from the west from late fall through spring, and then switch to a more southerly direction during the summer and early fall months (WRCC 2006c). Wind speeds and direction can vary greatly on a shorter time-scale from frontal passages, severe storms, and interaction with local topography.

Winters in the area are cool and dry. January, on average, is the coldest month, and the month with the least precipitation. For the city of Melrose, approximately 10 miles northeast of the

Melrose AFR, average high and low temperatures for January are 53 degrees Fahrenheit (°F) and 23°F, and the average monthly precipitation is 0.41 inches. Conversely summers are much warmer and wetter, with July being the warmest month, and August being the wettest. Average high and low temperatures for July are 92°F and 63°F, and the average recorded rainfall in August is 2.88 inches. The average annual precipitation in Melrose is 16.32 inches. Snowfall is fairly common during the winter months, with a peak monthly average of 3.4 inches in December. The annual average snowfall for Melrose is 13.7 inches (WRCC 2006e).

Prevention of Significant Deterioration (PSD) Class I Areas. Mandatory PSD Class I areas for the State of New Mexico are listed under 40 CFR 81.421. The nearest PSD Class I area is the Salt Creek Wilderness Area, located approximately 60 miles southwest of Melrose AFR.

Current Air Emissions. Air emissions at Melrose AFR primarily occur from (1) aircraft that originate from Cannon AFB and conduct training exercises over the range, (2) the ordnance dropped from aircraft, and (3) fugitive dust (particulate matter) generated from the ground impact of ordnance. Table 4.4-1 summarizes the estimated annual emissions produced at Melrose AFR. These data were calculated by comparing the current baseline sorties with the sorties reported in the 1998 *Environmental Assessment for Proposed Force Structure Change and Foreign Military Sales Actions at Cannon AFB, New Mexico* (Air Force 1998b). The ratio of sorties for each region was then multiplied by the emissions reported in that document to estimate current baseline emissions. Only aircraft emissions that occurred below 3,000 feet AGL are included in this analysis, as this is the average height of the surface mixing layer. Any emissions released above this level would not transport downward and affect ground-level air quality conditions.

TABLE 4.4-1. BASELINE EMISSIONS FOR MELROSE AFR

	ANNUAL EMISSIONS (TONS PER YEAR)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Ordnance ¹		0.02	<0.01	<0.01	1.58	1.05
Aircraft Flying Operations ²	0.81	6.87	101.95	3.37	1.62	1.60
Total	0.81	6.89	101.95	3.37	3.20	2.65

Notes: 1. Calculations based on 16,635 dummy bombs being dropped annually and using the USEPA's emissions factors for ordnance (USEPA AP-42, 2006). These dummy bombs are assumed to be classified in the "ground burst simulator" category, with an approximate net explosive weight of 0.141 pounds per bomb. VOC is actually expressed as Total Non-Methane Hydrocarbons.

2. Emissions from aircraft flying operations at the Melrose AFR include all activities under 3,000 feet AGL in the following areas: R-5104A, R-5105, and the Taiban MOA. Emissions were calculated by using the emissions from the 1998 *Environmental Assessment for Proposed Force Structure Change and Foreign Military Sales Actions at Cannon AFB, New Mexico*, and multiplying them by the ratio of current baseline sorties, to sorties documented in the 1998 Environmental Assessment (EA).

VOC = volatile organic compound

CO = carbon monoxide

NO_x = nitrogen oxides

SO_x = sulfur oxides

PM₁₀ = particulate matter less than or equal to 10 micrometers in diameter

PM_{2.5} = particulate matter less than or equal to 2.5 micrometers in diameter

4.4.3 ENVIRONMENTAL CONSEQUENCES

Air pollutant emissions produced from the Two-Target Alternative were quantitatively estimated, then compared to the criteria identified below to determine their significance. Air quality impacts from the beddown of AFSOC assets would occur from (1) combustive emissions generated by the operation of aircraft assigned to Cannon AFB, (2) combustive and fugitive

dust emissions due to the use of ordnance during training exercises, and (3) combustive and fugitive dust emissions from equipment usage during fire break construction and maintenance.

As previously discussed, Section 169A of the Clean Air Act (CAA) established the PSD regulations to protect air quality in regions that already meet the National Ambient Air Quality Standards (NAAQS). Certain national parks, monuments, and wilderness areas have been designated as PSD Class I areas, where appreciable deterioration in air quality is considered significant. The nearest PSD Class I area is the Salt Creek Wilderness Area, located approximately 60 miles southwest of Melrose AFR. Since the project site is such a long distance from this Class I area, the Two-Target Alternative would produce less than significant air quality impacts to this area.

4.4.3.1 TWO-TARGET ALTERNATIVE

The Two-Target Alternative would involve the transition of use of the Melrose AFR and Taiban MOA to meet training requirements for the AFSOC aircraft to be assigned to Cannon AFB. The 27 FW would be disestablished and aircraft currently stationed at Cannon AFB would no longer train over the Melrose AFR.

OPERATIONAL EMISSIONS

Upon implementation of the Two-Target Alternative, air emissions at the Melrose AFR and Taiban MOA would change due to an increase in number of sorties flown and the fact that the airspace would produce emissions at different rates than that of the aircraft currently assigned to the area. An increase in ordnance usage and fire break construction and maintenance activities at the Melrose AFR also would contribute to an increase in air emissions.

Future chaff and flare use in the Melrose AFR and Taiban MOA are not included in this analysis because these materials, although substantially increasing in quantity over the range, would not be frequently at altitudes that could contribute to the overall emissions.

To determine the change in emissions from proposed aircraft operations, a composite set of criteria pollutant emission factors were developed based on a weighted average of annual sorties for each type of aircraft stationed at Cannon AFB. These composite emission factors were then compared with the emission factors of the current fleet of aircraft to develop an emission factor ratio. In addition, the numbers of annual sorties were compared with the baseline annual sorties to develop another ratio to take into account the increase in use. The baseline emissions were then multiplied by the ratio representative of the difference in emission factors and by the ratio representing the increase in sorties.

Factors used to estimate project aircraft emissions were obtained from the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003) and the USEPA NONROAD 2005 emissions model (USEPA 2005). Table 4.4-2 summarizes the estimated change in aircraft emissions due to the Two-Target Alternative. These data show that there would be an increase in emissions of criteria pollutants from current levels, but these increases would not exceed any emission significance thresholds. Therefore, the Two-Target Alternative would produce less than significant air quality impacts within and around the Melrose AFR and Taiban MOA project region.

**TABLE 4.4-2. NET CHANGE IN EMISSIONS - MELROSE AFR/TAIBAN MOA -
TWO-TARGET ALTERNATIVE**

Source	TONS PER YEAR					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Aircraft Operation	16.28	14.88	58.68	15.93	19.40	19.23
Air and Ground Ordnance ¹	0.03	16.81	0.29	0.00	10.01	3.28
Fire Break Grading ²	0.02	0.14	0.34	0.05	4.06	0.86
Total	16.33	31.83	59.31	15.98	33.47	23.37
Significance Thresholds	100	100	100	100	100	100

- Notes: 1. VOC emissions are not included in ordnance emissions. Emissions from ordnance were estimated by using the emission factors from the USEPA's AP-42 document for a 5.56 mm ball cartridge and applying that to the projected total number of pieces of ordnance expected to be used annually.
2. Grading for firebreak construction/maintenance would occur on 6 acres per day and 50 days per year.

4.4.3.2 THREE-TARGET ALTERNATIVE

Implementation of the Three-Target Alternative would result in the same amounts of ordnance usage and sorties flown at Melrose AFR, compared to the Two-Target Alternative. As a result, emissions from aircraft operation and ordnance usage would be nearly identical to those estimated for the Two-Target Alternative and as presented in Table 4.4-2. The primary difference between the Three-Target Alternative and the Two-Target Alternative would be the addition of a target area for AC-130 gunships. It is expected that this additional target area would require a firebreak and therefore construction and maintenance of this feature would increase emissions from grading equipment and fugitive dust by an additional one-half of the emissions (fire break grading) identified in Table 4.4-2. With the addition of these emissions, total annual emissions from the alternative would not exceed any significance threshold. Therefore, implementation of the Three-Target Alternative would produce less than significant air quality impacts within and around the Melrose AFR and Taiban MOA project region.

4.4.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no beddown of AFSOC assets and no Cannon-based AFSOC training would occur at the Melrose AFR or Taiban MOA at this time. As with either Action Alternative, the No Action Alternative would produce less than significant air quality impacts within and around the Melrose AFR and Taiban MOA project region.

4.5 PHYSICAL RESOURCES

4.5.1 DEFINITION OF RESOURCE

This section discusses the Melrose AFR ROI. Descriptions of topography and geology are described in a regional context to depict the setting. Soils and water resource information provided is site-specific, focusing on the properties that would be most likely affected by activities planned. Hazardous material and waste management focuses on Melrose AFR.

4.5.2 EXISTING CONDITIONS

4.5.2.1 EARTH RESOURCES

Melrose AFR is located on a southeastward-sloping regional plateau known as the Southern High Plains. Within this area of the plateau, the topography is typified by flat, featureless terrain having almost no relief. Characteristically, the High Plains have a smooth and gently sloping or undulating surface on which scattered, normally dry, flat bottomed depressions are the dominant relief feature. Elevations at Melrose AFR range from approximately 4,200 feet above sea level in the northeast portion to over 4,600 feet above sea level in the southwest portion. There are several drainages and small canyons on Melrose AFR including Sheep Canyon. The largest topographic feature of Melrose AFR is the mesa, a northeast trending, flat-topped hill rising over 4,660 feet above sea level. The mesa is located on the southwest side of the range.

The semi-arid climate of the region contributes to the development of thin topsoil with low organic content, underlain at relatively shallow depths by a leached clay-carbonate hardpan or "caliche." Caliche forms as calcium carbonate and is leached from overlying sediments. Within the region, tightly cemented layers of caliche are present in a number of soil horizons as well as in the Ogallala aquifer below (Air Force 2001a, Air Force 1997a).

The soils on Melrose AFR have a permeability that ranges from moderate in the loam soils to high in the sand soils. The soils are highly susceptible to erosion from the persistent winds of the plains. The soils include the following associations.

- Tivoli-Springer-Brownfield sands are deep, loose, sandy soils. This association is found in the north part of the area.
- Amarillo-Clovis loamy fine sands association is a moderately deep to deep sandy soil. This association is found south of the Tivoli-Springer-Brownfield sands in the north-central part of the area.
- Amarillo-Clovis fine sandy loam is a moderately deep to deep soil. This association is found in the area below the Mesa and in the east-central part of the area.
- Amarillo-Clovis loam is a deep to moderately deep hardland soil. This association is found in the southeast part of the area.
- Potter-Mansker association is a very shallow to moderately deep calcareous soil. This association is found on top of the Mesa in the southwest part of the area (Air Force 1997a).

They can be generally characterized as slightly alkaline to alkaline (pH of 7.1 to 8.2) although these values range from a low of 6.6 to a high of 9.0. These soils are deep to moderately deep in profile and are moderately well to well drained. Additionally, the soils are characterized by typically coarse-textured material.

Generally speaking, the soils underlying the bombing range have very poor water-holding capacities, as consistent with the relative lack of surface water features within the region. As a consequence, depth to groundwater generally exceeds 100 feet (North Plains Groundwater District 2007).

Melrose AFR is underlain by several hundred feet of unconsolidated sediments deposited over sandstone known as the Triassic redbeds. This stratum forms the basement of the Ogallala

aquifer, which is developed within the overlying late Miocene to early Pliocene sediments. The Ogallala Formation sediments are comprised of unconsolidated and poorly sorted gravel, sand, silts, and clays (Air Force 2001a, Air Force 1997a).

4.5.2.2 WATER RESOURCES

Within this region of New Mexico, precipitation averages about 12 inches per year, most of which occurs during summer thunderstorms. Regional drainage consists of poorly developed ephemeral streams due to the low annual precipitation and high evaporation rates (Air Force 2001a, Air Force 1997a). The most prominent surface water features on Melrose AFR occur in the long shallow valleys of the Canada del Tule and Sheep Canyon draws and several smaller drainages carrying runoff from the Mesa. The Canada del Tule seasonal draw carries runoff from the southeastern half of the range and flows through it in the northeasterly direction. Historically, the draw carried water to Tule Lake, located northeast of the range; however, due to the numerous impoundments along its course, flow has decreased and surface water flow north of Sundale Valley Road is not evident. The Sheep Canyon drainage area consists of one major ephemeral drainage that flows northeast from the Mesa (the topographical high point on Melrose AFR, approximately 4,600 feet MSL (Air Force 1996).

These drainages do not typically contribute actual flow to the three river valleys into which they eventually drain (the Red or the Brazos). This is because much of the precipitation that falls is lost to infiltration and/or evaporation (Air Force 1996a). Stormwater runoff from the southeastern half of Melrose AFR is generally carried by the Canada del Tule draw and the Mesa is drained from the northeast by the Sheep Canyon drainage. Much of the runoff on Melrose AFR is captured in numerous impoundments that are used as sources of water for livestock. Small playas are present throughout the level portions of Melrose AFR.

Other surface water features on Melrose AFR include four periodically flooded areas (outside the Restricted Leased Area), 10 wildlife watering impoundments (three of which are on the existing Exclusive-Use area), 23 steel-rimmed stock tanks, and five other small man-made impoundments used to support livestock operations (inside the Restricted Leased Area). The steel-rimmed tanks average about 19 feet in diameter and 18 inches in depth. They are all located on the restricted leased land. The other small impoundments are less than 0.01 acre and average about 8 feet in depth. There are also several groundwater supply and monitoring wells located throughout Melrose AFR. Within the Exclusive-Use Area and at selected points around the range, there are a series of groundwater monitoring wells that have been established in association with monitoring of past activities on the range. Also found within the Restricted Leased and Unrestricted Leased Areas are a number of groundwater supply wells that service irrigation systems or stock tanks.

No jurisdictional waters of the U.S., including wetlands, are located within the Exclusive-Use Area, the Restricted Leased Area, or the Unrestricted Leased Area of Melrose AFR. All surface water features are either isolated or components of isolated drainages. Scattered earthen stock tanks occur in areas supporting grazing. No permanently flooded areas are located on the range.

4.5.2.3 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials Management. Melrose AFR is operated by a contractor who monitors and maintains the televised ordnance scoring system, bombing and gunnery targets, and access

roads. Small quantities of hazardous materials, such as paints, are used at the range and are managed through the base hazardous materials management program.

Hazardous Waste Management. Melrose AFR qualifies as a "conditionally exempt, small quantity generator" due to the monthly waste generations within the main compound and up on the mesa. Generation of RCRA hazardous and universal waste may include liquid or solids accumulations in containers for processes used to clean parts and equipment, and/or battery replacements. Hazardous waste reduction includes non-regulated solid waste filters.

Range clean up at Melrose AFR typically consist of metal fragments from inert ordnance, targets, and training ammunition. Under current practice, munitions safely recovered and removed from the targets are then stored in the holding container designation area. Current practices are necessary for compliance with AFI 13-212, which requires the range clearance of munitions debris on a regular basis. Tactical and conventional targets are cleared every 75-use days, annually, and every five years in accordance with the distance requirements of AFI 13-212. Every five years all impact areas are cleared to their boundary.

The Cannon AFB EOD team inspects all munitions debris. Occasionally, the small spotting charge in the training munitions fails to detonate or bomb casings on larger bombs do not fragment. EOD explosively exposes the filler of inert bombs to ensure no explosive filled munitions are transferred to the recycling contractor. If necessary, EOD personnel will safe all hazardous munitions remains in place. Practice munitions with spotting charges that fail to function properly are collected and the spotting charge is disposed of on the range, rendering it safe, EOD then supervises the collection and disposition of the debris. Solid waste (i.e., scrap munitions) is currently being stored in several locations within the target impact area at Melrose AFR. Scrap munitions include inert (non-explosive) ordnance. The EOD team has primary responsibility to ensure all inert ordnance and ordnance residue is rendered useless; therefore, such debris is subjected to double-inspection or a mechanized process to ensure ammunition, explosives, and other dangerous articles are not released to the public. These safety measures ensure protection of human health and the environment and proper disposition of safe ordnance debris according to appropriate Defense Reutilization and Marketing Office (DRMO) directives, as directed by Memorandum of Agreement with DRMO, or through an option for direct commercial sales.

Storage Tanks. There are currently four Air Force-owned aboveground storage tanks (ASTs) located at Melrose AFR; there are no underground storage tanks (USTs) at the range (personal communication, Smith 2006).

Resource Conservation and Recover Act (RCRA)/Defense Environmental Restoration Act (DERA) Program. As part of an on-going examination of past waste management practices at Melrose AFR, Cannon AFB has identified three Solid Waste Management Units (SWMUs) and four Areas of Concern (AOCs) associated with past military activities and maintenance and disposal activities. The sites are located within the existing impact area and have been investigated and groundwater monitoring is being conducted. Cannon AFB is requesting that the New Mexico Environment Department (NMED) consider that these seven sites be classified as No Further Action (NFA) given that the sites are located within an active range.

4.5.3 ENVIRONMENTAL CONSEQUENCES

The limited areas of proposed construction on Melrose AFR, and the great depth to bedrock and to the aquifer in the locations of the proposed facilities, make it unlikely potential impacts could

occur to geologic resources or groundwater. The potential impacts to physical resources, primarily soil and water, are from munitions and chaff or flare materials falling to the ground.

In August 1997, Headquarters Air Combat Command (ACC) conducted a study of the environmental effects of using self-protection chaff and flares in military aircraft training (Air Force 1997b). This physical resources section considers the effects of munitions and chaff and flare deposition on resources identified in Section 3.4, including soil chemistry, the potential for materials and debris to accumulate in water bodies and sediments, potential flare caused fires, and residual materials to leach toxic chemicals or change the chemical composition of surface areas. The impact would not be considered significant if toxic chemicals would not be released or if accumulated residual materials would not alter soil or water.

4.5.3.1 TWO-TARGET ALTERNATIVE

EARTH AND WATER RESOURCES

Due to the relatively flat terrain at Melrose AFR, little cut and fill would be needed to prepare the sites for facility construction. In any construction, the natural soil horizons would be disturbed if they have not already been disturbed from previous bombing range activity. There would be few hazards or limitations to construction of buildings or roads on the soil types at the locations of the proposed facilities. Potential secondary effects from surface-disturbing activities, such as increases in stormwater runoff or offsite sedimentation, would be minimized through the installation and maintenance of standard construction practices and landscaping including dust suppression and soil stabilization measures.

While soils would be changed by construction activities, the effects would be localized and would not result in significant secondary impacts to wind or water resources because standard construction practices would be implemented. No significant impacts to soil, water, or geologic resources would result from range construction.

With the establishment of an approximate 1 kilometer by 1 kilometer impact area in the northeast and southwest corners of the existing impact area, additional safety weapons footprints (Exclusive-Use) would surround these impact areas. As shown in Figure 4.5-1, these safety weapons footprints do not interfere with the operation of existing groundwater wells on Melrose AFR.

Munitions. Munitions use on the range would change the range from a primarily inert munitions range to a live munitions range. HE shells from 105 mm, 40 mm, and 30 mm weapons, practice rounds containing lead, and incendiary rounds would be used on new Melrose targets. The training would increase chemicals from munitions, lead, and other heavy metals on the range. Expanded EOD range clearance would be required in accordance with AFI 13-212, including the new AFSOC supplement.

Under the Two-Target Alternative, HE munitions use on the range could add up to 1,321 acres needing EOD clearance. The two approximately 1 kilometer by 1 kilometer impact areas would be swept by EOD to remove UXO. Up to an additional 3,200 acres would be affected by lead munitions from the small arms range.

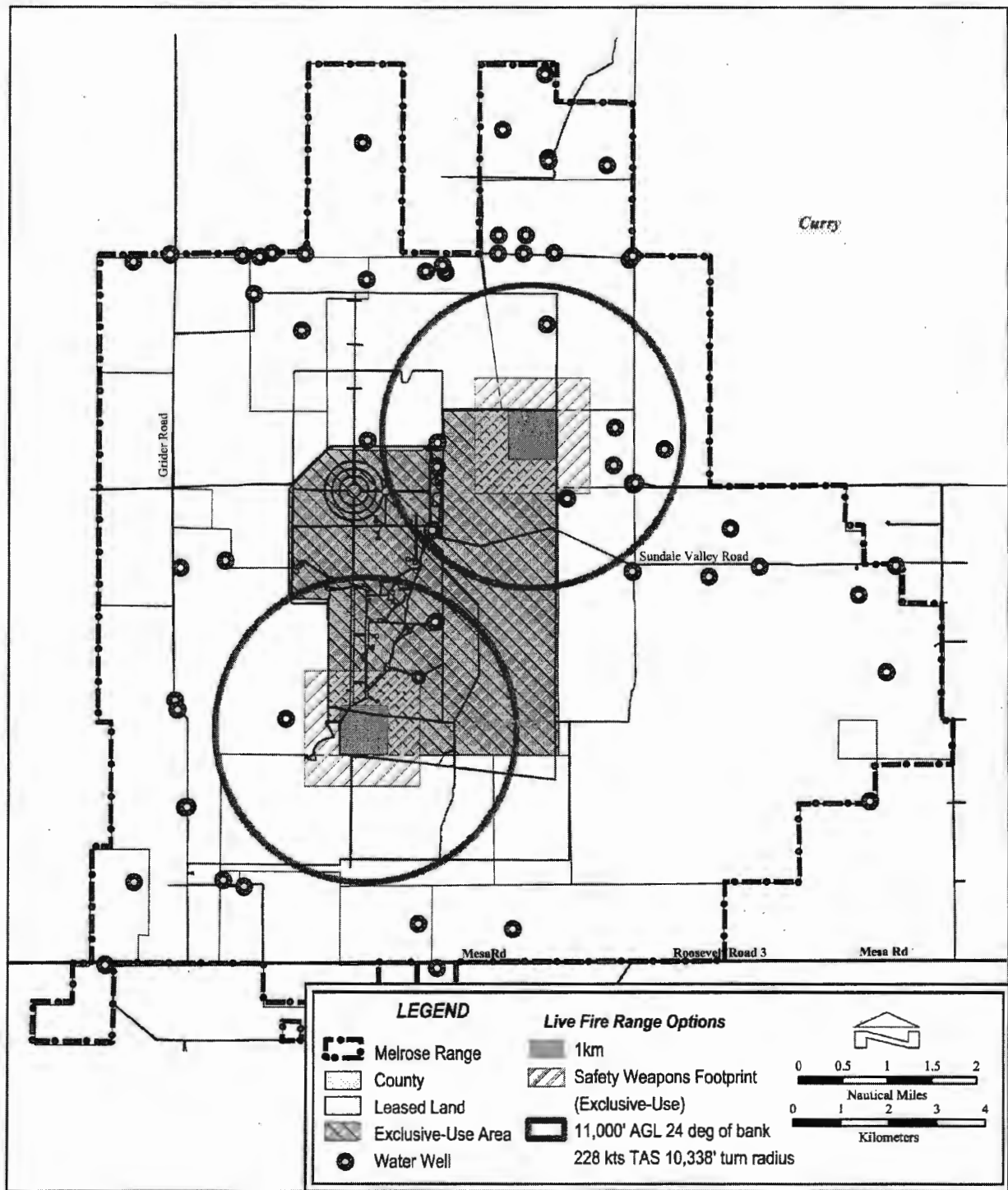


FIGURE 4.5-1. GROUNDWATER WELLS NEAR TWO-TARGET ALTERNATIVE ON MELROSE AFR

The components of munitions have the potential to negatively affect soil and water chemistry. Annual EOD clearance would reduce the extent of metal buildup and associated degradation of soils. HE chemical residues and lead residues would increase on Melrose AFR. The depth to groundwater would be expected to reduce the potential for chemicals or heavy metals to migrate off the range. Such chemicals or heavy metals could eventually affect soils or water resources on Melrose AFR.

Disturbance of the approximately 1 kilometer by 1 kilometer areas from munitions and target use, maintenance and EOD clearance activities have the potential to increase soil erosion with these areas. Soils on Melrose AFR are highly susceptible to wind erosion and depending on the amount, intensity and timing of precipitation, and the amount and condition of vegetative cover within the target areas, there is the potential for an increase in soil erosion from the target areas. This is not an unusual condition in southeastern New Mexico when vegetation does not cover these soil types.

Chaff. Chaff consists of aluminum-coated silica fibers 1 inch or less in length, and approximately the thickness of very fine human hair. Chaff disperses widely when deployed. Ultimate disposition depends upon the altitude of release and the prevailing winds at different altitudes at the time of release. A conservative estimate is that all chaff (including nylon or plastic parts and felt spacers) used in the Restricted Airspace would be deposited on the ground under the airspace. In reality, some chaff is expected to drift in air currents and land in areas not beneath the airspace, resulting in lower concentrations of chaff beneath the airspace. The chaff and flare end caps and other plastic or aluminum-coated wrapping residual materials would average one piece per approximately 2.83 acres per year under the airspace. Chaff filaments are estimated to average less than 0.20 ounces per acre per year. Training flight patterns, as well as winds, could result in variable deposition under the airspace. Higher percentages of chaff releases could occur toward the center of the Restricted Airspace and a correspondingly lower percentage of chaff releases could occur toward the edges of the airspace. Chaff particles landing beyond the boundaries of the airspace are expected to be widely dispersed and are not expected to be detectible or to impact environmental resources. In rare instances, chaff does not deploy correctly and rather than disperse in an electronic "cloud," the fibers may clump together and fall to the ground beneath the airspace. When this occurs, a tuft or clump of chaff can be discernible to the naked eye, but these chaff clumps would not accumulate in soil or water in quantities that could negatively affect or damage these resources.

The component of chaff that has the potential to negatively affect soil or water chemistry is aluminum, which tends to break down in acidic and highly alkaline environments. Laboratory and field analyses (Air Force 1997a) indicate that the pH of water in the soil or in a water body is the primary factor that determines the stability of the aluminum coating of chaff. The coating is the most soluble and likely to release aluminum if the soil or water pH is less than 5.0 (extremely acidic) or greater than 8.5 (strongly alkaline). In arid conditions such as those found in the ROI, soil pH tends to be neutral to high, but there is usually not enough water in the soil to react with the aluminum (Air Force 1997a). As described in Section 3.5, water bodies in the ROI are neutral to slightly alkaline, less than the threshold necessary to deteriorate the aluminum coating. Chaff that falls into surface water would be chemically stable. No impact to water bodies would be anticipated, even in the case of a highly unlikely event such as an entire clump of undispersed chaff falling into a small, confined water body.

Data on the chemical properties of the soils for Roosevelt County that encompass Melrose AFR were reviewed (Natural Resources Conservation Service [NRCS] 2002a). According to these data, there are three soil series that have a pH in the surface layers ranging between 7.9 and 9.0. These soil series represent a very small percentage of the total area that could be affected, and all but one have a very low potential for soluble chemicals in the soil being lost to surface runoff or leaching into groundwater (Air Force 1997a). The low percentage of soils in the ROI with a high enough pH to react with aluminum, in combination with the low soil water content, result in conditions that would be extremely improbable for aluminum concentrations to be produced from chaff particles that weather on the ground. No significant impact to physical resources would occur due to the increased deployment of chaff.

Flares. The M-206 flares used in training missions are designed to be fully consumed before reaching the ground, with a failure rate estimated to be less than 1 percent (Air Force 1997b). In rare cases when a dud flare or some of the materials from the burned flare reach the ground, the components that have the greatest potential to affect soil and water chemistry are minute quantities of chromium, magnesium, aluminum, boron, and barium. However, only magnesium and boron showed levels in sufficient concentrations for concern in field and laboratory tests on flares, and then only in acidic environments that do not occur in soil or water within the ROI (Air Force 1997b). The residual plastic, nylon, felt, and aluminum-coated wrapper materials that fall to the ground are basically inert and are not in concentrations that could affect physical resources. As noted in the discussion under chaff, the total deposition of chaff and flare residual materials under the restricted airspace average one piece per 2.83 acres per year. An average of one flare would be dispensed annually over each 29.5 acres under the Restricted Airspace.

Any fire could adversely affect vegetation, increase soil erosion, and result in sediment delivery in surface water bodies. There is a very low probability for fires to occur as a result of a burning flare striking the ground. This is due to the low failure rate of less than 1 percent combined with a 2,000 feet AGL minimum release altitude for fire conditions below high and 5,000 feet AGL for high or greater fire conditions. There have been no fires attributable to Cannon-based aircrews in the MOAs. Sections 4.3, 4.5, and 4.8 contain additional discussion of potential consequences from fire.

The potential for adverse impacts to physical resources would be essentially unchanged after deployment of flares. The likelihood of a flare-caused fire that would significantly damage surface resources would remain low. There would be no significant impacts to physical resources due to the chemical composition of flare materials that reach the ground.

HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials Management. With the increased use of Melrose AFR by both AFSOC aircraft and SOF, target, vehicle and equipment maintenance would generate the need for additional hazardous materials management activities. These materials would be managed through the Cannon AFB hazardous materials management program and no significant adverse environmental consequences are expected.

Hazardous Waste Management. Target and equipment maintenance activities are anticipated to increase with the use of Melrose AFR by AFSOC assets. These activities would generate hazardous waste that would be managed in accordance with the Cannon AFB Hazardous Waste Management Plan. Accumulation points would be established as required by state and

federal requirements and it is anticipated that Melrose AFR would maintain its conditionally exempt, small quantity generator status.

With the expanded use of live and inert munitions on Melrose AFR, additional EOD activities would be necessary and the amount of munitions-related debris that would be recycled and disposed of would increase. In accordance with the requirements outlined in AFI 13-212, including the new AFSOC supplement, range clearance activities would continue.

Storage Tanks. With the relocation of Melrose AFR equipment and maintenance buildings, existing ASTs would be relocated to support new structures. No adverse environmental consequences are anticipated.

RCRA/DERA Program. Development of two new target areas with the exclusive impact area of Melrose AFR and other target sets on the range would be coordinated with Cannon AFB Environmental Restoration Program (ERP) staff so that the construction and operation of these targets would not conflict with the existing three SWMUs and four AOCs and associated groundwater monitoring wells. Cannon AFB would continue to coordinate with the NMED on the status of the sites.

4.5.3.2 THREE-TARGET ALTERNATIVE

EARTH AND WATER RESOURCES

Effects to physical resources under the Three-Target Alternative are comparable to those described in Section 4.5.3.1. With the establishment of an approximately 1 kilometer by 1 kilometer impact area in the northwest, east-central, and southwest portion of Melrose AFR, additional safety weapons footprints (Exclusive-Use) would surround these impact areas. As shown in Figure 4.5-2, these safety weapons footprints for the northwest and southwest impact areas do not interfere with the operation of existing groundwater wells on Melrose AFR. Within the safety weapons footprint (Exclusive-Use) for the east-central impact area, there are four Air Force groundwater monitoring wells.

Munitions, including HE munitions, could be used on three targets under this alternative. The area needing EOD clearance would increase by up to 3,845 acres. The three approximately 1 kilometer by 1 kilometer target areas would be swept by EOD crews. Disturbance of the three approximately 1 kilometer by 1 kilometer areas from munitions and target use, maintenance and EOD clearance activities have the potential to increase soil erosion with these areas. Soils on Melrose AFR are highly susceptible to wind erosion and depending on the amount, intensity and timing of precipitation, and the amount and condition of vegetative cover within the target areas, there is the potential for an increase in soil erosion from the target areas. This is not an unusual condition in southeastern New Mexico when vegetation does not cover these soil types.

The area requiring cleanup from the small arms range is as described in the Two-Target Alternative. The Three-Target Alternative safety footprint overlaps with the small arms range and some clean-up areas would overlap. Potential for concentration of HE chemical and lead residuals in three target areas and the small arms range would be greater with three live-fire targets as compared with two live-fire targets.

Chaff and flare materials would be as described for the Two-Target Alternative. No significant impacts would be expected from chaff use. Flares properly deployed would not be expected to increase fire risk.

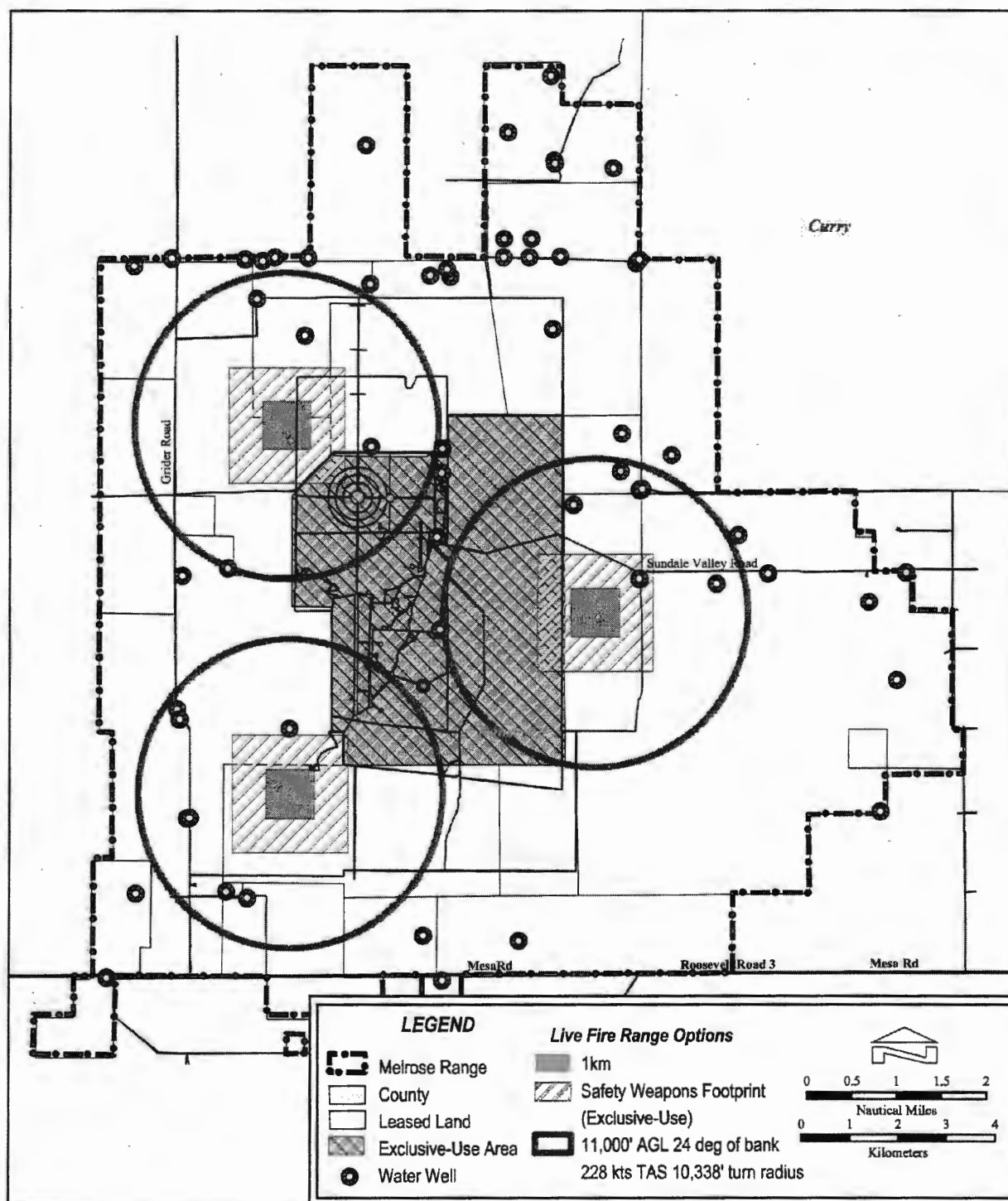


FIGURE 4.5-2. GROUNDWATER WELLS NEAR THREE-TARGET ALTERNATIVE ON MELROSE AFR

HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous Materials Management. With the implementation of this alternative there would be a slight increase in the amount of hazardous materials used for target, vehicle and equipment maintenance, as compared to the Two-Target Alternative. These materials would be managed through the Cannon AFB hazardous materials management program and no significant adverse environmental consequences are expected.

Hazardous Waste Management. Target and equipment maintenance activities would be greater under this alternative as a result of the establishment of three target areas for use by AC-130 gunships. These activities would generate hazardous waste that would be managed in accordance with the Cannon AFB Hazardous Waste Management Plan. Accumulation points would be established as required by state and federal requirements and it is anticipated that Melrose AFR would maintain its conditionally exempt, small quantity generator status.

With the expanded use of live and inert munitions on Melrose AFR, the amount of munitions-related debris that would be recycled and disposed of would increase. In accordance with the requirements outlined in AFI 13-212, including the new AFSOC supplement, range clearance activities would continue.

Storage Tanks. With the relocation of Melrose AFR equipment and maintenance buildings as identified under the Two-Target Alternative, existing Melrose AFR ASTs would be relocated to support new structures. The registrations with the State of New Mexico would be revised to meet regulatory requirements. No adverse environmental consequences are anticipated.

RCRA/DERA Program. Development of three new target areas with the exclusive impact area of Melrose AFR and other target sets on the range would be coordinated with Cannon AFB ERP staff so that the construction and operation of these targets would not conflict with the existing three SWMUs and four AOCs and associated groundwater monitoring wells. Cannon AFB would continue to coordinate with the NMED on the status of the sites.

4.5.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, no beddown of AFSOC assets would occur at Cannon AFB and no Cannon-based AFSOC training would occur at Melrose AFR at this time.

The effects to physical resources under the No Action Alternative would be the same as current conditions, with a reduction in overall chaff, flare, and munitions use associated with the deactivation of the 27 FW.

4.6 BIOLOGICAL RESOURCES

Biological resources are defined in Section 3.6. This section will consider terrestrial and aquatic habitats, and species with special protection status at Melrose AFR.

4.6.1 DEFINITION OF RESOURCE

Biological resources within the Melrose AFR ROI associated with the Two-Target Alternative include those wild species that reside or may occur in some transient fashion on the range and may be affected by project related operations, including training related ground disturbance. The definition includes plants, wildlife, and their habitats within both the target area and the Restricted Leased Area and modifications under the Two-Target Alternative.

4.6.2 EXISTING CONDITIONS

Melrose AFR lies within the Southwest Plateau and Plains Dry Steppe and Shrub Province ecoregion (Bailey 1995). The landform is flat to slightly rolling with natural communities dominated by arid grasses and scattered shrubs and small trees. The primary land use activity outside of the target impact area is livestock grazing with agricultural cultivation in the northern sections. Thus, the landscape setting is modified by a post-settlement history of ground disturbing land uses and grazing. Vegetation on Melrose AFR can be generally described as short grass prairie (91 percent of the area of the range), dominated by herbaceous plants and grasses (Figure 4.6-1). Common species include blue grama (*Bouteloua gracilis*), side-oats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), tobosa (*Hilaria mutica*), buffalograss (*Buchloe dactyloides*), and broom snakeweed (*Gutierrezia sarothrae*) along Canada del Tule. Prickly pear and cholla cacti (*Opuntia* spp.) occur throughout Melrose AFR. Isolated patchy shrub habitats make up most of the remaining area of the range.

As part of an inventory of vertebrate species found on Melrose AFR, Parmenter *et al.* (1994) classified plant communities, identifying five general habitat types: mixed-species grasslands, mesquite-grasslands, sand-hill shrublands, old agricultural fields, and areas under current cultivation, such as wheat fields. Varying numbers of wildlife species are found in these habitats. Commonly found throughout the range are habitat generalists such as the ornate box turtle (*Terrapene ornata ornata*), western hognose snake (*Heterodon nasicus*), coachwhip (*Masticophis flagellum*), mourning dove (*Zenaidura macroura*), common nighthawk (*Chordeiles minor*), western meadowlark (*Sturnella neglecta*), lark sparrow (*Chondestes grammacus*), horned lark (*Eremophila alpestris*), Cassin's sparrow (*Aimophila cassinii*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), silky pocket mouse (*Perognathus flavus*), northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), coyote (*Canis latrans*), and pronghorn (*Antilocapra americana*) (Parmenter *et al.* 1994). Swift fox (*Vulpes velox*), which historically occurred in the short grass prairie or plains-mesa grassland east of the Pecos River, may also be present on Melrose AFR. New Mexico Department of Game and Fish (NMDGF) surveys have found swift fox throughout its historical range, with the exception of cropland areas of eastern Curry and Roosevelt counties (Harrison and Schmitt 1997). Black-tailed prairie dog (*Cynomys ludovicianus*) colonies occupy less than 10 acres on Melrose AFR. Disturbed habitats, including those habitats disturbed by prairie dog burrowing, may support some nesting western burrowing owl (*Athene cunicularia hypugaea*) activity.

The most widespread habitat on Melrose AFR is mixed-species grassland that, in addition to the generalist species listed above, supports a number of grassland specialist species. The lowest species diversities are found in the sand hills, and in old agricultural and wheat field habitats. Common species found there are prairie lizard (*Sceloporus undulatus*), Texas horned lizard (*Phrynosoma cornutum*), mourning dove, cactus wren (*Campylorhynchus brunneicapillus*), brown-headed cowbird (*Molothrus ater*), and vesper sparrow (*Poocetes gramineus*) (Parmenter *et al.* 1994).

Melrose AFR provides some seasonally inundated areas and seasonal aquatic habitats. These include several minor surface water features, and intermittent streams and drainages. No jurisdictional waters or wetlands are located within the range boundaries. No aquatic habitats occur within or in proximity to proposed target areas. Scattered earthen stock tanks have been developed in areas adjacent to the Exclusive-Use Area supporting grazing. No permanently flooded areas are located on Melrose AFR.

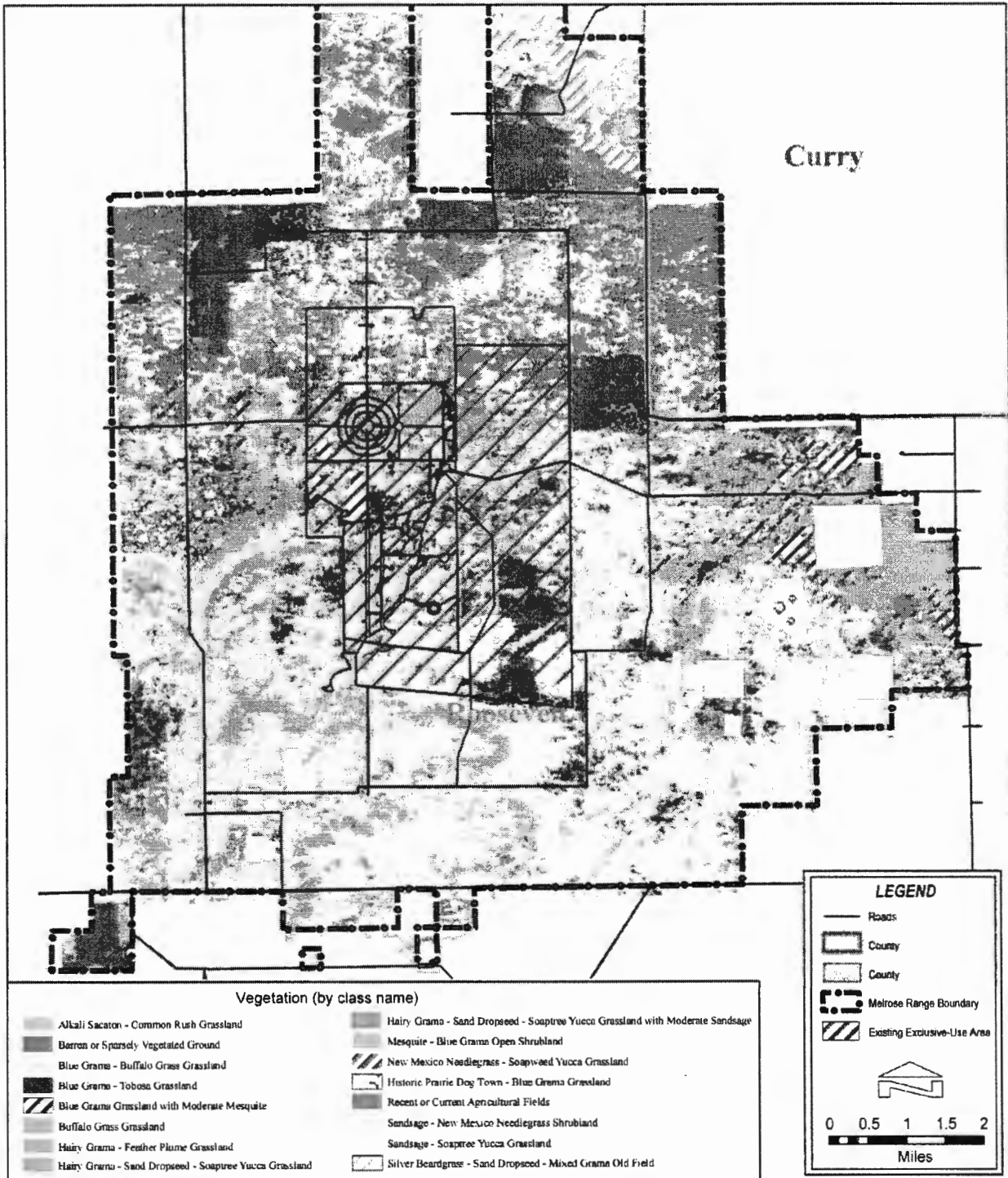


FIGURE 4.6-1. MELROSE AFR VEGETATION

Federally and state-listed threatened, endangered, or candidate species identified for Curry and Roosevelt counties, including Melrose AFR, are listed in Table 4.6-1.

No federally listed mammal species are known to occur within the ROI. The endangered black-footed ferret (*Mustela nigripes*) has not been documented in the state since 1934; in 1991 it was considered extirpated from the state (NMDGF 2006a). A certified black-footed ferret survey was conducted at Melrose AFR in 2000 and no black-footed ferrets or signs of black-footed ferrets were found.

Extensive surveys of Melrose AFR found no species of plant, amphibian, reptile, or mammal that was or is currently listed as threatened or endangered (Parmenter *et al.* 1994, DeBruin *et al.* 1995). Three bird species that are considered species of concern by the U.S. Fish and Wildlife Service (USFWS) were observed: ferruginous hawk (*Buteo regalis*), white-faced ibis (*Plegadis chihi*), and loggerhead shrike (*Lanius ludovicianus*) (Parmenter *et al.* 1994). Ferruginous hawks have used at least three nest locations on Melrose AFR in recent years, but nest sites are not used every year and were not occupied in 2002. One nest east of the impact areas was active in early 2003.

Mountain plovers (*Charadrius montanus*), which were formerly proposed for listing by USFWS as a threatened species, are occasional visitors to Melrose AFR, but are not known to breed or winter on the range. Mountain plovers nest in late March through August in habitats characterized by short grass and bare ground, including grazed areas, cultivated lands, and prairie dog colonies (USFWS 1999). Breeding habitat is found in many Rocky Mountain and Great Plains states; mountain plovers winter in California, Arizona, Texas, and Mexico (USFWS 1999). Mountain plovers were not detected during the 1993-94 breeding season surveys of Melrose AFR (Parmenter *et al.* 1994). Several groups of mountain plovers were observed on the range in surveys conducted during the spring migration period in 1998 (ACC 1999). Two groups were found in the southern portion of Melrose AFR, one near a stock tank and one in a dry playa. Mountain plovers were also seen on two subsequent days on a prairie dog colony in the east impact area. Breeding activity was not subsequently observed on the range. Although suitable nesting habitat exists on Melrose AFR, mountain plover use of the range appears to be limited to transient use during spring migration, which typically occurs in March and April (NMDGF 2006a). Cannon AFB currently conducts surveys for mountain plovers on Melrose AFR, including the impact areas (personal communication, Crow 2007).

The interior least tern (*Sterna antillarum athalassos*), federally and state-listed as endangered, is known to breed southwest of Melrose AFR along the Pecos River at Bitter Lake National Wildlife Refuge (NWR). Interior least terns have bred annually at, or in the vicinity of, Bitter Lake NWR since 1949 and are not known to breed elsewhere in New Mexico. The birds nest and forage predominantly along playa habitats on the refuge. Since 1989, the number of interior least terns at Bitter Lake NWR has ranged from three to seven breeding pairs. Least terns also occur as rare vagrants at other wetlands in the state, including Bosque del Apache NWR and in Eddy County (USFWS 1990, Bureau of Land Management 1997, NMDGF 2006a).

TABLE 4.6-1. FEDERALLY AND STATE LISTED THREATENED, ENDANGERED AND CANDIDATE SPECIES IDENTIFIED FOR CURRY AND ROOSEVELT COUNTIES, NEW MEXICO AND WITH POTENTIAL TO OCCUR AT MELROSE AFR

<i>Common Name and Scientific Name</i>	<i>Status (Federal/State)¹</i>	<i>General Habitat Association</i>	<i>Likelihood of occurrence at Melrose AFR</i>
Least tern (Interior Population), <i>Sterna antillarum</i>	E/E	Nest on riverine sandbars or open sandy or gravel coastal beaches. May nest on dredge material. Long distance migrant.	No habitat present. Occurrence highly unlikely.
Bald eagle, <i>Haliaeetus leucocephalus</i>	T/T	Breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, that reflect the general availability of primary food sources including fish, waterfowl, and seabirds.	Seasonal, incidental occurrence possible. Some perching/roosting opportunities present. Melrose AFR is not within riverine migration corridors.
Lesser prairie-chicken, <i>Tympanuchus pallidicinctus</i>	C/-	Mixed grass-dwarf shrub communities that occur on sandy soils; principally the sandsage and bluestem. Year-round residents where they occur	Small breeding population present on sandy soils in the northern part of Melrose AFR outside proposed target areas.
Sand dune lizard, <i>Sceloporus arenicolus</i>	C/E	In New Mexico, endemic to small areas of shinnery oak habitat. Prefers active and semi-stabilized sand dunes with mammal burrows and some litter. Associated with scattered stands of Harvard oak and sandsage; tends to occur in greatest abundance in areas where <i>Uta stansburiana</i> is scarce.	Presence on Melrose AFR not revealed by surveys. Melrose AFR is outside known distribution in state. Very low likelihood of occurrence.
Peregrine falcon, <i>Falco peregrinus</i>	- ² /T	Bare rock/talus/scree, cliff, shrubland/chaparral, urban/edificarian, woodland - conifer, woodland - hardwood, woodland - mixed	No habitat present. Transient individuals possible.
Baird's sparrow, <i>Ammodramus bairdii</i>	-/T	Forage among dense bunch grasses in northern prairie settings. Breed in ungrazed or lightly grazed mixed-grass prairie, wet meadows, local pockets of tallgrass prairie.	No foraging or breeding habitat present on AFR. Low likelihood of incidental occurrence.
Bell's vireo, <i>Vireo bellii</i>	-/T	Dense brush, willow thickets, mesquite, streamside thickets, and scrub oak, in arid regions often near water, also adjoining uplands	No habitat present. Low likelihood of occurrence.

Notes: 1. Status: Federal/State E = Endangered, T = Threatened, C = Candidate, - = not listed.

2. The peregrine falcon was delisted under the Federal Endangered Species Act (ESA) in August 1999.

Source: USFWS 2006, NMDGF 2006a.

The bald eagle (*Haliaeetus leucocephalus*), federally and state-listed as threatened, is a transient and winter habitat user along portions of the Pecos River, but does not occur within Melrose AFR or its associated airspace. The western burrowing owl (*Athene cunicularia hypugaea*) is considered a sensitive species by the Bureau of Land Management and U.S. Forest Service and is protected under the Migratory Bird Treaty Act. Burrowing owls are year-round residents in Roosevelt County (NMDGF 2006a) and are known to nest on Melrose AFR, but the number of nests on the range is not precisely known. Burrowing owls are frequently observed in mixed grassland habitat types and other open areas at Melrose AFR (personal communication, Crow 2006). Nest burrows are frequently found on prairie dog towns or in association with other burrowing mammals such as badgers (NMDGF 2006a). Melrose AFR and its burrowing owls are providing data for a southwestern regional study of burrowing owl migration patterns, site fidelity, and diet being conducted by DoD (Hartz 2006).

Lesser prairie-chickens (*Tympanuchus pallidicinctus*) are a USFWS candidate species and a New Mexico sensitive species. The species is known to nest in southern Roosevelt County (Massey 2001). Prairie chickens were not found on Melrose AFR during surveys in 1993 (Parmenter *et al.* 1994), 1998 (ACC 1999), or 2003; however, recent monitoring (April 2007) revealed the presence of a small breeding group in the northern portion of Melrose AFR. The birds were located in an area of sandy soils outside of the northernmost target area for both the Two-Target and Three-Target Alternatives. Open shrubby habitats in this portion of the range may provide appropriate cover and foraging habitat. Surveys for lesser prairie-chickens are currently being conducted and a candidate species plan will be prepared in the future.

The sand dune lizard (*Sceloporus arenicolus*), a federal candidate and state-listed threatened species, is not likely to occur within the ROI for the Two-Target Alternative. The nearest suitable habitat for sand dune lizards is found in moving sand dunes adjacent to the northern boundary of the range and the species has not been detected during extensive wildlife surveys conducted on the range (personal communication, Crow 2006).

The New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), Forestry Division, has authority over state-protected plant species in New Mexico. According to the agency database, no rare plants are known to occur in Roosevelt or Curry counties (New Mexico Rare Plant Technical Council 1999).

4.6.3 ENVIRONMENTAL CONSEQUENCES

This section addresses consequences to biological resources related to construction and operations associated with the Action Alternatives at Melrose AFR. Biological consequences associated with construction and operations at Cannon AFB and project-related airspaces are discussed in Sections 3.6.3 and 5.6.3, respectively.

Methodology for evaluating potential impacts and definition of impact significance to biological resources are discussed in Section 3.6.3.

4.6.3.1 TWO-TARGET ALTERNATIVE

Development of the Two-Target Alternative would effectively expand the Exclusive-Use Area from 8,800 to 10,600 acres of habitat. The additional Exclusive-Use Area had been previously leased for grazing.

Under the Two-Target Alternative, range support facilities, currently located at the center of the range, would be relocated to a previously developed site along the western side of the Exclusive-Use Area. These newly configured facilities would be located on the mesa framing the western portion of Melrose AFR. Expanded small arms range facilities would also be constructed on the east side of Melrose AFR. Construction activities may involve the disturbance of an estimated 100 acres of mixed-grassland and mesquite-grassland habitats adjacent to developed areas. Existing roads would be used to access construction locations. Disturbance associated with construction would result in the temporary displacement of wildlife species occupying habitats within and surrounding the construction site. These would include habitat-generalist species identified in Section 4.6.2. These species would re-occupy surrounding habitats or re-distribute themselves across the landscape. However, some permanent loss of habitat within the construction footprint would occur. No federally or state-listed species or their habitats are known to occur within the proposed construction area. Because of the small area involved, relative to the surrounding habitats, proximity to existing structures, and current land use (grazing) effect on habitat quality, impacts to wildlife species populations are expected to be minimal and less than significant. No impacts to federally and state-listed species are expected.

Similarly, construction of two new target areas within the Exclusive-Use Area would result in some habitat loss. Each target would be approximately 1 square kilometer (247.1 acres) in area and would be surrounded by a buffer area extending 2,296 feet from the approximate 1 kilometer target area edges. Target construction would involve blading and grading of existing soil surfaces and the erection of simulated target structures. The northern target, located on the northeast corner of the Melrose Exclusive-Use Area is sited in rangeland. Its creation would result in the removal of about 247 acres of soaptree-yucca grassland vegetation and wildlife habitat. The buffer area includes irrigated land on the east (restricted grazing allotment K) and rangeland on the north south and west. No federally or state-listed species or their habitats are known to occur in this area.

The southern target is located in the southwestern corner of the Melrose Exclusive-Use Area. This is an area of some relief as the landscape slopes up to the mesa that borders the western side of Melrose AFR. In the high plains, areas of topographic relief tend to enhance habitat complexity for wildlife and are often areas of higher biological diversity. Target construction in this area would result in the disturbance of blue grama-buffalograss grassland (on level portions of the site) and hairy grama-feather plume grassland (on steeper slopes). Construction of new target areas associated with the Two-Target Alternative would result in a loss of some wildlife habitat and the displacement of wildlife species within the two target areas. Operationally, these sites would be presumed to experience complete and continual ground disturbance. No federally or state-listed species or their habitats are known to occur within the proposed target area. Because of the small area involved, relative to the surrounding habitats, impacts to wildlife species populations from target construction are expected to be minimal and considered less than significant. No impacts to endangered or threatened species are expected.

Operations under the Two-Target Alternative would involve a complex mix of ground-based and aircraft activities at Melrose AFR. Range support operations and maintenance of range support facilities are presumed to have a similar effect on biological resources compared to current and recent historic conditions. Project related targets will require somewhat intensive repair and ordnance removal activity. These maintenance activities would exceed current conditions.

Target complexes within the proposed new target areas will receive intensive live fire from an assortment of aircraft (primarily AC-130 gunships), Special Tactics personnel, other Special Operations Command, and SOF from partner nations. Target re-construction/re-configuration, clean-up, and ordnance removal would create an increase in human visual and noise disturbance in areas that receive little such disturbance currently. Such disturbance will have a minor impact on wildlife species (birds and mammals) occupying adjacent habitats. Monitoring of target areas and adjacent habitats as part of periodic required Integrated Natural Resources Management Plan (INRMP) updates would help document and quantify any negative effects and permit AFSOC to develop procedures to minimize disturbance to wildlife and their habitats on Air Force-managed lands.

Training under the Two-Target Alternative will involve an increase in the types and amounts of ordnance delivered to Melrose AFR (Tables 2.2-3 and 2.2-4). These ordnance include both ground-fired rounds and aircraft-fired rounds composed of a variety of materials, including some heavy metals, such as lead. Lead can be toxic to wildlife if ingested (Eisler 1988). Metals or other chemicals from munitions have the potential to enter the food chain through direct ingestion or accumulation in plants. Ingestion of lead is known to result in poisoning of waterfowl, vultures, and raptors. In waterfowl, lead ingestion has been generally attributed to lead bird shot incidentally consumed by birds (especially mallards and pintails) feeding on the bottom of shallow water bodies where lead shot used in waterfowl hunting has accumulated. In raptors and vultures, poisoning may result from ingesting lead shot embedded in the flesh of prey (Eisler 1988; Kendall, *et al.* 1996). Lead objects are ground down by the gizzard or dissolved by stomach acids and absorbed into the body as lead salts, which disrupt normal body functions, especially the digestive and nervous systems of birds. Lead poisoning is uncommon in upland birds, but has been documented in mourning dove from areas where lead buckshot, similar in size and shape to seed and grit ingested by birds, is used extensively (Kendall *et al.* 1996).

The smallest rounds proposed for use at Melrose AFR are spherical 12-gauge shotgun pellets, which are about 0.33 inches (8.42 mm) in diameter, assuming a 00 buckshot load. All other small-arms ammunition proposed for use at Melrose AFR (Table 2.2-4) is much larger in size and/or has steel or copper jackets surrounding the lead. For example, the 5.45 mm and 5.56 mm projectiles are about 19 to 23 mm in length and comprised of a variety of materials including lead within a steel jacket. As they are significantly greater in size, it is doubtful that intact rounds used in training at Melrose AFR would enter the food chain as a result of birds mistaking it as seed, but it is possible that vertebrates such as lizards or birds could incidentally ingest small fragments of impacted rounds while foraging on the ground for insects or seeds. Because the rounds typically "mushroom" upon impact rather than fragmenting, accidental ingestion of lead fragments is an unlikely pathway into the food chain. Plant uptake is another potential route into the food chain, but few plants absorb and translocate lead in significant quantities and a review of the species present in the target area would be needed to identify potential lead accumulators.

No target areas would be located near any surface water sources or seasonally active drainages on Melrose AFR. Periodic sweeps of the range would remove UXO. Projectiles, fragments, and other munitions debris, would accumulate lead and other chemicals, which could impact wildlife or other ecosystem components as described above.

Airspace associated with Melrose AFR would see a four-fold increase in chaff use (3,762 units per annum to 18,000 units). Conceptual and perceptual issues and potential impacts of chaff and flare components on biological resources are discussed in Section 5.6.3.1. Chaff and the physical components of flares (e.g., end caps) have been well-studied and documented to have no effect on natural living resources, agricultural resources, or special-status species. No impacts to these resources are anticipated under the Two-Target Alternative.

Across the area currently authorized for flare use, overall use would decrease by 25 percent under the Two-Target Alternative. As with chaff use, airspace units associated with Melrose AFR would experience a four-fold increase in flare use (2,031 units per annum to 10,000 units). Flare types would be the same as currently authorized. Fire risk and fire-frequency changes are a concern for natural and human-related agricultural resources in arid environments. Although natural vegetation in the Southwest is considered fire-adapted, past and current land-use practices, in combination with drought, have altered fire regime and ecosystem processes. Ecosystem changes associated with fire may include (1) the introduction and spread of invasive non-native plants, which may promote the spread and intensity of fire or become established following fire; (2) habitat fragmentation, leading to increased vulnerability of isolated populations; and (3) increased wind and water erosion of soil following fire. Therefore, even though most native species of the high plains are adapted to and even benefit from wildfire, any fire could result in direct losses and indirect negative effects. Fires could also result in livestock and property losses.

Within the Melrose AFR ROI, aircraft training under the Two-Target Alternative would involve low-level navigational sorties, intensive air-to-surface live-fire activities, air drops, and vertical landings. Low-level sorties would approach proposed target areas and LZs or DZs on Melrose AFR. Low-level flight with altitudes as low as 100 feet AGL are permitted in R-5104 and R-5105 over Melrose AFR. Live-fire activities would focus on proposed target areas. Some of these training activities would involve multiple orbiting AC-130 gunships continuously firing on both target areas simultaneously. The AC-130s could be orbiting between 6,000 up to about 12,000 feet AGL while engaging targets. LZ/DZ operations would accommodate both MC-130 and CV-22 aircraft. Development and use of LZs/DZs at Melrose AFR would result in the loss of an additional 380 acres of habitat. Fifty percent of all training activity would occur at night. Potential impacts associated with aircraft training include both visual aspects and noise. Receptor biological resource species would be presumed to have differences in day/night responses to these aspects as discussed under airspace biological resources in Section 5.6.3.

Under the Two-Target Alternative, a variety of noise metrics describing the acoustical environment would change. Additionally, a shift from fast-moving jet aircraft to slower propeller-driven aircraft would cause a change in the frequency structure of the acoustical environment. Impulsive and sub-audible (infrasound) noise would be presumed to increase.

Changes associated with aircraft operations under the Two-Target Alternative would produce a variety of effects on wildlife species occupying habitats at Melrose AFR. These changes would be related to lower, slower training; tilt-rotor aircraft operations; landings and take-offs on range; and long-duration continuous firing exercises. Although noise exposure onset rates would increase, noise event duration would increase as would impulsive noise and visual cues associated with aircraft.

After development of the new target complexes and LZs/DZs, direct mortality of individual organisms would not be a significant factor given avoidance of the disturbed habitat by wide

ranging species and diminished carrying capacity of the disturbed habitat for native organisms with small home ranges as described below.

It is expected that the target areas would be avoided by large nocturnally active species such as pronghorn and mule deer after the target areas have been developed and subjected to initial use, given the degree of habitat disturbance associated with the development and initial use of the targets coupled with the frequency of nighttime use.

Disturbance-related behavioral and ecological changes in wildlife would include expansion of home ranges, abandonment of habitats, and reduced recruitment. These changes would vary with wildlife species group and wildlife species (see discussion in Section 5.6.3.1). Ungulates such as mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*) would likely experience acute flight responses and eventual displacement from some areas. Avian species responses are expected to be highly variable. Relatively little is known about the behavioral effects of aircraft training operations at night, but as a rule, daytime-active (diurnal) species respond less to disturbance at night than during the daytime. Nocturnal species would be expected to respond more greatly to disturbance during darkness when they are active. Physiological stress changes would be more subtle and difficult to quantify. Long-term effects of aircraft training activities under the Two-Target Alternative would include some species loss, species displacement, and a modification of ecological community structure at Melrose AFR. Impacts would be somewhat localized and not expected to affect regional wildlife populations or habitats.

During recent monitoring efforts conducted in April 2007, a small breeding group of the lesser prairie-chicken (a federal listed candidate and New Mexico state sensitive species) was detected in the northern portion of Melrose AFR. Surveys for this species date back to 1993 at Melrose AFR; this is the first record of occurrence. The status of this species at Melrose AFR is unclear at this time. Melrose AFR is located in a region of widely separated, isolated populations of lesser prairie-chickens within a landscape of habitats highly fragmented by historic land use practices. Open shrubby habitats with a grass component located in the northern portion of the range may provide some cover, foraging, and loafing habitat. Breeding or transient occupancy of areas of Melrose AFR, even with current military training regimes, is not unexpected. No critical habitat is identified for this species. Air Force biologists are conducting surveys for this species and as data are collected will develop a candidate species plan. Because AFSOC training operations, including live-fire exercise, occur at night, training under the Proposed Action would not be expected to interfere with critical pre-dawn and early morning courtship behaviors of these birds. Construction of the Two-Target Alternative and training under the Proposed Action would not be expected to result in direct mortality of lesser prairie-chickens or affect populations.

No other federally and state-listed endangered, threatened, and candidate species identified for Curry and Roosevelt counties have been observed at Melrose AFB. Aircraft training associated with the Two-Target Alternative is expected to have no impact on these other species.

4.6.3.2 THREE-TARGET ALTERNATIVE

Because the Three-Target Alternative includes development of a third target area and the three target areas would all be constructed outside the boundaries of the Exclusive-Use target impact area, impacts of the Three-Target Alternative would be greater than for the Two-Target Alternative. Development of the Three-Target Alternative would effectively expand the Exclusive-Use Area from 8,800 to 12,700 acres of habitat. The additional Exclusive-Use Area had been previously leased for grazing. Impacts would be qualitatively similar to those

described above for the Two-Target Alternative. In addition to the greater amount of habitat affected by establishment of a third new target area and causing all target areas to be located outside the boundaries of the Exclusive-Use Area, the operational impacts of having a third target area in use would increase the area affected by noise from ordnance use, increase the areas affected by munitions, and cause additive effects in areas between the targets when two or more targets are in use simultaneously. Because of the expansion of the Exclusive Use Area, effects on the ability of lesser prairie-chickens to utilize open shrubby habitats in the northern portion of Melrose AFR would be greater than under the Two-Target Alternative. Data are lacking to assess the consequences for population connectivity, dispersal, and energetics on an already highly-fragmented species.

4.6.3.3 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. The 27 FW and its current complement of F-16s would be disestablished as previously planned. Transient and NMANG aircraft would continue to use Melrose AFR; however, no training with Cannon AFB-based AFSOC assets would occur. Biological resources on Melrose AFR would be expected to experience less human and training activity than present under the No Action Alternative.

4.7 CULTURAL RESOURCES

4.7.1 DEFINITION OF RESOURCE

Cultural resources on Melrose AFR conform to the same definitions as for Cannon AFB (Section 3.7.1). To summarize, cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. Historic properties (as defined in 36 CFR 60.4) are significant archaeological, architectural, or traditional resources eligible for listing, or listed in, the National Register of Historic Places (NRHP). Historic properties are evaluated for potential adverse impacts from an action, as are significant traditional resources identified by American Indian tribes or other groups.

The ROI for cultural resources on Melrose AFR consists of those portions of the range that will be directly affected by ground-disturbing activities, including target construction and use, relocation of facilities, and EOD activities.

The earliest remains of human activity in the region date to approximately 12,000 years before present (BP) and are associated with the hunting of large game animals, such as mammoth and mastodon, commonly grouped and referred to as Pleistocene megafauna. During this time, the climate was cooler and wetter, supporting vast grasslands, shallow lakes, and wetlands. Known only through the material remains they left behind, these earliest inhabitants are known as the Clovis Culture, and existed for perhaps only 700 years. Evidence of the culture was first recognized at Black Water Draw, New Mexico, south of Clovis, in 1929. In the years since, the site has been extensively excavated, revealing intermittent occupations of successive cultures that span thousands of years.

Through the next several thousand years, the climate became warmer and drier. The grasslands turned to a desert shrub environment, and the lakes and wetlands disappeared along with the megafauna. The environmental changes forced a change in the subsistence of local populations, shifting to a reliance on other game animals and a greater utilization of plant resources.

Roughly 3,000 BP, ceramics came into use; the practice of agriculture developed; and more permanent, substantial residential structures (e.g., pueblos) were built (ACC 2004a).

Spanish explorers first entered the region beginning in the mid-16th century, following exploration routes along the Pecos and Canadian Rivers. They discovered a barren plain that occupies 37,000 square miles of west Texas and eastern New Mexico. To the north and west, the plain is bounded by an escarpment that rises 300 feet above the plain. Through the millennia, wind and water eroded the bedrock of the escarpment so that from a distance it resembles ramparts or fortifications. As a result, the region, which is actually a southern reach of the Great Plains, was named the Llano Estacado (palisaded plain). Once a forbidding place only suited to seasonal grazing, through irrigation the Llano now supports widespread agriculture and the communities of Lubbock and Amarillo, Texas, and Clovis, New Mexico.

American forts in the region, such as Fort Sumner within the study area, were established by the early 1860s to defend routes of travel through the area (ACC 2004a). After 1865, American cattle ranchers entered the region, establishing extensive ranches during the 1880s, including the Melrose AFR area.

4.7.2 EXISTING CONDITIONS

No World War II resources remain on Melrose AFR. Although there are a number of buildings from the Cold War era, all have been determined to be not eligible for the NRHP (ACC 2004a). Building 3125 and its accompanying tower have been previously misidentified as Cold War era resources. However, extensive archival research has confirmed that both facilities were built in 1992 (ACC 2004a).

Several archaeological survey projects have been conducted within Melrose AFR since 1981, covering the entire range (ACC 2004a). More than 240 archaeological sites, ranging in age from the Paleoindian period (before 7500 BP) through the Historic era (after 400 BP and up through World War II), have been recorded on the range (ACC 2004a). Although the NRHP eligibility status of many of these sites remains unknown, more than 60 of the sites are considered eligible or potentially eligible for inclusion in the NRHP; however, currently none are listed on the NRHP.

Melrose AFR includes a variety of landforms with varying densities of archaeological sites. Data analysis has shown trends in the association of sites from different time periods with certain landforms. The six landform types are Drainage, Dune, Gentle Slope, Mesa Top, Playa Basin and Steep Slope. Paleoindian sites are found most commonly in drainages; Archaic period sites are often located in drainages with gentle slopes being the next most common location; Archaic sites are the only dateable site type found in the steep slope landform. Ceramic period sites are most common in playa basins followed by drainages. Sites of unknown prehistoric period dominate the gentle slope category, with presence on mesa tops and drainages next. Historic sites are most commonly found in gentle slopes, drainages and mesa tops.

Native American groups with historic ties to the area include the Mescalero Apache, Jicarilla Apache, Kiowa, and Comanche. The nearest reservation is the Mescalero Apache Reservation, located approximately 100 miles southwest of Melrose AFR near Ruidoso, New Mexico. The Jicarilla Apache Reservation is 195 miles northwest of the range. The Comanche and Kiowa Tribes are located near Lawton, Oklahoma, approximately 300 miles northeast of Melrose AFR. No traditional resources have been identified to date within Melrose AFR. The Air Force has

initiated contact with the Mescalero Apache, Jicarilla Apache, Comanche, and Kiowa tribes to identify potential concerns associated with the Two-Target Alternative (refer to Appendix C).

4.7.3 ENVIRONMENTAL CONSEQUENCES

Impact analysis on Melrose AFR follows the definition of impacts and effects presented in Section 3.7.3. The Two-Target Alternative and Three-Target Alternative on Melrose AFR include the relocation of the manned site at the center of the exclusive-use area, an increase in the use of ordnance, a decrease in chaff and flare usage, the creation of new target areas, and the creation of one LZ/DZ.

4.7.3.1 TWO-TARGET ALTERNATIVE

Since there are no NRHP-eligible buildings on Melrose AFR, moving or renovating existing structures will have no effect on historic properties. There are more than 240 archaeological sites on Melrose AFR, at least 60 of which are eligible for the NRHP (ACC 2004a). Although these sites can be affected by ground disturbance associated with relocating structures, or target use and construction, at the present time, impacts to all NRHP-eligible archaeological resources within the Melrose AFR exclusive-use area have been mitigated (ACC 2004a). Mitigation may include data recovery consisting of excavation and detailed site recording, or similar actions at another site. No archaeological sites have been identified within the locations identified for target construction under this alternative. If, in the course of ground-disturbing activities, including target construction, cultural resources are encountered, the Air Force will comply with Section 106 of the National Historic Preservation Act (NHPA) by evaluating them for NRHP eligibility and managing these resources in accordance with the Cannon AFB and Melrose AFR Cultural Resources Management Plan (CRMP) (ACC 2004a).

4.7.3.2 THREE-TARGET ALTERNATIVE

Under the Three-Target Alternative, there would be three targets rather than two, and all would be constructed outside the exclusive-use target impact area, in the area of restricted lease. The areas proposed under this alternative have been surveyed for archaeological and architectural resources, and none are located within their boundaries. Should cultural resources be located during construction, the Air Force will manage these resources in compliance with Section 106 of NHPA and in accordance with the Cannon AFB and Melrose AFR CRMP (ACC 2004a).

4.7.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. There would be no new target construction, no relocation of structures, and a reduction in ordnance use on Melrose AFR as the 27 FW F-16 aircraft depart Cannon AFB. Cannon AFB would continue to manage all cultural resources within the range in accordance with the 2004 CRMP (ACC 2004a).

4.8 LAND USE AND RANCHING

4.8.1 DEFINITION OF RESOURCE

Land use addresses general land use patterns, land ownership, land management plans, and special use areas under the restricted areas. General land use patterns characterize the types of uses within a particular area such as rangeland, agricultural, military, and urban. Land ownership is a categorization of land according to type of owner. The major land ownership categories include private, state, and federal. Federal lands are described by the managing agency, which may include the Bureau of Land Management, U.S. Forest Service, or DoD.

The ROI for land use and ranching consists of Melrose AFR and all the lands under the existing restricted airspace R-5104 and R-5105 used for military training.

4.8.2 EXISTING CONDITIONS

Melrose AFR and R-5104/5105. Melrose AFR, which is administered by Cannon AFB, is located in the southern portion of the restricted airspace approximately 30 miles west of Cannon AFB. The range is located on approximately 60,010 acres, of which 8,800 acres are used for an exclusive-use impact area for the Air Force. The Air Force leases approximately 51,000 acres to ranchers for cattle grazing and farming. Figure 4.8-1 presents targets and manned areas.

Melrose AFR is currently divided into three management areas. The first area is the Exclusive-Use target area. This is the area that contains targets where ordnance is actually expended and is the area that contains most manned range support facilities. The area is fenced and access to this area is strictly controlled and monitored by the Air Force RCO. The second area, outside of the Exclusive-Use Area, is the Restricted Leased Land that serves as a buffer zone for range safety requirements. Cattle grazing is permitted in this area on a restricted basis. The third area between the Restricted Leased Land and the range boundaries is leased for unrestrictive grazing use. Warning signs identifying Melrose AFR are posted on the fence around the range boundaries. On the periphery of the 60,010-acre range, the Air Force has acquired restrictive easements that include structure height restrictions.

There are 13 ranchers that hold leases on Melrose AFR. The lease sizes for the current leaseholders range from 160 acres to about 14,393 acres. Most of the large leases have wells or other water devices (Air Force 1997a). Most of the leases are used for grazing range cattle. Two leases have developed irrigated cropland and one of those leases was identified during the Draft EIS public hearings as producing high-value, organically grown crops. Table 4.8-1 shows the lease numbers, acreage per lease, and access restriction zones for the Melrose AFR. The total of 50,932.8 leased acres, plus an estimated 277.2 acres of restricted and unrestricted access routes and other uses plus the Exclusive-Use 8,800-acre area equal the 60,010-acre Melrose AFR.

TABLE 4.8-1. CURRENT MELROSE AFR LEASES AND ACREAGE

Number	Zone B		Zone D	Total
	Restricted Access	Limited Access	Unrestricted Access	
PXLY-1-03-022			1,907.92	1,907.92
PXLY-1-03-023	1,810		7,460	9,270
PXLY-1-03-024	960	3,221.88	10,210.72	14,392.6
PXLY-1-03-025			2,080	2,080
PXLY-1-03-026	200		1,440	1,640
PXLY-1-03-027			1,600	1,600
PXLY-1-03-028	2,879.88	1,000	2,960	6,839.88
PXLY-1-03-029	5,878		282	6,160
PXLY-1-03-032	1,320		2,680	4,000
PXLY-1-03-030	1,280		160	1,440
PXLY-1-03-031			160	160
PXLY-1-03-033			800	800
PXLY-1-04-038		642.4		642.4
Totals	14,327.88	4,864.28	31,740.64	50,932.80

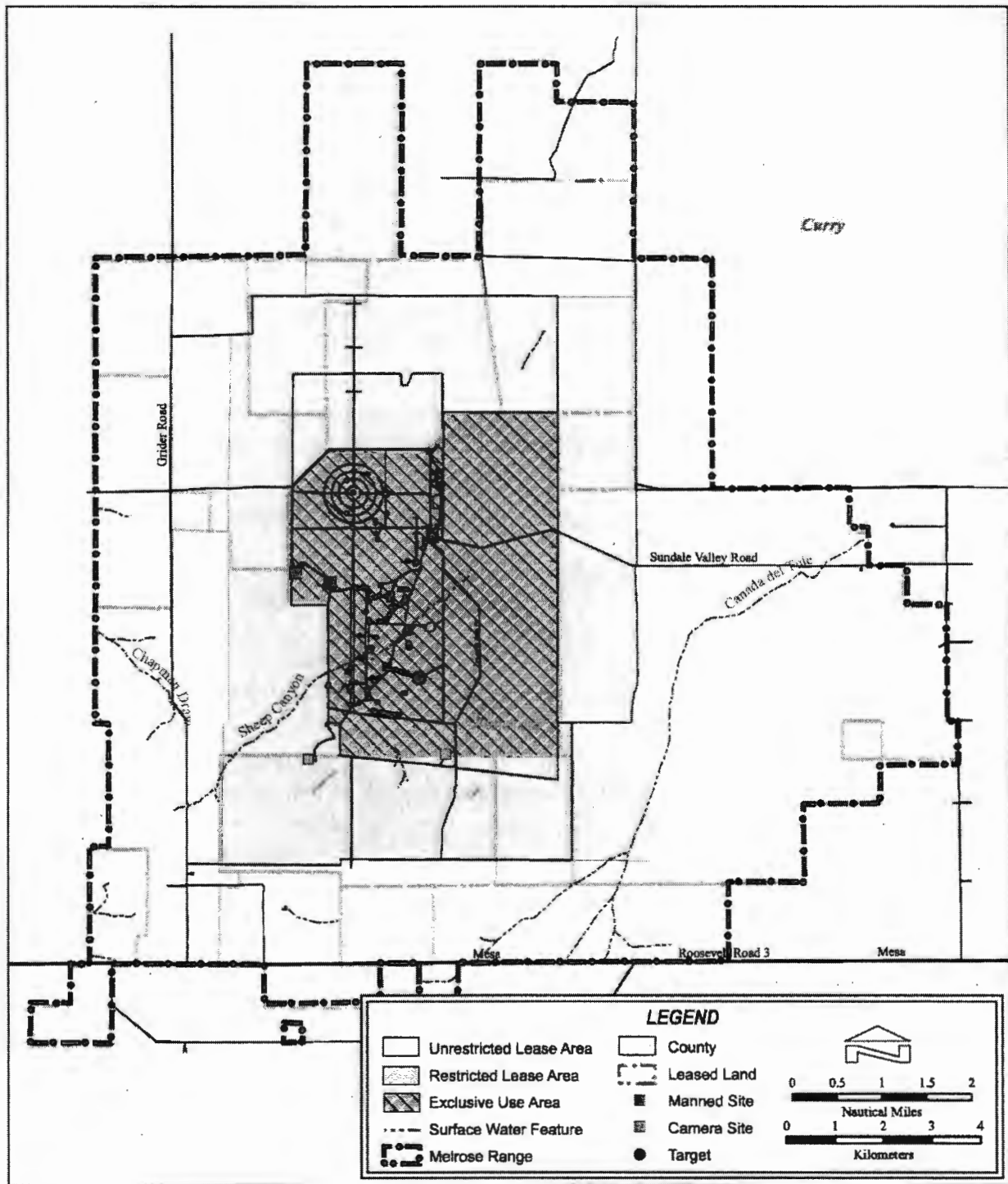


FIGURE 4.8-1. MELROSE AFR EXISTING TARGET AREAS AND LEASED LANDS

Access zones have been developed within Melrose AFR to guide Melrose AFR for rancher safety (personal communication, Wright 2006).

- Zone A: Exclusive Use; access to Zone A will require permission of the 27 FW Operations Group Commander or his/her designated representative. (Impact Area - none of which is leased out.)
- Zone B: Restricted and Limited Access; access is between the hours of 11:00 p.m. to 8:00 a.m. local time, Monday through Friday; the hours of 3:00 p.m. local time Saturday to 8:00 a.m. local time Monday; and the hours of 6:00 p.m. the day preceding a national holiday until 8:00 a.m. the day after the national holiday. Additional hours of access shall be scheduled through the 27 OSS/OSTW. Access to the leased area may be denied during special exercises in which case notification of denial will be given by the 27 FW/OG or his/her designated representative.
- Zone C: Unrestricted Access at this time, but may be restricted in the future depending on target configuration. Lessees are advised of restricted access at least six months prior to restrictions going into effect.
- Zone D: Access to Zone D is unrestricted and can be accessed 24 hours a day.

Cannon AFB developed a Grazing Management Plan within their INRMP to improve and monitor grazing and agricultural practices on the range. Grazing land improvements include structural improvements such as fences, cattle guards, water developments, and livestock enclosures, as well as non-structural improvements such as seeding, fertilizing, and vegetation management. The rangeland supports about one animal unit (AU) (typically a cow plus a calf) per 40 acres (Air Force 2007).

Because of New Mexico's arid climate in agricultural areas, no lands in New Mexico qualify as Prime Farmland unless irrigated with a dependable supply of irrigation water. Melrose AFR has irrigated land within Zone D. Depending upon the alternative Melrose AFR targets selected for use, irrigated cropland could be impacted by new range activities. Outside of Melrose AFR boundaries, irrigated farmland would be considered Land of Statewide Importance (NRCS 2006). No Melrose AFR construction would occur outside of range boundaries and no conversion of agricultural land would occur.

Public access on Melrose AFR is limited to ranchers or those who have business interests on the range. Recreation is not permitted and the general public is not allowed access. Liability and a hold harmless clause is included in existing leases. The leases also include a clause requiring farmers and ranchers to attend safety briefings conducted by the Air Force.

Outside the range boundary, lands are generally used for cattle grazing and crop production. Crops produced in Curry and Roosevelt counties include wheat, grain sorghum, corn, barley, cotton, hay, peanuts, and potatoes. Urban land uses comprise less than 1 percent of the total area. There is one identified noise-sensitive area on the periphery of the range: the Jewell Ranch. The Jewell Ranch is located to the southwest of the range and has a 1/2-mile no-fly circle around it.

Table 4.8-2 shows the acreages and percentages of land uses under R-5104/5105. Reflecting typical land uses found in eastern New Mexico, rangeland and agriculture are the dominant land uses under the airspace.

TABLE 4.8-2. EXISTING LAND USE UNDER R-5104/5105

<i>Land Use Category</i>	<i>Acreage</i>	<i>Percentage of Restricted Area</i>
Rangeland	245,325	83
Agriculture	48,249	16
Water/Wetland	767	<1
Urban	577	<1
Total	294,918	100

Source: USEPA 2000.

Land ownership under the restricted airspace outside Melrose AFR consists of approximately 71 percent private land, 21 percent state-owned, and 8 percent federal government-owned.

The majority of Melrose AFR is in Roosevelt County. Roosevelt County maintains a comprehensive plan but it does not specifically address Melrose AFR or surrounding properties. The County does not have a zoning ordinance but does administer subdivision regulations (personal communication, Hardin 2006).

TRANSPORTATION

Three Air Force civilians and 27 full-time contractors manage Melrose AFR. In addition, the Melrose AFR Fire Department employs four persons. Personnel travel to the range in either personal vehicles or government vehicles. Primary access to Melrose AFR is provided via U.S. 60/84 to New Mexico Highway 267 to Sundale Valley Road. A gated entrance is also located on the west side of the range off Krider Road. Numerous unpaved roads provide access for contractor/military personnel and ranchers. Traffic volume on these routes is low and therefore a level of service analysis has not been performed in this area (personal communication, Kurtz 2006).

4.8.3 ENVIRONMENTAL CONSEQUENCES

4.8.3.1 TWO-TARGET ALTERNATIVE

Melrose AFR has a variety of conventional and non-conventional targets. Implementation of the Two-Target Alternative at Melrose AFR would include the development of two live-fire target areas within the existing Exclusive-Use impact area as shown in Figure 2.2-2. The two target areas would each be approximately 1 kilometer square and would be located in the northeast and southwest corners of the existing Exclusive-Use Area, and would require a buffer area that extends out 2,296 feet beyond the approximate 1 kilometer square target boundary in all directions. Figure 2.2-3 presents a representative Target Set Layout to be installed within the impact area. The Two-Target Alternative is expected to expand the manned site at the center of the range (depicted in Figure 2.2-1) and could include expanding manned sites on the mesa to the western side of the range. Buildings that support the range, including the main tower and related support building and services, would be relocated from the center of the range.

Annually, approximately 40 percent of the Melrose AFR training activity would occur during environmental night (after 10:00 p.m. and before 7:00 a.m.). Training using LZs and DZs would be approximately in the same proportion (40 percent) during environmental night.

Under the Two-Target Alternative, modification to the existing Melrose AFR land use designations would occur. The Exclusive-Use Area would increase in size to include the area within the weapons safety footprint. Table 4.8-3 presents the existing, Two-Target Alternative, and Three-Target Alternative land use designations.

TABLE 4.8-3. ACRES OF LAND USE¹

<i>Land Use</i>	<i>Existing Conditions</i>	TWO-TARGET ALTERNATIVE		THREE-TARGET ALTERNATIVE	
		<i>Draft EIS</i>	<i>Final EIS²</i>	<i>Draft EIS</i>	<i>Final EIS</i>
Exclusive-Use	8,800	16,613	10,600	23,275	12,700
Restricted Grazing ¹	18,710	12,247	18,600	12,615	23,300
Unrestricted Grazing ¹	32,500	31,150	30,810	24,120	24,010
Total	60,010	60,010	60,010	60,010	60,010

Note: 1. Acres based on Geographic Information System; survey acreage may vary.

2. Preferred Alternative.

Typical grazing operations rotate cattle among owned or leased grazing areas during a season. The reduction in grazing acreage would affect ranch operations for ranchers affected by the changes in Melrose AFR land use. In the case of leases developed as irrigated farmland, live target use could have made the irrigated agriculture land use incompatible if 25 mm munitions were used from the gunships. The preferred alternative without the use of 25 mm munitions is not expected to be incompatible with the existing irrigated land.

During the Draft EIS public comment period, several commenters expressed concern about the use of 25 mm munitions and noted that the Two-Target Alternative would have less impact upon their ranching operations. However, two commenters noted that the Two-Target Alternative with the 25 mm munitions safety footprint could substantially affect the viability of their agricultural operations on leased land.

Cannon military aircraft currently use RR-188 chaff, M-206 defensive flares, other flares, and ordnance in Restricted Airspace over the Melrose AFR. Under the Two-Target Alternative, the use of RR-188 chaff and M-206 defensive flares under the Restricted Areas authorized would increase from 3,762 chaff bundles to 18,000. Flare use would increase from 2,031 to 10,000.

The release of chaff and flare end caps and other residual materials together would average one piece per 2.83 acres per year. Although the likelihood of encountering any chaff or flare residual components outside Melrose AFR is low, if such were found it could result in annoyance to the observer. Flare residual materials from unassessed flares and end caps from assessed flares or chaff were displayed by a participant at public meetings conducted by Cannon AFB in 2005. Participants expressed annoyance at finding residual flare and chaff materials on private property (Air Force 2006a).

Chaff particles are extremely difficult to discern from naturally occurring materials found in the area (Air Force 1997b). Chaff fibers break down to the consistency of background materials. Animals do not typically consume chaff (see Section 4.6), and it is unlikely that modern chaff or its residual components would accumulate in sufficient quantities to impact land uses, affect

recreational resources, or even be found. In rare instances, chaff does not deploy correctly and rather than disperse in a large cloud, the fibers may clump together and fall to the ground. When this occurs, tufts or clumps of chaff can be discernible to the naked eye. These tufts may catch on vegetation or blow across the landscape with the wind. Tufts may stay together or separate into individual fibers to some degree as the wind blows. Depending upon the context, the chaff may appear to resemble naturally occurring tufted seed pods or be viewed as foreign material. If viewed as a foreign material, the viewer may be annoyed by the presence of such chaff clumps.

During scoping meetings for this Environmental Impact Statement (EIS), participants expressed concern regarding potential detrimental effects to property values and the fire hazard of flares. The November 2005 fire was cited as a case where an Air Force release of a training munition caused substantial off-range damage.

Use of chaff and flares would be directly correlated to the pilot's response to a threat within the airspace. Residual deposition of chaff or flare end cap materials would be the result of altitude of chaff use, wind directions, and wind speeds. Due to the dispersal nature of deployed chaff and flares, the average wind in the area, wind altitudes, and the altitude at which chaff and flares are deployed, chaff or flare materials could be carried on wind currents outside, and, possibly, back inside the airspace. This analysis assumes that all chaff and flare end caps would be concentrated on lands under the airspace. This conservative assumption could produce a higher annual concentration of chaff or flare materials than may actually be experienced under the airspace.

With regard to both chaff and flares, the likelihood of adverse impacts on Melrose AFR associated with these elements would increase over current conditions. In the airspace, chaff concentrations would be estimated to be approximately 5.79 grams (0.20 ounce) per acre per year. An estimated one flare would be dispensed annually over the Restricted Area every 29.5 acres.

The risk of fire associated with flare use is low and virtually indistinguishable compared to other potential sources of fire (e.g., lightning). In the unlikely incidence of a fire, such as the November 2005 fire caused by a spotting charge from a dummy munition, the Air Force has established procedures for damage claims reimbursement. Section 4.3 further discusses control of fire.

There would be no anticipated change in general land use patterns, land ownership, or land management plans for the lands underlying the airspace as a result of continued chaff and flare use. This is consistent with other areas throughout the country where chaff and flares have been used.

Under the Two-Target Alternative, aircraft noise and impulse noise would increase in restricted airspace when compared with baseline conditions. Annual average noise levels outside Melrose AFR and under the restricted airspace would increase from an L_{dn} of 44 to 48 dB to an L_{dn} of 55 to 58. Noise levels at L_{dn} 58 dB are unlikely to change land use patterns, ownership, or management practices. The noise levels could result in annoyance to residents living under the restricted airspace associated with Melrose AFR.

Potential noise effects to land use would include aircraft and gun-related impulse noise. Impulse noise from munitions would be noticed both on the range and at ranches in the periphery of the range. The day and night firing of cannon from aircraft and the ground impact would produce noise levels that, while not of the levels that could harm human health, could be

perceived as an annoyance by ranch residents and workers (see Sections 4.2.3.1 and 4.2.3.2). This noise would not be expected to change agricultural land uses on the periphery of the range.

The Two-Target Alternative would include improvements to approximately 6 miles of Krider Road to provide access to the west side of the range. Paving would provide improved access for range and emergency response vehicles. Traffic volumes on Krider Road and Sundale Valley Road are not expected to increase sufficiently to create a drop in the Level of Service (LOS). Therefore, traffic-related impacts are not expected.

4.8.3.2 THREE-TARGET ALTERNATIVE

Under this alternative, three live-fire target areas for use by the AC-130 gunships would be developed within the 60,010-acre Melrose AFR. As shown in Figure 2.2-4, all three target areas would be located within Melrose AFR and as near as possible to the existing Exclusive-Use Area.

Table 4.8-3 shows the acreages within each land classification under existing conditions, the Two-Target Alternative, and the Three-Target Alternative. Under the Three-Target Alternative, modification to the existing Melrose AFR land use designations would occur. The Exclusive-Use impact area would increase in size from 8,800 acres to 12,700 acres and the Restricted Leased Land would increase from 18,710 acres to 23,300 acres. The Unrestricted Leased Lands would decrease to 24,010 acres. This action would change the land use designation and would change the use of the land. Leaseholders would have to change their leases and may decide to change their ranching practices. In the case of the two leases with a portion of each lease developed in irrigated farmland, live target use with 25 mm munitions would have been incompatible with the irrigated land use. The preferred alternative without the use of 25 mm munitions is not expected to be incompatible with the existing irrigated land.

During the Draft EIS comment period, two commenters noted that the Three-Target Alternative would not affect the viability of their agricultural land use on leased land as much as the Two-Target Alternative. However, several commenters expressed concern about the use of 25 mm munitions and noted that the Three-Target Alternative would have greater impact on their ranching land use than the Two-Target Alternative.

Consequences from aircraft and gun impulse noise and chaff and flare use would essentially be as described under the Two-Target Alternative. The noise levels are discussed in Sections 4.2.3.1 and 4.2.3.2. Off range, the resulting noise levels would be below 62 dBC.

The impacts from traffic under this alternative would be the same as under the Two-Target Alternative. Krider Road would be improved and traffic volumes on both Krider and Sundale Valley road are not expected to increase sufficiently to create a drop in the LOS. Therefore, traffic-related impacts would not result.

4.8.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. The F-16s would depart before the end of Fiscal Year (FY) 2008. Melrose AFR would continue to operate as a training range for military aircraft. Land ownership and general land use patterns would remain the same. Because Melrose AFR would remain an active range, no impact is expected to land use under the No Action Alternative.

4.9 SOCIOECONOMICS

4.9.1 DEFINITION OF RESOURCE

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly economic activity. Economic activity typically encompasses employment, personal income, and regional industries. Changes to these fundamental components can influence other community resources.

Melrose AFR is situated in the high plains of eastern New Mexico, 32 miles driving distance west of Cannon AFB, in Roosevelt County. Socioeconomic activities associated with the range are support for range activities and agriculture.

4.9.2 EXISTING CONDITIONS

Maintenance and construction activities on the range are part of the Cannon AFB military construction (MILCON) and operations and maintenance (O&M) program. Range employees are counted in the Cannon AFB personnel numbers. The range expenditures and personnel numbers are included in Section 3.9.1 for Cannon AFB.

Section 4.8.1 describes the agricultural land uses on Melrose AFR. The 60,010 acres of Melrose AFR are managed in three distinct ways, as noted in Table 4.8-1. Ranching operators manage grazing by rotating cattle among leased and owned properties, depending upon range conditions. Reduction in available rangelands could affect the overall ranching operations. In addition to grazing, two lessees produce row crops using center pivot irrigation systems.

4.9.3 ENVIRONMENTAL CONSEQUENCES

4.9.3.1 TWO-TARGET ALTERNATIVE

The use of two new Melrose AFR targets for live fire will change the grazing activity on portions of the range. Under the Two-Target Alternative, the Exclusive-Use Area would increase to 10,600 acres (see Table 4.8-3). Exclusive-Use Areas would exclude agricultural activities such as grazing or irrigated crops. Currently, Restricted Leased Grazing Lands and Unrestricted Leased Grazing Lands would be changed. This change would provide for safety zones around live-fire targets. The approximately 2.8 sections of rangeland removed from Restricted or Unrestricted grazing leases on Melrose AFR usually support approximately one AU per 40 acres. An AU is typically defined as the grazing area needed to support one cow and calf. The Two-Target Alternative could reduce the AUs by an estimated 45. In 2002, the latest year available with a comprehensive inventory, the number of beef cow cattle and calves in Curry, Roosevelt, and De Baca Counties was approximately 240,000. A reduction of 45 AUs would not significantly affect regional cattle operations, although it could detrimentally affect ranching operations of the affected lessees. Lessees with increased restricted grazing leases would need to assess ranch management practices. A portion of one lease to the northeast of the existing Exclusive-Use area is developed in irrigated organically grown agriculture. The preferred alternative, without 25 mm munitions, would be expected to affect the portion of the lease in grazing and could require management changes due to lease modifications. New access provisions could affect management of the irrigated portion of the lease. The live target safety footprint is not otherwise expected to impact the irrigated agriculture.

Residents within 6 miles of Melrose AFR live-fire targets would be subject to increased impulse noise from munitions and increased night overflight by training AFSOC aircraft. The day and night firing from AC-130 gunships would produce noise levels off range that, while not of the

levels that could harm human health, could be perceived as an annoyance by ranch residents and workers (see Section 4.2.3.1).

4.9.3.2 THREE-TARGET ALTERNATIVE

The consequences for the Three-Target Alternative are basically the same as those described for the Two-Target Alternative with the exception that three new targets for aerial gunnery would be established within the boundaries of Melrose AFR. As presented in Table 4.8-3, the 8,800-acre Exclusive-Use Area would become a 12,700-acre Exclusive-Use Area. This would move approximately 6.1 sections currently used for grazing into the Exclusive-Use Area.

Changes in the designation of grazing land within Melrose AFR would decrease both Restricted and Unrestricted leased grazing acreage. Lessees whose land converted to Exclusive-Use and those with additional acreage in restricted grazing may need to assess ranch management practices due to changes in access periods and/or changes in available leased acreage. In some cases noted during the public hearings on the Draft EIS, lease changes could significantly impact specific on-going ranch operations.

Under the Three-Target Alternative, 6.1 sections of rangeland could be affected that currently support one AU per 40 acres. This alternative could reduce the AUs by an estimated 98. Such a reduction would not significantly affect regional cattle operations, although it could detrimentally affect ranching operations of the affected lessees. Additional lessees would have land currently in unrestricted use converted to restricted use with additional access requirements that could affect cattle management activities in these areas.

4.9.3.3 NO ACTION ALTERNATIVE

The No Action Alternative would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Melrose AFR would continue to operate as a training range for transient and NMANG military aircraft. Melrose AFR grazing lease programs would remain as they currently exist. Noise levels and range activities would be reduced as the 27 FW was deactivated.

4.10 ENVIRONMENTAL JUSTICE

4.10.1 DEFINITION OF RESOURCE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to the extent permitted by law and appropriate, and consistent with the agency's mission, (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

For purposes of this analysis, minority, low-income and youth populations are defined as follows:

- *Minority Population:* Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.
- *Low-Income Population:* Persons living below the poverty level.
- *Youth Population:* Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the U.S. Bureau of the Census. Total and minority population figures are based on recent demographic data released from Census 2000 (U.S. Census Bureau 2000a). The census does not report minority population, per se, but reports population by race and by ethnic origin. These data were used to estimate minority populations potentially affected by implementation of the AFSOC beddown and associated training at Melrose AFB. Low-income and youth population figures were also drawn from the Census 2000 Profile of General Demographic Characteristics (U.S. Census Bureau 2000a). The R-5104 and R-5105 ROI for Melrose AFB is a subset of that for Cannon AFB, so the material presented in this section draws from Section 3.10.

4.10.2 EXISTING CONDITIONS

Disadvantaged groups within the Curry and Roosevelt counties ROI are specifically considered in order to assess the potential for disproportionate occurrence of impacts (see Table 4.10-1). The incidence of persons and families in the ROI with incomes below the poverty level was just slightly higher than state levels (U.S. Census Bureau 2000a).

Minority persons represent 40.1 percent of the population in the ROI. Hispanic or Latino persons account for most of the minority population in the ROI, representing 31.2 percent of the ROI population and 77.8 percent of the minority population. This is a lower ratio of minority population than that of the State of New Mexico as a whole. The youth population, which includes children under the age of 18, accounts for 29.5 percent of the ROI population, compared to 28.0 percent at the state level.

TABLE 4.10-1. 2000 POPULATION AND ENVIRONMENTAL JUSTICE DATA

Area	Population	MINORITY PERSONS		PERSONS BELOW POVERTY		CHILDREN UNDER 18	
		Number	Percent	Number	Percent	Number	Percent
Curry County	45,044	18,583	41.3	8,327	19.0	13,561	30.1
Roosevelt County	18,018	6,719	37.3	3,928	22.7	5,060	28.1
State of New Mexico	1,819,046	1,005,551	55.3	328,933	18.4	508,574	28.0
Total ROI	63,062	25,302	40.1	12,255	20.0	18,621	29.5

Notes: 1. The U.S. Census calculates percent low-income for individual counties based on total county populations that differ slightly from the county populations reported in the first column.
 2. Population figures for the each category are from different reporting years as described in the previous section. Therefore, except for minority population, the percentage figures are not based on the total population presented in this table but from the relevant data year.

Source: U.S. Census Bureau 2000a.

4.10.3 ENVIRONMENTAL CONSEQUENCES

For either the Two-Target or Three-Target Alternative, there are no permanent residents on the 60,010-acre Melrose AFR. Residents under the Restricted Airspace associated with Melrose AFR or under the Taiban MOA immediately adjacent to the range are representative of minority persons within the counties that constitute the airspace ROI. The youth population of children under the age of 18 under Restricted Airspace is consistent with the ROI population. No disproportionate impacts are expected to occur to minority or low-income populations or to children.

4.10.4 NO ACTION

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties; at Melrose AFR there would be no effects on minority or disadvantaged individuals.

5.0 TRAINING AIRSPACE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and potential environmental consequences within the military training airspace associated with Cannon Air Force Base (AFB) and Melrose Air Force Range (AFR). This airspace includes the Pecos, Taiban, Mt. Dora, and Bronco Military Operations Areas (MOAs), as well as Cannon AFB-scheduled Military Training Routes (MTRs) depicted on Figure 2.3-3, and other AFSOC training activities.

In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 32 Code of Federal Regulations (CFR) Part 989, et seq., the description of the affected environment focuses on those resources and conditions potentially subject to impacts. The affected environment is described for ten resource topics: Airspace Management, Noise, Safety, Air Quality, Physical Resources, Biological Resources, Cultural Resources, Land Use and Recreation, Socioeconomics and Environmental Justice. These resources are extensively interrelated, and consequently, each resource topic relies upon the findings of relevant other analyses. For example, noise analyses are reflected in the analysis of land use, socioeconomics, and biological resources.

The sections for each resource topic begin with an introduction that defines the resources addressed in the section, defines key terms as necessary and describes the region of influence (ROI) within which the effects from the Proposed and Alternative Actions are anticipated to occur. The ROI varies from resource to resource, but in general, effects from the Proposed and Alternative Action are expected to be concentrated on the range. Section 3.0 describes primary reasons why the ROI might differ among resources.

Following the introduction for each resource topic, information is presented about existing environmental conditions in the ROI. This information provides a frame of reference about conditions that prevail currently or existed in the recent past. Applicable laws and regulations for each resource are presented in Appendix D.

For each resource, the Proposed Training and the No Action Alternative, described in Section 2.3, are assessed for their potential to impact the natural and human environment. In some instances a brief methodology is provided to explain how the analysis of impacts was conducted.

The impacts described in this section represent a best estimation of the consequences of the use of Cannon AFB-scheduled military training airspace by Air Force Special Operations Command (AFSOC). The impact analysis for each alternative includes direct and indirect, as well as short-term and long-term impacts. The impacts of each alternative are compared against the baseline conditions. Cumulative impacts and other environmental considerations are described in Section 6.0.

5.1 AIRSPACE MANAGEMENT

5.1.1 DEFINITION OF RESOURCE

The airspace used for AFSOC training flights consists of MOAs, MTRs and Restricted Airspace (refer to Figure 2.3-1). Restricted airspace is associated with Melrose AFR and is discussed in Section 4.1. This section addresses MOA and MTR airspace.

5.1.2 EXISTING CONDITIONS

5.1.2.1 MILITARY OPERATIONS AREAS

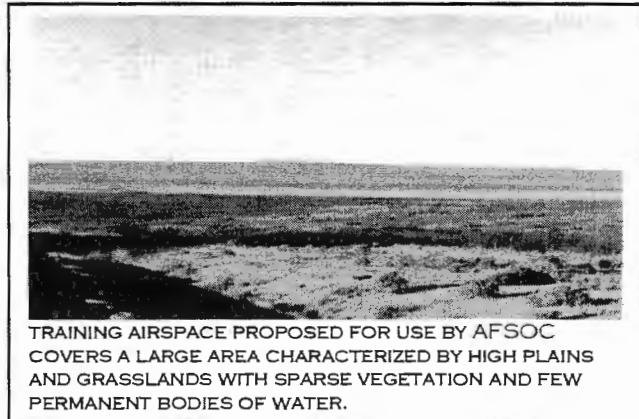
Each MOA is airspace of defined vertical and lateral limits established below the Class A airspace floor of 18,000 feet above mean sea level (MSL). MOAs separate and segregate certain non-hazardous military activities from Instrument Flight Rule (IFR) traffic and to identify for Visual Flight Rule (VFR) traffic where these activities are conducted (Pilot/Controller Glossary [P/CG] 2004). MOAs are considered "joint use" airspace. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible Air Route Traffic Control Center (ARTCC). Joint use by both participating and VFR non-participating aircraft is accomplished under the "see-and-avoid" concept described in 14 CFR § 91.113(b), which states that "[w]hen weather conditions permit, pilots operating IFR or VFR, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft" (P/CG 2004). Right-of-way rules are contained in 14 CFR Part 91. Non-participating aircraft operating under VFR are not prohibited from entering a MOA, even when the MOA is active for military use. ARTCC provides separation of non-participating IFR aircraft within active MOAs in a variety of ways, including restricting IFR traffic from the active MOA. "Lights out" training is not currently conducted by 27th Fighter Wing (27 FW) F-16s in the Pecos MOA. However, under a Letter of Agreement (LOA) between the Albuquerque ARTCC and the 27 FW, the 27 FW could perform lights out training if needed.

Figure 5.1-1 presents the military training airspace in the vicinity of Cannon AFB. This airspace includes the airspace scheduled by Cannon AFB and by other bases. Cannon AFB schedules the Pecos, Taiban, Bronco, and Mt. Dora MOAs. The Beak and Talon MOAs are scheduled by Holloman AFB near Alamogordo. R-5107 and related ranges constitute the Army-scheduled White Sands Missile Range. The MTRs pictured represent the main routes. Multiple alternate entry/exit points providing access to these main routes are not represented on this figure. MTRs are scheduled by various Department of Defense (DoD) agencies.

The Pecos MOAs are four distinct MOAs that are divided into a north and south segment, with each segment having a high and low component. In general, these MOAs abut each other horizontally and vertically, essentially forming one contiguous block of airspace. The exception to this is the Pecos South High MOA, which extends to the south beyond the southern border of the Pecos South Low MOA. This structuring of the MOA airspace, in effect, created a "shelf" of MOA airspace extending to the south of the southern border of the Pecos South Low MOA that begins at 11,000 feet MSL. Termed the "Roswell Shelf," this provided non-Special Use Airspace (SUA) up to 11,000 feet MSL to support other aircraft transiting to and from Roswell, New Mexico. This Roswell Shelf was needed prior to the 1997 improvements in FAA radar coverage at Roswell.

Overlying about 3,120 square miles; the Pecos MOA extends from 500 feet above ground level (AGL) up to but not including Flight Level (FL) 180. Sortie-operations in Pecos MOA are concentrated between 500 and 1,000 feet AGL (40 percent) and above 10,000 feet AGL (45 percent). Use of Pecos MOA can be independent of training in Melrose AFR airspace, although aircraft often conduct sortie-operations in Pecos MOA, Taiban MOA, and Melrose AFR airspace during a single training mission. The Pecos MOA also supports air-to-air training activities. About 3,500 sortie-operations were conducted in Pecos MOA under baseline conditions. F-16s from Cannon AFB performed 76 percent of these sortie-operations.

The Taiban MOA overlies approximately 310 square miles and is situated along the northeastern edge of the Pecos MOAs. This MOA effectively extends the Pecos North Low MOA and a portion of the Pecos South Low MOA eastward to the Restricted Airspace, which supports operations on Melrose AFR. These MOAs are scheduled and managed by staff at Cannon AFB; utilization is under the control of the Albuquerque ARTCC. Currently the 27 FW uses the Sumner ATCAA and conducts large-force exercises in the Beak MOA. The Beak MOA, with approximately 3,850 baseline sortie-operations, ranges in altitude from 500 feet AGL to approximately 7,000 feet AGL. About 55 percent of flight activities occur between 500 and 2,000 feet AGL, with 45 percent between 2,000 and 10,000 feet AGL. Roughly 62 percent of the current sortie-operations in Taiban MOA are attributable to F-16s from Cannon AFB.



TRAINING AIRSPACE PROPOSED FOR USE BY AFSOC
COVERS A LARGE AREA CHARACTERIZED BY HIGH PLAINS
AND GRASSLANDS WITH SPARSE VEGETATION AND FEW
PERMANENT BODIES OF WATER.

Mt. Dora MOA is located 110 miles north of Cannon AFB. This triangular MOA overlies approximately 5,340 square miles, mostly in New Mexico, but with small sections in Texas and Colorado. The MOA extends from 1,500 feet AGL to approximately FL180. Cannon AFB-based aircraft split use of Mt. Dora MOA, accounting for 52 percent of the 747 total baseline sortie-operations. Flight activities are evenly distributed above and below 2,000 feet AGL, with 45 percent of the activity above 10,000 feet AGL. The Mt. Dora MOA has received little use from Cannon-based fighter aircraft in the past decade due to its distance from Cannon AFB. AFSOC Cannon-based C-130 aircraft are proposed to use the Mt. Dora MOA more than the F-16s used that airspace.

Bronco MOA covers approximately 6,820 square miles in eastern New Mexico and northwestern Texas. Minimum flight altitude in the northern one-third of the MOA is 8,000 feet MSL with 10,000 feet MSL as the floor altitude in the remainder of the MOA. All portions of Bronco MOA extend up to FL180. Baseline annual sortie-operations totaled 1,200; Cannon AFB F-16s accounted for 80 percent. The Bronco MOA south of Cannon AFB has been used for 27 FW F-16 training and for training by Texas-based units.

The MOAs proposed to be used by AFSOC aircraft are developed, coordinated, used, and managed in accordance with LOAs between the 27 FW and the Albuquerque and Fort Worth Centers. For the airspace, the LOA delegate airspace to Cannon AFB Radar Approach Control, defines responsibilities, and outlines procedures for aircraft operations, air traffic control operations, and utilization of airspace for which the 27 FW is the scheduling authority. Such LOAs are supplementary to the procedures in Federal Aviation Administration (FAA)

Orders 7110.65 (Air Traffic Control) and 7610.4 (Special Military Operations). The MOAs are described in Table 5.1-1. Figure 5.1-2 presents these MOAs and the MTRs scheduled by Cannon AFB. The primary MTR routes are presented in Figure 5.1-2. Each MTR also typically has several branching entry or exit points.

TABLE 5.1-1. EXISTING MOAS ASSOCIATED WITH CANNON AFB AND MELROSE AFB

MOA/ATCAA	ALTITUDES		PUBLISHED HOURS OF USE		Controlling ARTCC
	Minimum	Maximum	From	To	
Pecos North Low MOA	500 AGL ¹	UTBNI ² 11,000 MSL ³	8:00 a.m. ⁴	8:00 p.m. ⁴	Albuquerque
Pecos North High MOA	11,000 MSL	UTBNI FL 180 ⁵	8:00 a.m.	8:00 p.m.	Albuquerque
Pecos South Low MOA	500 AGL	UTBNI 11,000 MSL	Inter By NOTAM ⁶	Inter By NOTAM ⁶	Albuquerque
Pecos South High MOA	11,000 MSL	UTBNI FL 180	Sunrise ⁴	Sunset ⁴	Albuquerque
Taiban MOA	500 AGL	UTBNI 11,000 MSL	8:00 a.m.	Midnight	Albuquerque
Bronco 1	8,000 MSL	FL 180	7:00 a.m. ⁴	10:00 p.m. ⁴	Fort Worth
Bronco 2	10,000 MSL	FL 180	NOTAM		Fort Worth
Bronco 3 & 4	10,000 MSL	FL 180	7:00 a.m. ⁴	10:00 p.m. ⁴	Fort Worth
Mt. Dora East/West High	11,000 MSL	FL 180	NOTAM		Albuquerque
Mt. Dora East/West Low	1,500 AGL	UTBNI 11,000 MSL	NOTAM		Albuquerque

- Notes:
1. AGL = Feet Above Ground Level
 2. UTBNI = Up To, But Not Including
 3. MSL = Feet Above Mean Sea Level. Average ground elevation in ROI is approximately 5,000 MSL.
 4. Times are Monday through Friday. Additional scheduling is promulgated through Notices To Airmen (NOTAMs).
 5. FL = Flight Level. Described in terms of hundreds of feet MSL using a standard altimeter setting. Thus, FL180 is approximately 18,000 MSL.
 6. Inter By NOTAM = Times of use are intermittent, and are published in NOTAMs.

Source: FAA 2000b; LOA 1996

The 27 FW and New Mexico Air National Guard (NMANG) currently fly F-16s and conduct a range of training activities in this MOA/Air Traffic Control Assigned Airspace (ATCAA) airspace. Other aircraft using the airspace include B-1B bombers from Dyess AFB. The B-1Bs schedule the airspace from one to five times per week, flying one to three aircraft during a scheduled period. Transient aircraft flown in the airspace include A-10s, F-15s, F/A-18s, F-22As, German Air Force Tornados, B-52s, C-130s, and various helicopters. Large-force exercises conducted in the airspace can involve approximately 20 aircraft of varied types (personal communication, Berg 2004).

There is sufficient MOA airspace in the local area. Mt. Dora, Pecos, Taiban, and Bronco MOAs are scheduled by Cannon and are suitable for AFSOC aircraft training requirements. Aerial refueling (AR) training would be accomplished on AR tracks designated by FAA. Currently, AR-602 shown on Figures 5.1-1 and 5.1-2 is scheduled and used by Cannon AFB. AR-602 is available for AR at altitudes ranging from FL180 to FL260. The altitude capabilities of AFSOC aircraft would require AFSOC to request FAA to lower existing or designate new AR tracks to accommodate Cannon-based aircraft.

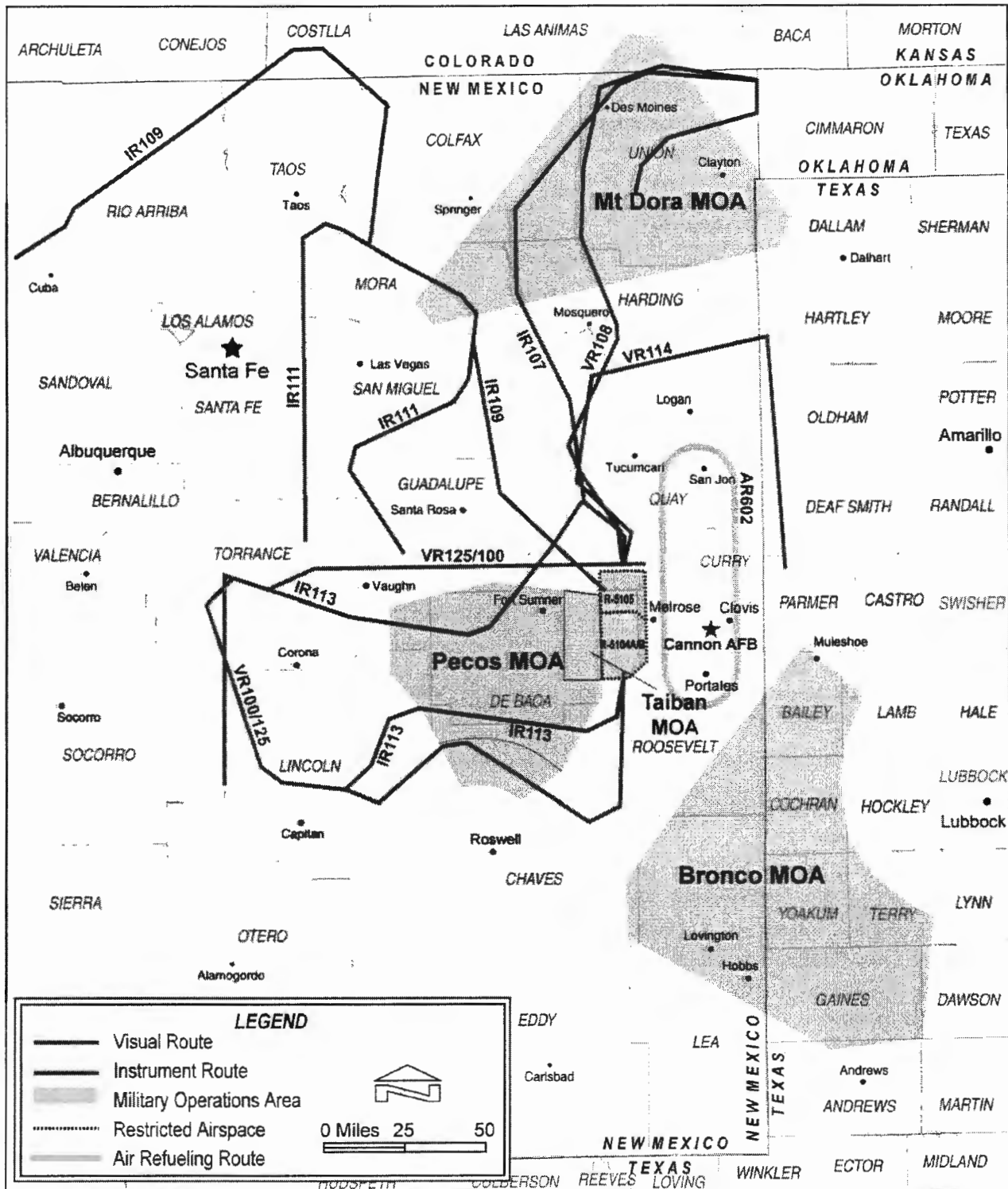


FIGURE 5.1-2. EXISTING MILITARY TRAINING AIRSPACE SCHEDULED BY CANNON AFB, NEW MEXICO

5.1.2.2 MILITARY TRAINING ROUTES

MTRs are flight corridors developed and used by the DoD to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training that may include airspeeds in excess of 250 knots indicated airspeed (KIAS) (P/CG 2004). MTRs are developed in accordance with criteria specified in FAA Order 7610.4 (AP/1B 2003). They are described by a centerline, with defined horizontal limits on either side of the centerline, and vertical limits expressed as minimum and maximum altitudes along the flight track. On Figure 5.1-2, MTRs are identified as Visual Routes (VR) or Instrument Routes (IR). VRs are used by DoD and associated Reserve and Air National Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 feet MSL at airspeeds in excess of 250 knots KIAS (P/CG 2004). IRs are used by DoD and associated Reserve and Air National Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR weather conditions below 10,000 feet MSL at airspeeds that may be in excess of 250 knots KIAS (P/CG 2004). Figure 5.1-1 shows the MTRs in the vicinity of Cannon AFB. Of these, AFSOC aircraft would utilize VR-100, VR-108, VR-114, VR-125, IR-107, IR-109, IR-111, and IR-113, presented on Figure 5.1-2.

5.1.2.3 OTHER AVIATION AND AIRSPACE USE

Public airports and private airfields underlie MOA airspace. The Fort Sumner public airport is situated under the Pecos North MOAs. Although there is no controlled airspace associated with this airport's operation, aeronautical charts reflect that the floor of the Pecos North Low MOA is restricted to 1,500 feet AGL in the airport's vicinity. The same restrictions apply to public airports under the Mt. Dora and Bronco MOAs. Private airfields, such as Double V and Bojax, are located under the Pecos South MOAs. An airfield for El Paso Natural Gas is located on the extreme southern boundary of the Pecos South High MOA.

There are four Federal Airways ("Victor" Routes) in the vicinity of the Pecos MOAs. V-264 traverses southwest to northeast in the northern section of the Pecos MOAs, providing routing between the Corona Very High Frequency Omni-directional Radio Range and Tactical Air Navigation Aid (VORTAC) and Tucumcari, New Mexico. V-291, V-68, and V-83 traverse northwest to southeast along the western border of the Pecos MOAs, and provide routing between the Corona VORTAC and Roswell, New Mexico. All of these routes are situated outside of the boundaries of the Pecos MOAs. Air carrier and air taxi traffic in the region is considered moderate; general aviation traffic in the region is considered relatively light.

There are two Jet Routes, 74 and 76, which pass between the Pecos and Mt. Dora MOAs at higher altitudes than those that would be flown by AFSOC C-130 aircraft. A standard instrument departure (SID) track (Worth-3) passes through the Pecos MOAs south of J-74. Worth-3 supports departures from Dallas-Fort Worth and passes through the northern region of the Pecos South MOA in a northwesterly direction from Lubbock, Texas, to the Corona VORTAC.

5.1.3 ENVIRONMENTAL CONSEQUENCES

5.1.3.1 PROPOSED TRAINING OF AFSOC ASSETS

MOAs. Under the Proposed Training, annual sortie-operations conducted in MOAs would increase by 200 percent in the Taiban MOA, 190 percent in the Pecos MOA, 450 percent in the

Mt. Dora MOA, and 6 percent in the Bronco MOA (see Table 2.3-2). While the increases in Taiban, Pecos, and Mt. Dora MOAs are substantial, the Taiban and Pecos MOAs have supported sortie-operation levels approaching the levels proposed by AFSOC. Potential issues concerning airspace congestion are resolved through scheduling activities with regional Air Traffic Control (ATC) centers.

The slower moving AFSOC aircraft with a larger crew than F-16 jets would increase the number of personnel available to practice see-and-avoid within training airspace. Existing see-and-avoid procedures and avoidance measures for civil aviation airports under the MOAs would continue unchanged. The scheduling, coordination, processes, and procedures currently used to manage these MOAs are well established and would need no modification to support implementation of the Proposed Training. These MOAs would continue to be scheduled by Cannon AFB for Cannon AFB-based and transient aircraft use.

MTRs. Implementation of the Proposed Training would result in a substantial increase in MTR use over the existing levels (see Table 5.2-3). All eight MTRs scheduled by Cannon AFB would see increased after-dark training and training during the hours of environmental night (10:00 p.m. to 7:00 a.m.). Rather than F-16s or other jet aircraft, the AFSOC training would involve fixed-wing, propeller-driven variants of C-130s and CV-22s. AFSOC aircraft normally fly at 250 to 1,000 feet AGL on MTRs with training missions of four to five hours. Aircraft would be expected to fly 30-minute low-level training below 250 feet AGL. During night missions, these altitudes would be below altitudes used by general aviation and no potential impact would be anticipated. During daylight missions, low-altitude general aviation aircraft such as agricultural aircraft could be encountered at training altitudes. The C-130 and CV-22 have both a pilot and co-pilot and fly at speeds that support see-and-avoid procedures during daylight (and night) operations.

No change in the baseline structure or management of the eight MTRs used by Cannon AFB would occur. AFSOC personnel at Cannon AFB would schedule MTRs for Cannon AFB and transient aircraft. Existing noise avoidance areas would be evaluated to determine their applicability to AFSOC training activities and would be adopted as appropriate. Observance of existing avoidance procedures would continue as it is currently executed. Scheduling of the MTRs and observance of existing avoidance procedures would continue to be the responsibility of Cannon AFB.

Flights for Landing Zone (LZ)/Drop Zone (DZ) training or water training would be conducted using existing airspace training routes or, as applicable, under ATC.

5.1.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. AFSOC aircraft would thus not avail themselves of the military training airspace at this time. The airspace environment would be as described in Section 5.1.2 but without the contribution of the 27 FW F-16 aircraft due to the Base Realignment and Closure (BRAC) directive to disestablish the 27 FW.

5.2 NOISE

5.2.1 DEFINITION OF RESOURCE

The ROI for military training airspace are the respective airspace units. A general discussion of noise metrics is provided in Section 3.2 and a more thorough explanation is provided in Appendix F.

In this Environmental Impact Statement (EIS), sound levels are presented for noise generated by military aircraft, as well as munitions on Melrose AFR (refer to Section 4.2). Those are not the only noise sources; there is an existing ambient sound environment as well. Aircraft noise must be compared with existing noise as well as evaluated on an absolute basis. The sound levels in the affected area have not been measured, but they would be comparable to sound levels in other lightly populated areas in the Western United States (U.S.). Table 5.2-1 lists sound levels that have been measured in those kinds of areas. The table notes the sources of the data and the metric reported. When predicted aircraft noise levels fall in the lower ranges of the levels in Table 5.2-1, they are estimates of noise levels rather than quantitative measurements due to instrument accuracy at very low ambient conditions. Based on the sound levels and types of areas summarized in Table 5.2-1, ambient sound levels in the ROI (outside of population centers) would be expected to be in the range of 25 to 36 decibels (dB).

TABLE 5.2-1. SOUND LEVELS IN LIGHTLY POPULATED AREAS

<i>Location</i>	<i>Sound Level Range, dB</i>	<i>Reference</i>
North Rim, Grand Canyon	16-31 ¹	U.S. Environmental Protection Agency (USEPA) 1971
Farm in Valley	35-44 ¹	USEPA 1971
Small Town Residential Cul-de-Sac	40-50 ¹	USEPA 1971
Grand Canyon	22-35 ²	Miller <i>et al.</i> 2003
Idaho, sagebrush country	25-36 ³	Fidell <i>et al.</i> 2003
Central and Eastern Colorado	28-44 ⁴	Air National Guard 1996

Notes: 1. L_{90} to L_{10} (L_{90} and L_{10} are the sound level exceeded 90 percent and 10 percent of the time)

2. L_{50} , range over eighteen sites (L_{50} is the sound level exceeded 50 percent of the time)

3. L_{eq} , range over eight sites (L_{eq} is the equivalent sound level)

4. L_{90} , range over 17 sites

5.2.2 EXISTING CONDITIONS

Base-assigned aircraft from Cannon AFB currently account for approximately 76 percent of aircraft activities in the MOAs and are estimated to be a comparable percentage of the activities in the MTRs. Table 5.2-2 presents the average operational parameters reflected in the noise modeling effort for current aircraft. The altitude bands are based on the assumption that the upper and lower boundaries of an airspace encompass the range of altitudes expected to be flown by training aircraft. Baseline noise levels calculated for potentially affected airspace are presented in Table 5.2-3.

**TABLE 5.2-2. EXISTING TYPICAL AIRCRAFT OPERATING PARAMETERS
IN AIRSPACE SCHEDULED BY THE 27 FW**

<i>Airspace</i>	<i>Time in Airspace (minutes)</i>	PERCENTAGE OF TIME AT ALTITUDES			
		<i>100-500 feet AGL</i>	<i>500-1,000 feet AGL</i>	<i>1,000-5,000 feet AGL</i>	<i>5,000+ feet AGL</i>
Taiban MOA ¹	30	0	20	65	15
Pecos MOA ¹	37.8	0	20	30	50
Mt. Dora MOA	30	0	0	45	55
Bronco MOA	42	0	0	0	100
MTRs ²	--	0	90	10	0

Notes: 1. Taiban and Pecos MOAs are adjacent to and support operations in R-5104A/5105.

2. Time in airspace is not a parameter used in modeling noise for MTRs. The altitude bands are the same for all MTRs.

**TABLE 5.2-3. BASELINE NOISE LEVELS FOR AIRSPACE UNITS
PROPOSED FOR AFSOC USE**

<i>Airspace</i>	ANNUAL SORTIE-OPERATIONS		<i>Noise Levels (L_{dnmr} in dB)²</i>
	<i>Day¹</i>	<i>Night¹</i>	
Taiban MOA ³	2,949	902	47
Pecos MOA	2,608	869	36
Mt. Dora MOA	737	10	<30
Bronco MOA	927	273	<30
IR-107	13	0	<30
IR-109	72	0	<30 - 31
IR-111	24	1	<30 - 36
IR-113	45	0	<30
VR-100/125	451	0	<30 - 38
VR-108	80	0	30
VR-114	473	0	<30 - 33

Notes: 1. Day is defined as 7:00 a.m. until 10:00 p.m. Night is 10:00 p.m. to 7:00 a.m.

2. Values under centerline of highest use MTR segment.

3. Taiban and Pecos MOAs are adjacent to and support operations in R-5104A/5105.

5.2.3 ENVIRONMENTAL CONSEQUENCES

5.2.3.1 PROPOSED TRAINING OF AFSOC ASSETS

Table 5.2-4 presents the proposed aircraft operating parameters for AFSOC aircraft.

**TABLE 5.2-4. PROPOSED TYPICAL OPERATING PARAMETERS
IN AIRSPACE SCHEDULED BY AFSOC**

<i>Airspace</i>	PERCENT OF TIME AT ALTITUDE (AGL)			
	<i>100-500</i>	<i>500-1,000</i>	<i>1,000-5,000</i>	<i>5,000+</i>
Taiban MOA	0	40	40	20
Pecos MOA	0	40	40	20
Mt. Dora MOA	0	0	80	20
Bronco MOA	0	0	0	100
MTRs	64	16	15	5

A comparison of Tables 5.2-2 and 5.2-4 demonstrates that in MOAs, the AFSOC training aircraft will fly a greater percent of time at lower altitudes than do the F-16s. Comparing Tables 5.2-3 and 5.2-5 demonstrates that the total number of MTR missions are proposed to increase substantially from baseline conditions.

**TABLE 5.2-5. PROJECTED NOISE LEVELS FOR AIRSPACE
UNITS INTENDED FOR AFSOC USE**

<i>Airspace</i>	ANNUAL SORTIE-OPERATIONS		<i>Noise Levels (L_{dnmr} in dB)²</i>
	<i>Day</i>	<i>Night¹</i>	
Taiban MOA ³	5,163	2,450	55
Pecos MOA	4,354	2,219	45
Mt. Dora MOA	2,084	941	36
Bronco MOA	826	449	<30
IR-107	775	511	44
IR-109	788	511	48
IR-111	780	510	47
IR-113	145	80	40
VR-100/125	1,736	1,102	49
VR-108	884	551	46
VR-114	866	551	41

Notes: 1. Environmental night is between 10:00 p.m. and 7:00 a.m.

2. Value when centerline of highest use MTR segment.

3. Taiban and Pecos MOAs are adjacent to and support operations in R-5104A/5105.

Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) from military aircraft has been computed for each airspace unit, and is presented in Table 5.2-5 for the Proposed Training. The sound levels shown are those associated with each area under the airspace. Noise levels for the proposed training fall into three categories:

- High-altitude airspace, where operations are at high altitude (above 10,000 feet MSL) and noise levels are very low.

- Low-altitude MOAs where the floor is as low as 500 feet AGL. Noise levels would be greater than existing in the Taiban, Pecos, and Mt. Dora MOAs.
- MTRs where a variety of aircraft travel along a corridor of varying widths.

Table 5.2-5 also presents the extent of AFSOC night sortie-operations and a comparison with Table 5.2-3 demonstrates that there will be an increase in annual night flights on the MTRs from 0, in most cases, to values ranging from over 500 to slightly over 1,100 per year. Assuming a representative year of 220 flying days and 40 percent during environmental night would produce a daily average of two C-130 or CV-22 overflights between 10 p.m. and 7 a.m. along the MTRs. Along VR-100/125, there would be an average of four overflights per environmental night.

AFSOC aircrews would operate between 100 feet and 1,000 feet AGL, and usually 250 feet AGL and above, along most of an MTR. The terrain-following training missions may take the aircrew to an altitude of between 100 and 250 feet AGL when the path crosses a high point of a mountainous ridge, but would only be at this altitude for a few minutes. These training flights are intended to simulate real world conditions, and, as such, the flight paths to the actual training location will avoid populated areas. It is also normal operating policy to plan routes that are aligned so that disturbance to persons, property, and wildlife on the ground are minimized. The number of training flights along the MTRs would result in noticeable increases in noise levels along all MTRs.

Changes in noise levels on the MTRs associated with the increased day and night use would be noticed. Although the comparatively quieter turboprop AFSOC aircraft will not create the same SEL noise levels as the F-16s, the relative frequency of night overflights would be expected to increase annoyance to people residing under the airspace.

The MTRs are typically 15 to 20 miles wide and a training aircraft could be flying anywhere along the width of the route. Table 5.2-5 demonstrates that some segments of some routes, such as the amount of VR-100/125 training activity and where IR-109 and IR-111 overlap, there will be an increase from ambient conditions of $L_{dnmr} < 30$ to 36 dB to noise levels around 40 to 49 dB. Although these noise levels are not at sustained levels that could damage human health (see Appendix F), the noise levels could result in annoyance and noise complaints from residents under the MTRs.

The MTRs are configured to avoid populated areas as well as airports and ground obstructions, by established distances (8 miles), per FAA and U.S. Air Force (Air Force) regulations. Several of the MTRs are over portions of National Forests, National Grasslands, Wilderness Study Areas, National Monuments, Indian Reservations, and military reservations. The National Forest and Grassland areas offer a variety of recreational activities, including camping, hiking, biking, off-road vehicle areas, and fishing. In addition, the State of New Mexico has established special management areas such as parks and other natural areas. Table 5.2-6 presents special land management areas under Cannon AFB scheduled MOAs and MTRs. AFSOC would review special land use areas under each MTR. All national forests, national monuments, and state parks would be avoided by 2,000 feet. AFSOC will coordinate with the National Forests and Grasslands to ensure any possible future complaints are addressed and identified for altitude avoidance.

**TABLE 5.2-6. SPECIAL USE LAND MANAGEMENT AREAS UNDER
CANNON SCHEDULED MOAS AND MTRS
(PAGE 1 OF 2)**

<i>Airspace</i>	<i>Land Use Area</i>	<i>Type</i>	<i>Acreage</i>
Pecos MOA	Fort Sumner	State Park	119
	Sumner Lake	State Park	665
Mt. Dora MOA	Capulin Volcano	National Monument	840
	Chicosa Lake	State Park	475
	Clayton Lake	State Park	471
	Kiowa	National Grassland	305,420
	Rita Blanca	National Grassland	29,250
Bronco MOA	Muleshoe	National Wildlife Refuge	5,415
IR-107	Capulin Volcano	National Monument	840
	Chicosa Lake	State Park	115
	Comanche	National Grassland	5,230
	Conchas Lake	State Park	1,255
	Kiowa	National Grassland	165,280
	Melrose AFR	Military Reservation	22,000
IR-109	Carson	National Forest	204,015
	Chamas River Canyon	National Forest Wilderness	26,105
	Cimarron Canyon	State Park	33,000
	Jicarilla Apache	Indian Reservation	64,600
	Rio Chama	Wild and Scenic River Wilderness Study Area	13,260 3,425
	Rio Grande	Wild and Scenic River	6,375
	Sabinoso	Wilderness Study Area	12,275
	San Pedro Parks	National Forest Wilderness	3,335
	Santa Fe	National Forest	88,515
	Sumner Lake	State Park	410
	Taos	Indian Reservation	8,000
	Wheeler Peak	National Forest Wilderness	345

**TABLE 5.2-6. SPECIAL USE LAND MANAGEMENT AREAS UNDER
CANNON SCHEDULED MOAS AND MTRS
(PAGE 2 OF 2)**

<i>Airspace</i>	<i>Land Use Area</i>	<i>Type</i>	<i>Acreage</i>
IR-111	Carson	National Forest	137,175
	Melrose AFR	Military Reservation	22,000
	Pecos	National Forest Wilderness	93,315
	Sabinoso	Wilderness Study Area	3,745
	Santa Fe	National Forest	192,540
	Sumner Lake	State Park	7,575
	Villanueva	State Park	1,655
IR-113	Capitan Mountains	National Forest Wilderness	12,010
	Cibola	National Forest	29,960
	Lincoln	National Forest	104,610
	Little Black Peak Carrizozo	Wilderness Study Area	21,905
	Melrose AFR	Military Reservation	22,000
	Salinas Pueblo Missions	National Monument	750
	Sumner Lake	State Park	8,430
	Valley of Fires	State Park	550
	White Sands Missile Range	Military Reservation	4,650
VR-100/125	Capitan Mountains	National Forest Wilderness	25,038
	Cibola	National Forest	17,940
	Lincoln	National Forest	109,770
	Salinas Pueblo Missions	National Monument	750
	Sumner Lake	State Park	11,835
VR-108	Chicosa Lake	State Park	470
	Conchas Lake	State Park	1,545
	Kiowa	National Grassland	134,320
VR-114	Conchas Lake	State Park	1,545

Source: Air Force 1995.

LZ, DZ, and water training locations would be subjected to increased noise from C-130, CV-22, other aircraft, or personnel activities. LZ and DZ locations would be identified to avoid, to the extent possible, noise impacts upon local residents. Recreationalists at lake locations may be annoyed by training activities.

Agreements for low-altitude and water activity would be needed with managing agencies. Scheduling the four or five monthly training activities to avoid high-use holiday and other recreation periods could reduce the number of affected persons, but would still have the potential to annoy some lake residents and recreationalists.

5.2.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Thus, no AFSOC training would occur at Melrose AFR and AFSOC aircraft would not avail themselves of the military training airspace at this time. The noise environment for military training noise levels would be lower than that described in Section 5.2.1 after the 27 FW is disestablished.



THE NATIONAL GRASSLANDS ARE A PROTECTED HABITAT IN NORTHERN NEW MEXICO.

5.3 SAFETY

5.3.1 DEFINITION OF RESOURCE

This section addresses flight and explosive safety associated with operations conducted in the airspace managed by Cannon AFB. These operations include activities and training conducted in regional military airspace. Flight safety considers aircraft flight risks and explosive safety discusses the management and use of ordnance or munitions associated with airbase operations and training activities conducted in various elements of training airspace.

5.3.2 EXISTING CONDITIONS

Flight Safety. Air Force flight operations are conducted according to specific procedures contained in various Air Force Instructions (AFIs). Among them the AFI-11 series addresses general flight rules, aircrew training, as well as aircraft specific operational requirements. These instructions establish the framework for safe operation of Air Force aircraft.

It is impossible to predict the precise location of an aircraft accident, should one occur. 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 in the ROI: the immediate surrounding areas have relatively low population densities; pilots 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 or environmental contamination. First responders to a crash may suffer from trauma as a result of crash results. Again, because the extent of these secondary effects is situationally dependent, they are difficult to quantify. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated

areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky areas during the winter. When an aircraft crashes, it may release hydrocarbons. Those petroleum, oils, and lubricants (POLs) not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. For example, the porosity of the surface soils will determine how rapidly contaminants are absorbed, while 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.

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. These mishap rates do not consider combat losses due to enemy action. Class A mishap rates and a discussion of Class A mishaps are presented in Section 3.3.2.2.

Wildlife Strike Hazard. Almost 55 percent of bird-aircraft strikes occur during low-altitude flight training (Air Force Safety Center 2002). Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds 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 20 pounds. 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 are in their highest concentrations one hour before and after sunset. They 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.

Along with waterfowl, raptors, shorebirds, gulls, herons, songbirds, and other birds also pose a hazard. In considering severity, the results of bird-aircraft strikes in restricted areas show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Raptors of greatest concern in the airspace 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. 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).

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 2001, the Air Force Bird-Aircraft Strike Hazard (BASH) Team documented 48,522 bird strikes worldwide. Of these, 20 resulted in Class A mishaps where the aircraft was destroyed. These occurrences constituted approximately 0.04 percent of all reported bird-aircraft strikes (Air Force Safety Center 2002). There would be no significant adverse effect of wildlife strikes on any population of resident or migratory birds.

Explosive Safety. Chaff and defensive flares are managed as ordnance; no other ordnance would be expended within the airspace. Chaff and flares are authorized for use in designated airspace. Use is governed by detailed operating procedures to ensure safety.

Chaff, which is ejected from an aircraft to reflect radar signals, is small fibers of aluminum-coated silica packed into approximately 4-ounce bundles. When ejected, chaff forms a brief electronic

"cloud" that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (Air Force 1997b). During Fiscal Year (FY) 2005, 27 FW aircrews expended 44,728 bundles of chaff. Two 1-inch by 1-inch plastic or nylon pieces and one 1-inch by 1-inch felt piece fall to the ground with each released chaff bundle. Appendix A provides an expanded discussion of chaff.

Defensive training flares consist of small pellets of highly flammable material that burn rapidly at extremely high temperatures. Their purpose 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 flare, essentially a pellet of magnesium, ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds, or approximately 400 feet from its release point (Air Force 1997b). During FY 2005, 27 FW aircrews expended 32,229 flares.

The existing use of flares as defensive countermeasures results in small plastic, nylon, and aluminum-coated mylar pieces falling to the ground. As discussed in Appendix B, Characteristics of Flares, flare residual materials are generally light with a high surface-to-weight ratio. This results in essentially no likelihood of a flare end cap, piston, or wrapper causing injury in the highly unlikely event residual material from a flare struck a person or an animal.

During the scoping and public comment periods, concerns were expressed that a flare has the potential to start a fire if a flare were still burning when it hit the ground. As described in Chapter 2.0, flares burn out in approximately 400 feet. Flare use in MOAs is currently authorized above 2,000 feet AGL under conditions not designated at, or above, high fire risk.

Use of training flares where approved within Cannon AFB-managed airspace would continue to be incorporated by AC/MC-130 and CV-22 aircraft with the following management practices:

- The minimum altitude for flare release in SUA will continue to be 2,000 feet AGL (flares burn out after falling approximately 400 feet).
- When the National Fire Danger Rating System indicates high fire conditions or above, the minimum altitude for flare release would be raised to 5,000 feet AGL.
- Cooperation with local agencies for mutual aid response to fires will continue.

Cannon AFB now has seven mutual aid agreements with nearby fire departments including one recently entered into with the Floyd Fire Department. These measures substantially reduce any risk of a fire from training with defensive flares.

Wake Vortices. During the scoping and public comment periods, participants asked if there would be the potential for structural damage from wake vortices. As a plane flies, the trail of disturbed air that follows the aircraft as it passes through the atmosphere is called a wake that is bounded by circular flow shed from the wing tips, called tip vortices. An aircraft wake is similar in concept to the wake of a boat. As with boats, larger aircraft (boats) which are close to the ground (shore) produce a greater potential for a wake effect on the ground (shoreline). Wake vortices from aircraft in flight descend from their initial altitude with time. For aircraft flying at low levels, this produces the potential for vortices descending close enough to the ground to impact ground structures. Vortex strength decreases with time and the vortices will not descend below a minimum height above the ground, nominally equal to 40 percent of the generating aircraft's wingspan. Many factors contribute the vortex strength and rate of decay. These factors include aircraft weight, airspeed, wingspan, load factor, and atmospheric

turbulence levels. For example, the strength of a vortex increases with wing load factor (the gravity or g number), but the increasing load factor causes a vortex to descend at a higher rate; thereby having a smaller residency time to impact anything on the ground.

Existing F-16 aircraft are small and do not produce wake vortex effects on the ground which could cause damage. Current and projected transient users of Cannon AFB airspace can include larger aircraft. Under normal flight conditions and all but rare atmospheric conditions, wake vortices from transient B-52 or B-1B low altitude flights fail to generate sufficient velocities to damage structure and vehicles or to pose a hazard to people or animals on the surface. Under infrequent circumstances, such as unusual aircraft maneuvers, damage could occur (Jurkovich and Skujins 2006).

There have not been documented reports of wake vortex damage during the infrequent training by larger aircraft in the Cannon AFB-scheduled airspace. Should there be validated damage claims, the Air Force has established procedures for such claims that begin by contacting Cannon AFB Public Affairs Office.

5.3.3 ENVIRONMENTAL CONSEQUENCES

5.3.3.1 PROPOSED TRAINING OF AFSOC ASSETS

Aircraft using the IR and VR routes slated for use under this proposal are subject to potential bird strikes, especially during the peak migratory season from October to mid-December and from mid-January to the beginning of March. In order to avoid potential risks for bird strikes within the airspace, AFSOC mission planners have the ability to access near real-time data to minimize the potential for bird strikes.

The U.S. Avian Hazard Advisory System (AHAS), <http://www.usahas.com>, is a valuable tool in assessing the near real-time potential for bird strike risk for the continental U.S. The associated website provides simple-to-use pages to access bird strike risk for published IR, VR, and Slow Route (SR) routes, Ranges, MOAs, and Military Airfields. AHAS was created to provide Air Force pilots and flight scheduler/planners with a near real-time tool for making informed decisions when selecting flight routes. It was created in an effort to protect human lives and equipment during air operations throughout the continental U.S. It also benefits migrating birds. Utilization of this tool will aid AFSOC mission planners in avoiding routes with severe risk of bird strikes.

Aircraft safety and bird-aircraft strike risks could be increased from existing 27 FW experience due to the proposed lower altitude flights of the AFSOC aircraft. AFSOC training coincides with bird migration altitudes; the after-dark training occurs when some species migrate; and water training, occurs where migratory species congregate. Although the total number of BASH incidents is not expected to be great and would not approach a measurable effect on bird populations, the number is expected to increase from that of 27 FW safety experience.

All safety actions that are in place for existing F-16 training will continue to be in place for C-130, CV-22, and other aircraft training. These actions include provisions for life flight priority use and altitude restrictions on flare use. Aircraft safety within the training airspace could be enhanced by the improved radars and situational awareness provided by redundant flight safety systems or AFSOC aircraft. The C-130 and CV-22 have both a pilot and co-pilot and fly at speeds that support see-and-avoid procedures during daylight (and night) operations.

Chaff and flares would not be used in the Mt. Dora or Bronco MOAs. Chaff and flare use would decrease in the Pecos North, Pecos South, and Taiban MOAs as compared to FY 2005 levels (see Table 2.2-3). No safety consequences from continued chaff and flare use are anticipated.

A public comment on the Draft EIS questioned the potential for damage from wake vortices, especially to windmills under the airspace which provide water to stock. A potentially damaged windmill could stop pumping water and may not be discovered immediately. This could affect range cattle and other animals dependent upon the water source.

A C-130 in level flight at 210 knots, 150,000 pounds of weight, and 250 feet AGL could produce a maximum wake vortex velocity of about 38 miles per hour at about 100 feet AGL within 60 seconds. Windmills are typically capable of handling wind loads substantially in excess of this speed. This indicates that there would be minimal potential impact on ground structures for any C-130s in level flight at or above 250 feet AGL.

A CV-22 at 250 feet AGL, based on its smaller wingspan, could result in wake vortices descending faster and obtaining a lower minimum height above the ground as compared to the C-130. Theoretically, CV-22 vortices could reach their minimum height of approximately 20 feet AGL within 45 seconds. However, the unique configuration of the CV-22, with the propellers located at the wing tips, will affect the wake vortices. The prop wash, which rotates in a direction counter to the wake vortex circulation, coupled with the turboprop engine exhaust, will serve to make the wake vortices weaker and decay faster than those shed by a "clean" wing. The CV-22 vortex breakdown is projected to occur after 15 seconds and is projected to dissipate at about 175 feet AGL. This indicates that there would be little or no potential impact on ground structures for any CV-22 in level flight at or above 250 feet AGL.

The C-130 and the CV-22 could be as low as 100 feet AGL for short periods and could pull up or maneuver with the potential of creating a 1.1g turn for the C-130 or a 1.25g turn for the CV-22. An analysis of a C-130 1.1g case from 100 feet AGL produces maximum predicted vortices of 51 miles per hour (mph) at 50 feet AGL. An analysis of a CV-22 1.25g case from 100 feet AGL could theoretically produce a vortex maximum velocity on the order of 80 mph at approximately 24 feet AGL just prior to breakup. As noted, this is a very conservative CV-22 maximum velocity. This unlikely, but possible, velocity is expected to be reduced by the propeller wash and turboprop exhaust in the wing tip region, both of which counter the wake vortex strength, and thus velocity. Neither the C-130 nor the CV-22 is expected to fly for long periods at 100 feet AGL. In most cases, this would be expected to occur when the aircraft crosses a higher topographic feature. Stock windmills are typically located in lower topographic areas where the groundwater is closer to the surface.

There is little or no potential for structural damage to windmills from level flight of either aircraft, and there is very low potential for a maneuvering aircraft at 100 feet to create the wind vortex level at exactly the point where a windmill is located. Continued and projected transient users of Cannon AFB scheduled airspace also include larger aircraft. Under normal flight conditions and all but rare atmospheric conditions, wake vortices from low altitude flights fail to generate sufficient velocities to damage structure and vehicles or to pose a hazard to people or animals on the surface. Under infrequent circumstances, such as unusual aircraft maneuvers, damage could occur (Jurkovich and Skujins 2007). The Air Force has established procedures for damage claims that begin by contacting Cannon AFB Public Affairs Office.

5.3.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Cannon AFB-based AFSOC aircraft would therefore not avail themselves of the military training airspace. Safety for military training would be better than that described in Section 5.2.1 due to the disestablishment of the 27 FW.

5.4 AIR QUALITY

This section discusses air quality considerations and conditions in the areas encompassed by the Mt. Dora and Pecos MOAs (the Taiban MOA was included in the discussion of the Melrose AFR) and associated MTRs within eastern New Mexico scheduled by Cannon AFB. The Mt. Dora and Pecos MOAs include (1) all or portions of Chaves, Lincoln, De Baca, Guadalupe, Mora, Harding, Union, and Colfax counties in the State of New Mexico, and (2) small portions of Las Animas County in Colorado, and Dallam County in Texas. While portions of the project MOAs and MTRs cross state lines, almost all of these areas and project air quality impacts would occur within the State of New Mexico. While the Bronco MOA overlies counties in Texas, no portion of the MOA extends below 3,000 feet AGL. Emissions released above 3,000 feet are effectively blocked from mixing with the near-surface airshed because of temperature inversions. Therefore, this section only considers conditions within New Mexico.

5.4.1 DEFINITION OF RESOURCE

The definition of the MOAs and associated MTR air quality regulations are identical to those presented in Section 3.4.1.

5.4.2 EXISTING CONDITIONS

Climate. The general climate for Eastern New Mexico is arid or semi-arid, with light precipitation, abundant sunshine, low relative humidity, and relatively large annual and diurnal temperature ranges (Western Regional Climate Center [WRCC] 2006a).

Winds in the region tend to be moderate in strength and persistent. There is a peak in wind speeds in the spring (WRCC 2006b). Winds are predominantly from the west in the fall through spring, and then switch to a more southerly direction during the summer and early fall months (WRCC 2006c). Wind speeds and direction can vary greatly in different areas within the region due to the local topography. The presence of air mass frontal passages and severe storms can also have a drastic effect on wind speeds and directions over short periods of time.

Temperatures in the region are greatly dependent upon several factors, with perhaps the greatest being elevation. Lower-elevation areas in the south have annual average temperatures in the lower 60s (degrees Fahrenheit [°F]), while the higher mountains and valleys in the north can have annual average temperatures closer to 40°F. These differences display the extremes, but with the exception of higher elevation sites, the region generally experiences cool winters and much warmer summers. Average lows in the winter are in the 20s (°F) and highs are in the 50s (°F). Average lows in the summer are in the lower 60s (°F) and highs are in the lower 90s (°F). Since skies are generally clear and humidities low, diurnal temperature ranges can often be rather large (WRCC 2006a).

Precipitation is generally light and infrequent in the winter months, and usually falls from weather fronts originating in the Pacific Ocean. The bulk of the precipitation is usually sapped from these storms during their trek over the states to the west of New Mexico, leading to only sporadic light precipitation by the time the front reaches the region. The summer months tend to be the greatest contributor to annual precipitation totals. During that time, moisture from the

Gulf of Mexico is often drawn up into the region forming scattered but strong thunderstorms. Any one location may experience the effects of these storms quite infrequently, but due to their strength, heavy amounts of rain may fall during that brief time (WRCC 2006a).

Snowfall is not uncommon in the region during the winter months. In fact, the bulk of winter precipitation in the mountainous areas comes in the form of snow. The lower elevation areas may occasionally experience light snowfall as well. Annual average extremes range from 3 inches in the southern and eastern desert areas to over 100 inches in the northern mountains (WRCC 2006a).

Regional Air Quality. Federal regulations at 40 CFR 81 delineate certain air quality control regions (AQCR) which were originally based upon population and topographic criteria closely approximating each air basin. The potential influence of emissions on regional air quality would typically be confined to the air basin in which the emissions occur. Due to the large area of activity, the ROI for this action would include five different AQCRs: (1) Pecos-Permian Basin Intrastate AQCR (AQCR 155), (2) El Paso-Las Cruces-Alamogordo Interstate AQCR (153), (3) Northeastern Plains Intrastate AQCR (154), (4) Amarillo-Lubbock Intrastate AQCR (211), and (5) San Isabel AQCR.

Attainment Status. All of the areas included in the Mt. Dora and Pecos MOAs and associated MTRs are presently in attainment of all National Ambient Air Quality Standards (NAAQS).

Prevention of Significant Deterioration (PSD) Class I Areas. Mandatory PSD Class I areas for the State of New Mexico are listed under 40 CFR 81.421. The nearest PSD Class I areas are the Salt Creek Wilderness Area, located approximately 10 miles south of the Pecos MOA, and the Pecos Wilderness Area about 30 miles southwest of the Mt. Dora MOA. IR-111 traverses through the Pecos Wilderness Area. Aircraft attached to Cannon AFB flew 22 daytime sorties within IR-111 during the baseline year.

Current Air Emissions. Air emissions that occur within the Mt. Dora and Pecos MOAs and associated MTRs and used by aircraft based at Cannon AFB occur primarily from the combustion of fuel in aircraft engines. Table 5.4-1 summarizes the estimated annual emissions produced within the different airspaces. The aircraft emissions in Table 5.4-1 were calculated by comparing the current baseline sorties with the sorties reported in the 1998 *Environmental Assessment for Proposed Force Structure Change and Foreign Military Sales Actions at Cannon AFB, New Mexico* (Air Force 1998b). The ratio of sorties for each region was then multiplied by the emissions reported in that document to estimate current baseline emissions. Only aircraft emissions that occurred below 3,000 feet AGL are included in this analysis because this is the average height of the surface mixing layer. Any emissions released above this level would not transport downward and affect ground-level air quality conditions.

TABLE 5.4-1. BASELINE EMISSIONS FOR TRAINING AND SPECIAL USE AIRSPACE

AIRSPACE ^{1,2}	ANNUAL EMISSIONS (TONS PER YEAR) ³					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
MOAs						
Mt. Dora	0.15	0.92	15.36	0.46	0.31	0.30
Pecos	0.66	5.74	107.21	3.24	1.25	1.24
MTRs						
IR-107	0.02	0.19	1.30	0.05	0.01	0.01
IR-109	0.13	0.55	12.58	0.33	0.16	0.16
IR-111	0.02	0.08	1.97	0.06	0.02	0.02
IR-113	0.00	0.20	4.40	0.20	0.00	0.00
VR-100/125	0.43	3.15	75.10	2.04	0.84	0.83
VR-108	0.03	0.21	4.55	0.13	0.06	0.06
VR-114	0.12	0.97	26.20	0.72	0.25	0.25

- Notes: 1. Bronco MOA is not included since it does not extend below 3,000 feet AGL.
 2. Taiban MOA was included in discussion of Melrose AFR.
 3. Emissions from aircraft include all activities under 3,000 feet AGL. Emissions were calculated by using the 1998 Environmental Assessment for Proposed Force Structure Change and Foreign Military Sales Actions at Cannon AFB, New Mexico, and multiplying emissions reported in that document by the ratio of current baseline sorties to sorties reported in the Environmental Assessment.

5.4.3 ENVIRONMENTAL CONSEQUENCES

Air pollutant emissions produced from the Proposed Training were quantitatively estimated, then compared to the criteria identified below to determine their significance. Emission sources associated with the Proposed Training would include combustive emissions generated by operation of aircraft assigned to Cannon AFB.

As previously discussed, Section 169A of the Clean Air Act (CAA) provides special protection to air quality within Federal Class I areas. The nearest Class I areas to the project region are the (1) Salt Creek Wilderness Area, located approximately 10 miles south of the Pecos MOA and (2) Pecos Wilderness Area, about 30 miles southwest of the Mt. Dora MOA. However, IR-111 traverses through the Pecos Wilderness Area. The project MOAs are far enough away from Class I areas such that the Proposed Training would produce less than significant air quality impacts to these areas. However, this analysis provides a consideration of the impact of proposed aircraft emissions within IR-111 to air quality within the Pecos Wilderness Area.

5.4.3.1 PROPOSED TRAINING OF AFSOC ASSETS

The Proposed Training would lead to an increase in the number of annual sorties in the Mt. Dora, Pecos, and Bronco MOAs and associated MTRs. Alterations to emissions in the Bronco MOA were not considered because the MOA is entirely above the accepted atmospheric mixing level of 3,000 feet AGL; thus, any emissions generated at this altitude would minimally impact ground level air quality.

Section 4.4.3 establishes a technique for determining changes in emissions due to different aircraft types and numbers of sorties. This same technique also was used to estimate changes in emissions expected in the Mt. Dora and Pecos MOAs and associated MTRs. Factors used to estimate project aircraft emissions were obtained from the *Air Emissions Inventory Guidance*

Document for Mobile Sources at Air Force Installations (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003).

Chaff and flare use in the Pecos MOA are not included in this analysis because the Proposed Training would decrease the use of these materials and their contribution to the overall emissions would be minimal.

Table 5.4-2 summarizes the estimated change in annual aircraft emissions within MOAs and MTRs due to the Proposed Training. These data show that the Proposed Training would increase criteria pollutant emissions from current levels within each airspace. The increase in emissions from the Proposed Training within each MOA and all but three of the MTRs would not exceed any significance threshold. However, emissions within IR-107, IR-109, and IR-111 would exceed the established significance threshold for nitrogen oxides (NO_x) of 100 tons per year (TPY). However, these routes are each several hundred miles in length and aircraft emissions would be dispersed along their entire lengths. It is expected that these NO_x emissions would not increase ambient ground level concentrations of nitrogen dioxide (NO_2) at any location, such that they would contribute to an exceedance of the NAAQS for NO_2 . Thus, the Proposed Training would produce less than significant air quality impacts within and around the MOAs and MTRs utilized by aircraft stationed at Cannon AFB.

TABLE 5.4-2. CHANGE IN EMISSIONS – MOAS AND MTRs – PROPOSED TRAINING

Location	TONS PER YEAR					
	VOC	CO	NO_x	SO_x	PM_{10}	$\text{PM}_{2.5}$
MOAs						
Mt. Dora	6.68	5.22	35.58	5.10	8.10	8.03
Pecos	8.45	6.09	2.76	8.84	9.34	9.26
MTRs						
IR-107	20.39	33.41	111.97	16.54	6.27	6.21
IR-109	20.27	12.24	131.77	13.50	14.75	14.61
IR-111	15.28	8.33	107.12	11.01	9.39	9.31
IR-113	0.00	1.71	16.51	3.26	0.00	0.00
VR-100/125	10.30	8.50	63.24	11.63	11.97	11.86
VR-108	4.60	4.30	44.37	4.89	4.93	4.88
VR-114	2.34	1.95	13.20	3.23	2.89	2.86
Significance Thresholds	100	100	100	100	100	100

The proposed training would increase flights within IR-111 and through the Pecos Wilderness Area Class I area and therefore would impact air quality within this Class I area. This action would increase flights within IR-111 from a current level of 22 to 1,291 sorties per year and 1,077 of the flights would occur at night. Aircraft would normally fly at 250 to 1,000 feet AGL with 30 minute intervals below 250 feet AGL. Air quality impacts of proposed air emission sources to Class I areas generally focus on (1) visibility impairment and (2) ground-level increases in pollutant concentrations.

Criteria used to evaluate air quality impacts in Class I areas generally pertain to stationary emission sources, such as those associated with the New Mexico Air Quality Bureau (NMAQB) Construction and PSD permitting processes (NMAQB Regulations 20 New Mexico Administrative Code [NMAC] 2.72 and 20NMAC2.74). Criteria to evaluate impacts of mobile source emissions to Class I areas are not well defined. Visibility impairment is defined as (1) a reduction in regional visual range and (2) atmospheric discoloration or plume blight. This action would produce less than significant impacts to visibility within the Pecos Wilderness Area because (1) the proposed aircraft emissions would be transient in nature and (2) only 214 flights would occur during daylight hours. Hence, proposed aircraft emissions would be adequately dispersed to the point that they would not substantially impact visibility within the Pecos Wilderness Area.

Approximately 6 percent of the length of IR-111 is within the Pecos Wilderness Area. Review of Table 5.4-2 shows that 6 percent of the annual aircraft emissions estimated for IR-111 and that potentially would occur within the Pecos Wilderness Area include (1) 0.9 tons of volatile organic compound (VOC), (2) 0.5 tons of CO, (3) 6.4 tons of NO_x, (4) 0.7 tons of SO₂, and (5) 0.6 tons of PM₁₀. Since most of these emissions would occur within 1,000 feet AGL, proposed aircraft operations within the Pecos Wilderness Area could appreciably increase ground-level concentrations of these pollutants and therefore could significantly impact air quality within this Class I Area.

Impacts of proposed aircraft emissions to ground-level pollutant concentrations within the Pecos Wilderness Class I Area could be mitigated by flying above 2,000 feet AGL over the Pecos Wilderness Class I Area. Adherence to this mitigation would adequately disperse proposed aircraft emissions and would produce inconsequential ground-level pollutant concentrations within this area. Mitigated project aircraft emissions would produce less than significant air quality impacts within the Pecos Wilderness Class I Area.

5.4.3.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Cannon AFB would become an AFSOC installation but there would be no beddown of AFSOC assets and no Cannon AFB-based AFSOC training would occur within the Mt. Dora, Pecos, and Bronco MOAs and associated MTRs. As a result, the No Action Alternative would produce less than significant air quality impacts within and around these airspaces.

5.5 PHYSICAL RESOURCES

5.5.1 DEFINITION OF RESOURCE

This section discusses physical resources beneath airspace associated with the Proposed Training. Because of the area captured by the ROI, discussion of physical resources takes a more regional perspective. Soils and water resource discussion on the properties that would be most likely affected by activities planned under the Proposed Training.

5.5.2 EXISTING CONDITIONS

The semi-arid climate of the region contributes to the development of thin topsoil with low organic content, underlain at relatively shallow depths by a leached clay-carbonate hardpan or "caliche." Caliche forms as calcium carbonate. It is leached from overlying sediments and precipitates in the pore spaces of the host sediments. Tightly cemented layers of caliche are present in several horizons in the natural soils and the Ogallala aquifer below (Air Force 1997a).

Surficial soils underlying the airspace can be generally characterized as sandy to silty loams, with considerable localized variation. These soils in the region can be generally characterized as slightly alkaline to alkaline (pH of 7.4 to 8.4), though soil variations under the airspace also exhibit more neutral soil chemistry (pH of 6.6 to 7.5). Soil in the region is moderately to well drained (U.S. Department of Agriculture [USDA] Soil Conservation Service [SCS] 1988).

Much of Eastern New Mexico is underlain by approximately 200 to 400 feet of unconsolidated sediments deposited over sandstone known as the Triassic redbeds. This stratum forms the base of the Ogallala aquifer, which is developed within the overlying sediments. The Ogallala Formation sediments were laid down as alluvial deposits composed of unconsolidated poorly sorted gravel, sand, silts, and clays (Air Force 1997a)



ESCARPMENTS ALONG THE CANADIAN RIVER WATERSHED IN NORTHEASTERN NEW MEXICO UNDERLIE MTRS INCLUDING IR-107 AND VR-108.

Regional drainage consists of poorly developed ephemeral streams due to the low annual precipitation and high evaporation rates (Air Force 2003). The most prominent surface water features in the ROI are the Pecos River, and Alamosa, Taiban, and Yeso creeks, all within the Upper Pecos watershed. The Pecos River is designated as a warmwater or coldwater fishery (depending on the reach) by the New Mexico Environment Department and is also used to supply water for irrigation, municipal, and industrial uses. The river flows are governed by the Pecos River Compact, developed in 1948, which requires New Mexico to deliver water to Texas. Most of the surface water bodies in the ROI are intermittent streams and arroyos.

The Permian Basin is a geologic syncline with thick layers of sedimentary rock, mainly Permian limestone, from which oil and gas has been produced since the 1920s. The Permian Basin and oil and gas development occurs at the edges of the ROI in Roosevelt and Chaves counties (Scholle 2000). Based on well data from 2003, almost 200 oil wells and 1,800 gas wells within the ROI occur in Chaves County, with approximately 25 percent located under the Pecos Low MOA (New Mexico Oil Conservation Division 2003). These wells do not contain structures that are high off the ground. There are no active wells under the existing airspace in the rest of the ROI.

There are four Major Land Resource Areas (MLRAs) and eight Sub-resource Areas within the ROI. Unless otherwise listed, the information used to describe each of these areas is drawn from *Major Land Resource Areas and Subresource Areas, New Mexico* (USDA SCS 1980) and *Land Resource Regions and Major Land Resource Areas of the United States* (USDA SCS 1981).

The Southern Desertic Basins, Plains and Mountains MLRA covers much of the southernmost area of New Mexico from the Arizona border south of the Gila Mountains to the southeast corner of the state. In general, the topography can be described as having broad desert basins and valleys bordered by gently to strongly sloping fans and terraces. Low precipitation and scarce surface water bodies limit land uses. The soils are predominantly well drained and medium textured. A small portion of Pecos MOA as well as VR-100/125 falls within the Southern Desertic Basins, Plains, and Mountains MLRA.

The Pecos/Canadian Plains and Valleys MLRA falls between the Rocky Mountains on the northwest and the High Plains to the east. In the ROI, it includes some isolated areas of escarpments and mountains (mostly outside the ROI) and the majority of the Western Great

Plains. The main groundwater source, underlying portions of Guadalupe, Quay, and De Baca counties, is the Fort Sumner underground water basin. The Yeso geologic formation, consisting of sandstone, siltstone, and gypsum, is the principal aquifer. Groundwater recharge occurs mainly by infiltration of precipitation. Most of the ROI falls within the Pecos/Canadian Plains and Valleys MLRA.

The Southern High Plains MLRA is located in the eastern portion of New Mexico and into Texas. It is underlain by nearly horizontal sedimentary rocks that have been covered by alluvial and aeolian deposits. Playa lakes are scattered throughout the region. The Ogallala Aquifer is the principal aquifer system in this part of the ROI. It occurs chiefly in the Ogallala Formation, a mixture of clay, silt, sand, and gravel layers, often with thick gravel layers near the bottom and a caprock of caliche at the top, underlain by red beds (sandstones and sandy shales). Bronco MOA and large portions of Mt. Dora MOA fall within the Southern High Plains MLRA.

A small portion of the Southern Rocky Mountains MLRA extends into New Mexico from Colorado in the North. This MLRA is dominated by two north-south trending mountain ranges. The southern limit of one of these ranges, the Sangre de Cristo Mountains, overlaps the periphery of the ROI. Ranges are dissected by numerous steep stream valleys. The headwaters of many of the major rivers of the High Plains are in this MLRA (outside the ROI). Exposed rock is mostly Mesozoic and Paleozoic sedimentary. Alluvial deposits from mountains extend strongly into the adjacent Southern High Plains MLRA. The northwest margin of Mt. Dora MOA, as well as IR-109, intrude the Southern Rocky Mountains MLRA.

The Pecos River, comprising the primary surface water feature in the Upper Pecos watershed, flows southerly under Pecos MOA within the ROI and is the dominant permanent surface water feature under the airspace. Within the Upper Pecos watershed, there are a total of 2,460 river miles. Under the airspace, there are numerous intermittent drainages including streams, draws, and arroyos that drain toward the Pecos River. In total, these perennial drainages account for 242 river miles within the watershed (U.S. Environmental Protection Agency



SOILS UNDER MOST OF THE AIRSPACE ARE SUSCEPTIBLE TO WIND AND WATER EROSION.

[USEPA] 2001). The water quality of the upper Pecos River is characterized by the USEPA as being seriously impaired but with a low vulnerability to future degradation (USEPA 2001). In addition to the traditional surface water resources of the area, there are numerous impoundments and open tanks for stock watering dispersed throughout the project area.

Wetlands within the airspace ROI are summarized in Table 5.5-1. Jurisdictional wetlands comprise less than 1 percent of the ROI and most are within the Pecos River Valley. Wetlands and riparian areas, however, are critically important for many species of animals, particularly migratory birds. Wetlands are discussed in Section 5.6.2 and are subject to federal regulation.

TABLE 5.5-1. WETLANDS WITHIN THE REGION OF INFLUENCE

<i>Wetland Type</i>	<i>Acres</i>
Palustrine Scrub-Shrub	1,990
Palustrine & Riverine Unconsolidated Shore & Bottom	995
Total Wetland Acreage	3,585
Total Land Area	3,225,344
Wetland Percent of Total Land Area	0.11

Source: U.S. Fish and Wildlife Service (USFWS) 1983.

Bitter Lake National Wildlife Refuge (NWR), just south of the ROI along the Pecos River, is an example of the plant and animal diversity that is found in wetland and riparian areas. At least 357 species of birds have been observed on the refuge (Bitter Lake NWR 2004). Approximately 59 mammal species, 50 species of reptiles and amphibians, and 24 fish species have been recorded.

Because of the relative lack of permanent surface water resources underneath much of the airspace, water supplies for irrigation, industrial, and domestic purposes are obtained exclusively from groundwater. The principal regional aquifer for both potable and irrigation water is the lower portion of the Ogallala aquifer (Air Force 1997a). The thickness of the aquifer ranges from zero, where the Ogallala Formation wedges out against older rocks, to as much as 150 feet in parts of Curry County. The groundwater flows generally in an east-to-southeast direction and the slope of the water table is a relatively flat 7 to 15 feet per mile. The upper 50 feet of sediments are composed of silty sand with zones cemented by caliche. These caliche zones lower the permeability and amount of infiltration of surface water through the near-surface sediments (Air Force 1995).

Additional project elements associated with airspace under the Proposed Training include water training sites to be established at suitable lentic features within two hours driving distance from Cannon AFB. These areas of interest, selection criteria, and their relationship to AFSOC training are discussed in Section 2.3.4. Areas under consideration include Conchas Lake, Santa Rosa Lake, Sumner Lake, and Ute Lake.

Conchas Lake, a reservoir located at the confluence of the Canadian and Conchas Rivers, was formed through the construction of an earthen and concrete dam 235 feet high and 1,250 feet long. At capacity, the dam impounds a 25-mile long narrow reservoir with a surface area of 9,600 acres. The shoreline is highly irregular with numerous curves and coves. Water surface elevation is 4,200 feet. Exposed rock and underlying bedrock are composed of a group of sedimentary elements of Upper Triassic age. Channel deposits are composed of Pleistocene glacial wash-out material from the Sangre de Cristo Mountains in Las Animas County, Colorado. Lakeshores vary from steep, rocky and canyon like to level and sandy.

Santa Rosa Lake lies in the Pecos River Valley in a region of artesian-spring lakes and pools. Santa Rosa Lake, in contrast, is a reservoir formed through the damming of the Pecos River seven miles north of the city of Santa Rosa. The dam is a rock and concrete structure 212 feet high and 1,950 feet long. At capacity, the dam impounds a 4-mile-long by 3-mile-wide reservoir with a surface area of 3,800 acres. Several small islands disrupt the lake surface. Regional irrigation demands result in highly variable water levels over the course of the watering season; Santa Rosa Lake is described as having no permanent pool. Exposed rock is of Triassic age and

similar to that found at Conchas Lake. Surface sands, silts and clays are Pecos River alluvium and presumed to have been deposited during the past two million years.

Sumner Lake was formed through the construction of Alamogordo Dam. The dam is an earthen (soil and rock) structure with a height of 134 feet at a length of 3,084 feet. At capacity, the reservoir has a surface area of 4,500 acres at an elevation of 4,300 feet. As with Santa Rosa Lake, Sumner Lake lies within the Pecos River Valley. As well as Triassic sandstones, siltstones, and mudstones, some Permian material is exposed in bedrock at the site. Surface sediments are similar to those found at Santa Rosa Lake and Typical of the upper Pecos River Valley.

Ute Lake is the eastern most of the water training areas of interest. It is a long, narrow, somewhat sinuous reservoir formed through the damming of the Canadian River near the town of Logan, New Mexico. Ute dam is an earth-filled concrete structure with a height of 148 feet and a length of 2,050 feet. At capacity, the dam creates a reservoir with a surface area of 8,200 acres at an elevation of 3,900 feet. Surface geology is similar to that described for Conchas Lake.

5.5.3 ENVIRONMENTAL CONSEQUENCES

5.5.3.1 PROPOSED TRAINING OF AFSOC ASSETS

Impacts to physical resources usually include actions that could disturb the earth. LZ and DZ construction would occur to permitted or leased land in accordance with the best management practices. Permits would be obtained as described in Section 2.3.4.

Potential impacts to physical resources also include actions that could affect water resources. Because land-base ingress and egress during water training would only occur at developed sites such as established boat ramps or other recreation access, no increased erosion, sedimentation, or bank destabilization would occur. Water training at reservoirs and lakes would increase the use of fuel and other materials that could potentially enter the water. Fuel will be in closed containers, and boat or aircraft training would be conducted in such a way to prevent the introduction of foreign materials into the reservoirs.

Under the Proposed Training, both chaff and flare use would decrease under the airspace except under the restricted area (Table 5.5-2). Any potential for fires caused by flares would also decrease. Because any effects from chaff and flares that could occur under the airspace would be less than existing conditions, no impact is expected to physical resources under the Proposed Training. Refer to Section 4.5 for a discussion of chaff and flare impacts on physical resources under the Restricted Airspace.

TABLE 5.5-2. CURRENT AND PROPOSED CHAFF AND FLARE USAGE

<i>Airspace</i>	<i>Current Chaff</i>	<i>Proposed Chaff</i>	<i>Current Flares</i>	<i>Proposed Flares</i>
Mt. Dora MOA	0	0	0	0
Pecos MOA	20,484	10,000	15,100	9,000
Bronco MOA	0	0	0	0
Taiban MOA	20,483	6,000	15,099	5,000
Restricted (R-5104/5105)	3,762	18,000	2,031	10,000
VR-100/125	3,888	2,000	0	0
Totals	48,617	36,000	32,230	24,000

5.5.3.2 NO ACTION ALTERNATIVE

The effects to physical resources under the No Action Alternative would be the same as current conditions. Chaff and flare use in the existing Restricted Areas would continue. No changes to physical resources would occur under this alternative.

5.6 BIOLOGICAL RESOURCES

Biological resources are defined in Section 3.6. This section will consider terrestrial habitats and species with special protection status residing beneath airspace associated with the Proposed Training.

5.6.1 DEFINITION OF RESOURCE

Biological resources within the airspace (MOAs and MTRs) associated with the Proposed Training include those wild species that reside or may occur in some transient fashion and may be affected by project-related mission/training activities. The definition includes both wildlife species and their habitats. Because direct ground disturbance within airspace areas is not part of the Proposed Training, wetlands are not considered within the context of the Clean Water Act (CWA) and associated regulations. The larger surface area encompassed by the airspace ROI lends itself to a landscape level approach to description and subsequent analysis.

5.6.2 EXISTING CONDITIONS

The ROI lies largely within the *Southwest Plateau and Plains Dry Steppe and Shrub Province*, as described by Bailey (1995). The *Chihuahuan Semi-Desert Province* is in the south, while western areas include the *Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow Province*. Within these ecoregions, following terminology in Dick-Peddie (1993), the dominant vegetation community in the ROI is Plains-Mesa Grassland. Landscape level vegetation communities are described below.

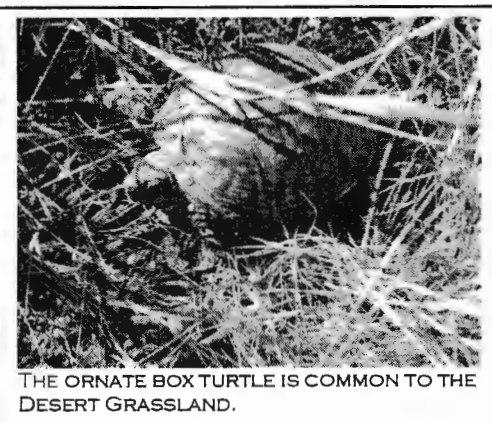
Plains-Mesa Grassland. Plains-Mesa Grasslands are found between 4,000 and 7,500 feet MSL on plains, mesas, and low hills. Three grassland types may be present: tall grass, mixed, and/or short grass prairies. Tall grass prairie is relatively rare and is largely limited to sandhills near Portales in Roosevelt County. Blue grama (*Bouteloua gracilis*) and other grama grasses (*Bouteloua* spp.) dominate mixed and short grass prairie. Other important grasses include buffalograss (*Buchloe dactyloides*), Indian ricegrass (*Achnatherum hymenoides*), dropseed (*Sporobolus* spp.), galleta grass (*Hilaria jamesii*), and lovegrass (*Eragrostis* spp.). Although shrubs have always been part of the Plains-Mesa Grassland, the shrub component has increased in recent decades due to livestock grazing and fire suppression (Bailey 1995). Four-wing saltbush (*Atriplex canescens*), winterfat (*Ceratoides lanata*), rabbitbrush (*Chrysothamnus* spp.), and snakeweed (*Gutierrezia* spp.) are common shrubs. Forbs, such as coneflowers (*Ratibida* spp.) and globemallows (*Sphaeralcea* spp.), and pricklypear cacti (*Opuntia* spp.) are also important in Plains-Mesa Grasslands.

Typical mammals associated with Plains-Mesa Grassland are the pronghorn (*Antilocapra americana*), black-tailed prairie dog (*Cynomys ludovicianus*), swift fox (*Vulpes velox*), and Plains pocket gopher (*Geomys bursarius*) (Brown 1994). Domestic cattle, sheep, and horses are common grazers. Representative birds include the lesser prairie-chicken (*Tympanuchus pallidicinctus*), long-billed curlew (*Numenius americanus*), western burrowing owl (*Athene cunicularia hypugea*), lark bunting (*Calamospiza melanocorys*), and western meadowlark (*Sturnella neglecta*). Additional grassland specialist species found in mixed grasslands include reptiles such as the six-lined

racerunner (*Cnemidophorus sexlineatus*), many-lined skink (*Eumeces multivirgatus*), Great Plains skink (*Eumeces obsoletus*), and Plains blackhead snake (*Tantilla nigriceps*), and mammals such as thirteen-lined ground squirrel (*Spermophilis tridecemlineatus*) and hispid pocket mouse (*Chaetodipus hispidus*) (Parmenter *et al.* 1994).

Desert Grassland. The lower elevation limit of Desert Grassland is around 3,600 feet MSL. This community type has been impacted by grazing and drought. In some areas, the native perennial bunchgrasses have been replaced by exotic annual grasses and low-growing sod grasses, such as Lehmann lovegrass (*Eragrostis lehmanniana*) and curly mesquite grass (*Hilaria belangeri*), respectively. Ecologically important grasses are black grama (*Bouteloua eriopoda*) and tobosa (*Hilaria mutica*). Black grama is found on gravelly upland sites, while tobosa is the dominant grass on heavier soils in lowlands and swales. Other grasses include various grama grasses, red three-awn (*Aristida longiseta*), hairy tridens (*Tridens pilosus*), and buffalograss. Lupines (*Lupinus* spp.), filarees (*Erodium* spp.), and buckwheats (*Eriogonum* spp.) are common forbs. Cacti and succulent plants, such as agaves (*Agave* spp.), sotol (*Dasylirion* spp.), and yucca (*Yucca* spp.) are characteristic of Desert Grasslands. Important shrubs include mesquite (*Prosopis* spp.), all-thorn (*Koeberlinia spinosa*), and catclaw acacia (*Acacia greggii*). Tarbush (*Flourensia cernua*) and creosotebush (*Larrea tridentate*) have increased with disturbance and drought.

Mammals common to the Desert Grassland are the black-tailed jackrabbit (*Lepus californicus*), spotted ground squirrel (*Spermophilis spilosoma*), various species of kangaroo rats (*Dipodomys* spp.) and woodrats (*Neotoma* spp.), badger (*Taxidea taxus*), and coyote (*Canis latrans*). Birds include Swainson's hawk (*Buteo swainsoni*), mourning dove (*Zenaida macroura*), roadrunner (*Geococcyx californicus*), ash-throated flycatcher (*Myiarchus cinerascens*), curve-billed thrasher (*Toxostoma curvirostre*), and Cassin's sparrow (*Aimophila cassinii*). Ornate box turtle (*Terrapene ornate*), western hognose snake (*Heterodon nasicus*), western hooknose snake (*Gyalopion canum*), and desert grassland whiptail (*Cnemidophorus uniparens*) are representative reptiles.



THE ORNATE BOX TURTLE IS COMMON TO THE DESERT GRASSLAND.

Plains-Mesa Sand Scrub. Although historically this community type was restricted to the extreme southern parts of New Mexico and along the Rio Grande River, it has expanded and encroached into Desert Grassland. Its typical elevation range is 2,300 to 5,200 feet MSL. Creosotebush, tarbush, and whitethorn (*Acacia neovernicosa*) are the dominant features of the Chihuahuan Desert. Numerous species of yuccas, agaves, sotols, and nolas (*Nolina* spp.) are found in succulent-scrub upland areas, as are woody shrubs and low-growing cacti. Succulent-scrub uplands grade into Desert Grassland where grassland species, such as grama grasses, can be found. Lower elevation playas may also support Desert Grassland species.

The Plains-Mesa Sand Scrub is perhaps best known for its diversity and abundance of reptiles. Lizards include the Texas banded gecko (*Coleonyx brevis*), greater earless lizard (*Cophosaurus texanus*), and several species of spiny lizards (*Sceloporus* spp.) and whiptails (*Cnemidophorus* spp.). Snakes include the western hooknose snake, whipsnakes (*Masticophis* spp.), and rattlesnakes (*Crotalus* spp.). Typical mammals found in Plains-Mesa Sand Scrub are the desert pocket gopher (*Geomys arenarius*), southern grasshopper mouse (*Onychomys torridus*), Texas antelope squirrel (*Ammospermophilus interpres*), and desert pocket mouse (*Perognathus penicillatus*). Scaled quail

(*Callipepla squamata*), white-necked raven (*Corvus cryptoleucus*), cactus wren (*Campylorhynchus brunneicapillus*), and black-throated sparrow (*Amphispiza bilineata*) are representative birds.

Juniper Savanna. This community type is characterized by pinyon pine (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*), together commonly called pinyon-juniper woodland. This woodland is found between 4,900 and 7,500 feet MSL, particularly on rocky mesas, plateaus, slopes, and ridges. Understory vegetation includes grama grasses, galleta grass, Indian ricegrass, buckwheats, and lupines. Woody shrubs include threadleaf groundsel (*Senecio longilobus*), snakeweed, fourwing saltbush, and cliffrose (*Cowania mexicana*). Several species of hedgehog cacti (*Echinocereus* spp.), pricklypears, and chollas (*Opuntia* spp.) are also present.

Pinyon-juniper specialist wildlife species are the pinyon mouse (*Peromyscus truei*), pinyon jay (*Gymnorhinus cyanocephalus*), gray flycatcher (*Empidonax wrightii*), and gray vireo (*Vireo vicinior*). Pinyon-juniper woodlands are also important for wintering elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*) (Brown 1994).

Although they comprise less than 1 percent of the airspace ROI, jurisdictional wetlands present a greater diversity and importance under the airspace than they do on Cannon AFB or Melrose AFR. Most are within the Pecos River Valley. In arid settings, as in other landscapes, wetlands and riparian areas are critically important for many species of animals, particularly migratory birds. Typical wetland plants include cattail (*Typha latifolia*), bulrush (*Scirpus acutus*), rushes (*Juncus* spp.) and sedges (*Carex* spp.), often interspersed with willows (*Salix* spp.). Native riparian areas are also imperiled due to increased water demands and invasion by the exotic shrubs saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*).

Plains cottonwood (*Populus deltoides*), peachleaf willow (*Salix amygdaloides*), and narrowleaf cottonwood (*Populus angustifolia*) dominate the riparian community along the larger river systems, such as the Pecos River. Riparian scrublands, composed of several willow species, seepwillow (*Baccharis salicifolia*) and saltcedar, are found along floodplains and streams throughout. At the higher elevations, riparian communities of streams and canyons can be characterized by narrowleaf cottonwood, maple (*Acer* spp.), box elder (*Acer negundo*), alders (*Alnus* spp.), willows, blue elderberry (*Sambucus glauca*), and red-osier dogwood (*Cornus sericea*).

Bitter Lake NWR, along the Pecos River, provides an example of the plant and animal diversity typical of wetland and riparian areas in Eastern New Mexico. At least 357 species of birds have been observed on the refuge (Bitter Lake NWR 2004). Approximately 59 mammal species, 50 species of reptiles and amphibians, and 24 fish species have been recorded.

The occurrence of listed, proposed, or designated candidates for federal protection as threatened or endangered species identified for the counties falling under MOAs and MTRs identified for use by the proposed project is summarized in Table 5.6-1. State status of these species is also given. Note that this list is based on county by county information. If any part of a county lies under an airspace element that would be used by the project, species in the county are included in the table. Therefore, it is likely that some of the species listed in Table 5.6-1 may not occur within or near the airspace described in the Proposed Training.



WETLANDS, INCLUDING THE FT. SUMNER LAKE PICTURED HERE, ARE CRITICALLY IMPORTANT FOR MANY SPECIES.

**ALLY LISTED, PROPOSED, OR DESIGNATED CANDIDATE ENDANGERED OR THREATENED SPECIES
ED FOR COUNTIES UNDER AIRSPACE IDENTIFIED FOR PROPOSED AFSOC TRAINING
(PAGE 1 OF 5)**

COUNTY OF OCCURRENCE BY STATE ¹			STATUS (FEDERAL AND STATE) ²				General Habitat Associations	
Texas	Colorado	Oklahoma	Fed	CO	NM	OK	TX	
Dawson, Oldham	Las Animas	Cimarron	E	E	E		E	Nest on riverine sandbars or open sandy or gravel coastal beaches. May nest on dredge material. Long distance migrant. Breeds at Bitter Lake NWR along the Pecos River north of Roswell, outside the project area. Not expected to regularly occur within the project area.
Andrews, Bailey, Cochran, Dallum, Dawson, Deaf Smith, Gaines, Hartley, Hockley, Lamb, Oldham, Parmer, Terry, Yoakum			E		E		E	May be found in association with marshes, prairie potholes, salt playas (e.g., Salt Plains NWR, near Enid OK, east of the project region). May forage near agricultural fields. Although it is listed for many counties in the project region, it is very unlikely to occur here except as a possible migrant ("accidental"). The flyway lies to the east of the project region. The experimental population once established in NM has died out and there are no plans to replace it. In its biennial status review, NMDGF (2006) states: "With the demise of the last survivor [in 2002] of the discontinued Rocky Mountain experimental flock, and the continued absence of proof of natural occurrence of the species in the state, NMDGF should consider whether the species should be removed from New Mexico's list of threatened and endangered species.

**ALLY LISTED, PROPOSED, OR DESIGNATED CANDIDATE ENDANGERED OR THREATENED SPECIES
ED FOR COUNTIES UNDER AIRSPACE IDENTIFIED FOR PROPOSED AFSOC TRAINING
(PAGE 2 OF 5)**

COUNTY OF OCCURRENCE BY STATE ¹			STATUS (FEDERAL AND STATE) ²				General Habitat Associations	
Texas	Colorado	Oklahoma	Fed	CO	NM	OK	TX	
								Texas Department of Parks and Wildlife lists it as a "possible migrant" in the panhandle region of Texas, although it is listed for most of the Texas Counties along the border with New Mexico. The migratory pathway of the main existing population crosses Oklahoma and Texas well to the east of the project area.
	Conejos, Costilla		E	E	E			Found in dense groves of willows, arrowweed, buttonbush, tamarisk, Russian olive, and some other riparian vegetation, often with a scattered overstory of cottonwood. Breeds in riparian areas. The listed western subspecies occurs in the project area only along the Rio Grande River. The other counties listed are occupied by non-listed subspecies.
			E		E			Associated with yucca grasslands and adjacent shrubby habitats. Very few documented sightings within the project area in past two decades. Populations are resident in West Texas and northern Chihuahua, Mexico. Establishment of a non-essential experimental population is proposed by USFWS for New Mexico and Arizona.
	Las Animas		T	T	E			Occurs on sandflats and bare shorelines along rivers and lakes. Very rare migrant in New Mexico with 7 sightings. One breeding record in eastern Colorado outside project area (Prewitt Reservoir).

**ALLY LISTED, PROPOSED, OR DESIGNATED CANDIDATE ENDANGERED OR THREATENED SPECIES
ED FOR COUNTIES UNDER AIRSPACE IDENTIFIED FOR PROPOSED AFSOC TRAINING
(PAGE 3 OF 5)**

COUNTY OF OCCURRENCE BY STATE ¹			STATUS (FEDERAL AND STATE) ²				General Habitat Associations	
<i>Texas</i>	<i>Colorado</i>	<i>Oklahoma</i>	<i>Fed</i>	<i>CO</i>	<i>NM</i>	<i>OK</i>	<i>TX</i>	
	Conejos, Costilla, Las Animas		T	E				Associated with mature sub-alpine coniferous forest. Require expansive stands. Adverse to crossing open areas and low density stands. Unlikely to be in project area, although a reintroduction attempt is planned in southern Colorado.
Andrews, Bailey, Cochran, Dallum, Dawson, Deaf, smith, Gaines, Hartley, Hockley, Lamb, Oldham, Parmer, Terry, Yoakum	Conejos, Costilla, Las Animas	Cimarron	T	T	T		T	Breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, that reflect the general availability of primary food sources including fish, waterfowl, and seabirds. In the project region, most birds are wintering or migrating. Breeding is extremely localized at three locations in Colfax County and a no longer occupied site in Sierra County (along Rio Grande). Sumner Lake, a reservoir on the Pecos River, is identified as a key habitat for wintering bald eagles (NMDGF 2006b) as is the lower Canadian River.
	Conejos, Costilla, Las Animas		T					Favors old growth mixed-conifer forests. Occupied Critical Habitat exists in the western part of the project area under project MTRs in the Sacramento and Sangre de Cristo mountains.

ALLY LISTED, PROPOSED, OR DESIGNATED CANDIDATE ENDANGERED OR THREATENED SPECIES
ED FOR COUNTIES UNDER AIRSPACE IDENTIFIED FOR PROPOSED AFSOC TRAINING
(PAGE 4 OF 5)

COUNTY OF OCCURRENCE BY STATE ¹			STATUS (FEDERAL AND STATE) ²				General Habitat Associations	
Texas	Colorado	Oklahoma	Fed	CO	NM	OK	TX	
Andrews, Gaines			C		E			In New Mexico, endemic to small areas of shinnery oak habitat. Prefer active and semi-stabilized sand dunes with mammal burrows and some litter. Associated with scattered stands of Harvard oak and sandsage; tends to occur in greatest abundance in areas where <i>Uta stansburiana</i> is scarce. Present under project airspace. Not expected to be affected by overflight.
Andrews, Bailey, Cochran, Dallum, Dawson, Deaf Smith, Gaines, Hartley, Hockley, Lamb, Oldham, Parmer, Terry, Yoakum			C					Mixed grass-dwarf shrub communities that occur on sandy soils; principally the sandsage and bluestem. Year-round residents where they occur. Present under the airspace in both New Mexico and Texas. New Mexico has state-owned Lesser Prairie-Chicken conservation areas under the Pecos MOA.
	Conejos, Costilla		C					Open woodlands with dense undergrowth, overgrown orchards and pastures, moist thickets, and willow groves along stream banks are the preferred habitat. The western yellow-billed cuckoo, which is the subspecies under review for listing, is found west of the project area and does not occur within it. The counties listed include observations for other subspecies of yellow-billed cuckoo.

**ALLY LISTED, PROPOSED, OR DESIGNATED CANDIDATE ENDANGERED OR THREATENED SPECIES
ED FOR COUNTIES UNDER AIRSPACE IDENTIFIED FOR PROPOSED AFSOC TRAINING
(PAGE 5 OF 5)**

COUNTY OF OCCURRENCE BY STATE ¹			STATUS (FEDERAL AND STATE) ²				General Habitat Associations	
<i>Texas</i>	<i>Colorado</i>	<i>Oklahoma</i>	<i>Fed</i>	<i>CO</i>	<i>NM</i>	<i>OK</i>	<i>TX</i>	
			P		T			Occurs in a variety of permanent aquatic habitats including montane springs, streams, ponds, lakes, marshes, stock ponds, and plunge pools of canyon streams. Highly aquatic, seldom strays from water source. In drainages west of Continental Divide only. Not present under project airspace.

urrence determined through review of county lists provided on USFWS website (USFWS 2006)

and State E = Endangered, T= Threatened, C = Candidate, P = Proposed

Heritage Program 2006, NMDGF 2006b, Oklahoma Natural Heritage Program 2003, Texas Parks and Wildlife Department 2006,

The burrowing owl and gray vireo are under study by DoD as species of concern. Neither species is currently listed, proposed, or designated as a candidate species for listing under the ESA. The burrowing owl may be locally abundant in open habitats within the ROI and often thrives in loose soils associated with certain types of ground disturbing activities. The gray vireo is a patchily distributed songbird in arid shrublands and may occur beneath western portions of training airspace associated with the Proposed Action.

5.6.3 ENVIRONMENTAL CONSEQUENCES

This section addresses the consequences of training in the Special Use Airspace associated with Cannon AFB outside of Cannon AFB or Restricted Airspace associated with Melrose AFB. These airspace elements include the MOAs and MTRs. MTRs, which include the IRs and VRs, are shown in Figure 2.2-4. Activities in the airspace that could affect biota include noise and visual effects from aircraft overflight (especially low-level flights between 100 and 500 feet AGL) and vertical takeoffs and landings; use of chaff and flares, bird-aircraft strikes, and activities of on-ground (or in-water) personnel supporting air drops on land or in water. Although the airspace that would be used by AFSOC is already established and has been in use by aircraft from Cannon AFB and elsewhere, there would be changes in the timing of the use and the type of aircraft involved. The majority of AFSOC training in the airspace would take place during the hours of darkness. Rather than F-16s and other jet aircraft, the AFSOC training would involve fixed-wing, turboprop, four-engine C-130s, twin-engine tilt rotor CV-22s, and rotary-wing (UH-1) aircraft. There would continue to be use of the MOAs and MTRs by NMANG and transient jet aircraft from bases other than Cannon AFB.

The methodology for evaluating potential impacts and definition of impact significance to biological resources are discussed in Section 3.6.3. The Air Force has contacted the U.S. Fish and Wildlife Service (USFWS) with respect to threatened, endangered, and proposed species under the airspace proposed for training use.

Specific issues and concerns identified for biological resources are related to the potential effects of (1) low-altitude overflights in existing airspace, (2) chaff and flare use, and (3) water training. In the following discussion, published literature is reviewed on the potential impacts of aircraft noise and chaff and flares on wildlife and livestock. For most wild species in the ROI, no specific studies on their response to aircraft noise are available. A discussion of general patterns of animal response to noise and published studies on effects of aircraft noise on wild and domestic animals is included in this section.

5.6.3.1 PROPOSED TRAINING OF AFSOC ASSETS

AIRCRAFT OVERFLIGHTS AND NOISE

Potential general issues related to noise effects on wildlife may include the following:

- Startle response injury due to trampling or uncontrolled running or flight.
- Increased expenditure of energy, particularly during critical periods.
- Decreased time spent on life functions (e.g., seeking food or mates).
- Temporary masking of auditory signals from other animals of the same species, predators, or prey (e.g., noise could prevent an animal from hearing the approach of a predator).

- Damage to eggs or nestlings if a bird is startled from its nest.
- Exposure of eggs or young in nest if a parent flees.
- Increased risk of predation when startled animals flee from nests, roosts, or other protective cover.
- Site abandonment.

The following section provides an overview of published literature regarding potential impacts to biological resources. The review of the noise effects literature shows that the most documented reaction of animals newly or infrequently exposed to aircraft noise is the "startle effect." Although an observer's interpretation of the startle effect is behavioral (e.g., the animal runs in response to the sound or flinches and remains in place), it does have a physiological basis. The startle effect is a reflex; it is an autonomic reaction to loud, sudden noise (Westman and Walters 1981, Harrington and Veitch 1991). Increased heart rate and muscle flexion are the typical physiological responses.

The literature indicates that the type of noise that can stimulate the startle reflex is highly variable among animal species (Manci *et al.* 1988). In general, studies have indicated that close, loud, and sudden noises that are combined with a visual stimulus produce the most intense reactions. Rotary-wing aircraft such as helicopters generally induce the startle effect more frequently than fixed wing aircraft (Gladwin *et al.* 1988; Ward *et al.* 1999). Although little is known about the effects of CV-22 operations on wildlife species, this aircraft, during take-offs, landings, and nacelle rotation can be presumed to be similar to a helicopter. Animals can habituate to fixed wing aircraft noise as demonstrated under controlled conditions (Conomy *et al.* 1998; Krausman *et al.* 1998) and by observations reported by biologists working in parks and wildlife refuges (Gladwin *et al.* 1988). However, species differ in their ability to habituate to aircraft noise.

Research on the effects of aircraft noise on wildlife has largely focused on behavioral effects. Most studies of physical effects (e.g., heart rate, blood chemistry) have been restricted to captive or semi-captive animals. Furthermore, researchers have concentrated on the larger and more easily studied species, such as elk and raptors. Some species groups have been studied only rarely (e.g., reptiles and amphibians, neotropical migrant songbirds). McClenaghan and Bowles (1995) emphasized the research difficulty in distinguishing potential long-term effects on free-ranging wild populations due to aircraft noise compared to other environmental factors.

Several studies have investigated aircraft noise effects on domestic animals. Reviews of available information are found in Manci *et al.* (1988), United States Forest Service (U.S. Forest Service 1992), and in Air Force (Air Force 2001f).

Wild Ungulates and Game Species. Wild ungulates appear to vary in sensitivity to aircraft noise. Responses reported in the literature varied from no effect and habituation to panic reactions followed by stampeding (Manci *et al.* 1988, Weisenberger *et al.* 1996). Luz and Smith (1976) observed that pronghorn antelope did not run until a helicopter was 150 feet AGL. Preliminary results by Bayless *et al.* (2004) have shown flight responses followed by habituation of pronghorn to Blackhawk or Apache helicopter overflight (used during daytime and nighttime hours, respectively) when the flight pattern is a racetrack, but a repeated flight response with no habituation to a helicopter hovering in one place at the same distance. Pronghorn can be active during both daylight and nighttime hours. Greatest movement activity of pronghorn at a northern Arizona study location, however, took place during twilight hours. Studies on

pronghorn response to overflight by jet aircraft and helicopters have suggested rapid habituation to overflight after initial responses, which include running for short distances (Workman *et al.* 1992, Bayless *et al.* 2004). In the Bayless *et al.* (2004) study, which included daytime and nighttime exposures to nearby helicopter activity, movements in response to overflight during nighttime hours were less than movements in response to overflight during daylight.

Stephenson *et al.* (1996) found that mule deer had larger home ranges in areas with ground-based military training than the control group of deer (i.e., no ground-based military training). However, they were unable to distinguish potential effects from military aircraft. Reactions of captive elk (*Cervus elaphus*), pronghorn antelope, and bighorn sheep (*Ovis canadensis*) to the impulse noise of sonic booms decreased with exposure (Workman *et al.* 1992), suggesting habituation. For pronghorn, initial responses were an increased heart rate that returned to normal within 1½ minutes, running for short distances, and increased alertness. By the third exposure to a sonic boom, the animals' heart rate response had decreased by half and they did not run. Krausman *et al.* (1998) studied the response of wild bighorn sheep in a 320 hectare (1.2 square mile) enclosure to frequent F-16 overflight at 120 meters AGL. Heart rate increased above preflight level during 7 percent of the overflights but returned to normal within 120 seconds. No behavioral response by the bighorn sheep was observed during the overflights. Aircraft noise has the potential to be most detrimental during periods of stress, especially winter, gestation, and calving (DeForge 1981). However, wildlife management agencies regularly use helicopters and fixed-wing aircraft for radio tracking and surveying wild ungulate populations (e.g., Krausman and Hervet 1983).

Raptors. Most studies have found few negative effects of aircraft noise on raptorial birds. Ellis *et al.* (1991) examined behavioral and reproductive responses of several raptor species to low-level flights and sonic booms. No incidents of reproductive failure were observed and site re-occupancy rates were high (95 percent) the following year. Several researchers found that ground-based activities, such as operating chainsaws or an intruding human, were more disturbing than aircraft (White and Thurow 1985, Grubb and King 1991, Delaney *et al.* 1997). Red-tailed hawks (*Buteo jamaicensis*) and osprey (*Pandion haliaetus*) appeared to readily habituate to regular aircraft overflights (Andersen *et al.* 1989, Trimper *et al.* 1998). Mexican spotted owls did not flush from a nest or perch unless a helicopter was as close as 330 feet (Delaney *et al.* 1997). Johnson and Reynolds (2002) reported on the response of Mexican spotted owls to low altitude (1,400 feet AGL) jet overflights of owl territories in narrow canyons in Colorado. Behaviors ranged from no response to sudden turning of the head. These behaviors did not exceed those observed before and after each fly-by. Nest attendance, time-activity budgets, and provisioning rates of nesting peregrine falcons (*Falco peregrinus*) in Alaska were found not to be significantly affected by jet aircraft overflights (Palmer *et al.* 2003). On the other hand, Andersen *et al.* (1990) observed a shift in home ranges of four raptor species away from new military helicopter activity, which supports other reports that wild species are more sensitive to rotary-wing aircraft than fixed-wing aircraft. There is a paucity of published studies of avian response to overflight during nighttime hours, at least partially the result of the logistical difficulties of conducting studies during darkness (Larkin nd). However, based on observations by biologists that a wide range of avian species allow a very close approach by observers on foot during nighttime hours without taking flight or exhibiting other behavioral reaction, it appears likely that the response of such species to overflight at night would be less than during daytime, when most birds are active and don't allow a close approach by observers. This observation applies to a wide variety of waterfowl, shorebirds, raptors, and songbirds. The response of nocturnally active birds such as

owls, poorwills, and nighthawks to overflight at night is not generally known. Delaney *et al.* (1997), who made measurements of Mexican spotted owl behavior in response to HH-60G Pave Hawk helicopters, indicated that their data suggest that diurnal flights would likely have less potential for disrupting critical spotted owl activity than nocturnal flights and indicated that the 3 hours following sunset and the three hours preceding dawn were most important.

Waterfowl and Other Waterbirds. The few waterbodies under the airspace have prevalent waterfowl and waterbirds. Mancini *et al.* (1988) noted that aircraft can be particularly disturbing to waterfowl. Conomy *et al.* (1998) suggested, though, that responses were species-specific. They found that black ducks were able to habituate to aircraft noise, while wood ducks did not. In colonial nesters, effects may be more dramatic due to the crowded nature of the nesting colonies. Burger (1981) found that herring gulls (*Larus argentatus*) responded intensively to sonic booms and many eggs were broken as adults flushed from nests. As with other species, waterfowl and other waterbirds demonstrate a greater sensitivity to rotary-wing aircraft than to other aircraft.

Small Mammals. The burrows of some mammals may reduce their exposure to aircraft noise. Francine *et al.* (1995) found that kit foxes (*Vulpes macrotis*) with twisting tunnels leading to deeper burrows experienced less noise than kangaroo rats with shallow burrows. Kit foxes are closely related to swift foxes (*Vulpes velox*), which occur under the airspace. Small mammals exposed to frequent and loud aircraft noise can develop enlarged adrenal glands. Chesser *et al.* (1975) found that house mice (*Mus musculus*) captured near an airport runway had larger adrenal glands than those captured 2 kilometers from the airport. In the lab, naïve (previously unexposed) mice subjected to simulated aircraft noise also developed larger adrenal glands than a control group. The implications of enlarged adrenals for small mammals with a relatively short life span are undetermined, but may indicate lower body condition, reproductive problems, and shorter lifespans.

Aquatic Species. No studies were reviewed on the effects of aircraft overflight on fish or other aquatic species. It is assumed that there would be minimal, if any, effects of airborne noise in the aquatic environment because of the inefficient transfer of sound from air to water.

Livestock. As with wildlife, the startle reflex is the most commonly documented effect on domesticated animals. Results of the startle reflex are typically minor (e.g., increase in heart rate and nervousness) and do not result in injury. Exceptions may occur when animals are crowded in small enclosures such as corrals or feedlots, where loud, sudden noise may cause a widespread panic reaction. However, such negative impacts were only observed when aircraft were less than 330 feet AGL (U.S. Forest Service 1992). Between 1994 and 2005, five cases were reported of cattle injury or death under the Pecos MOA where cattle in an enclosed pen bolted into barbed wire. Each response was attributed to a low-level aircraft overflight. These responses occurred under existing conditions (Air Force 2006a).

Numerous studies have found little direct evidence linking aircraft noise to decreased rates of milk production, weight loss, or lower reproductive success (Mancini *et al.* 1988). Head *et al.* (1993) did not find a decrease in milk yields or milk components when 36 Holstein cows were exposed to jet aircraft noise; the cows also showed little to no behavioral responses. Many studies documented that all types of livestock habituate to aircraft noise (see reviews in Mancini *et al.* 1988). Espmark *et al.* (1974) noted minimal behavioral reactions, such as general muscle contraction, ear and tail twitching, or walking or running a short distance (up to 20 meters), in cattle and sheep exposed to 28 sonic booms. They noted that cattle and sheep were, "less disturbed towards the end of the test period, thus indicating that adaptation had taken place"

(Espmark *et al.* 1974). Livestock grazing has been an acceptable land management practice on Air Force ranges for decades. At Melrose AFR, the Air Force leases approximately 51,000 acres to ranchers for cattle grazing (Air Force 2001e).

No controlled studies of the responses of mounted horses to aircraft noise are available. Anecdotal reports indicate that horses with riders startle when surprised by a low-altitude overflight, but responses varied with the horse, rider, terrain, and other conditions. Several anecdotes noted that horses gallop or bite or kick in response to low-altitude overflights (Manci *et al.* 1988); however, no documented injuries to horses or riders were reported, and there was evidence that horses adapted to aircraft noise.

Several studies on the effects of noise on poultry were reviewed in *The Impact of Low Altitude Flights on Livestock and Poultry* (Air Force 1993). The report found that the major impact concern for poultry from low-altitude flying arises from pileups in turkey flocks (i.e., where turkeys pile together in a concentrated area often resulting in death from suffocation or overheating); pileups of chickens were not reported. The report also concluded that low-altitude flights result in no effects on chicken growth and reproduction functions (e.g., egg laying).

IMPACTS OF THE PROPOSED TRAINING

AIRCRAFT OVERFLIGHT AND NOISE

Table 2.3-2 provides an overview of proposed aircraft sortie-operations for MTRs and MOAs. The aircraft associated with the Proposed Training include (1) several special-purpose variants of the C-130 Hercules (AC-130H, MC-130H, MC-130P, MC-130W), which are large fixed-wing, four-engine, turboprop transport-type aircraft; (2) the CV-22, a medium-sized twin-engine tilt rotor V/STOL aircraft; (3) the C-47, a medium-sized, twin-engine, propeller-driven fixed wing transport similar to a DC-3; (4), and small numbers of UH-1 "Huey" helicopters, a single-engine, "rotary-wing" aircraft with a two-bladed rotor; and (5) undefined single- or twin-engine propeller-driven Non-Standard Aircraft (NSA). These aircraft are much quieter than F-16 jets; see Table 5.6-2 for a comparison of estimated Sound Exposure Levels (SELs) between F-16A, C-130, CV-22, and UH-1 at different altitudes AGL.

TABLE 5.6-2. COMPARISON OF ESTIMATED SOUND EXPOSURE LEVELS BETWEEN F-16A, C-130, CV-22, AND UH-1 AIRCRAFT AT DIFFERENT ALTITUDES IN FEET AGL

	Airspeed	SEL in dBA					
		300 AGL	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL
F-16A	450	110	107	101	95	85	74
C-130H ¹	220	99	95	90	84	76	68
CV-22	210	94	91	87	82	73	65
UH-1 "Huey"	80	99	96	91	89	79	73

Notes: 1. Takeoff power.

The majority of aircraft use of the MTRs and MOAs is at nighttime, especially by the MC-130 variants. Excluding transient aircraft, which are not associated with AFSOC training and which fly mostly during daytime, 40 percent of the 9,611 annual sortie-operations on MTRs would be between 10:00 p.m. to 7:00 a.m. and 35 percent of the 15,609 sortie-operations on MOAs would be between 10:00 p.m. to 7:00 a.m. In general, the MC-130s would fly at 250 to 1,000 feet AGL.

dropping to 100 feet AGL, where permitted. Typically, low-level sortie-operations would begin after dark (6:00 p.m. to 9:00 p.m., depending on the season) and last for 4 to 5 hours. During terrain-following training along MTRs, which permit flight down to 100 feet AGL, the MC-130s would fly between 100 and 1,000 feet AGL.

Assuming approximately 220 flying days per year, numbers of sortie-operations on most of the MTRs would average slightly over 1 per flight day during daytime and about 5 per flight day after dark. The Taiban MOA would experience the heaviest usage with an average of approximately 7 sortie-operations per flight day during daytime and approximately 27 sortie-operations after dark. During the year, up to 40 percent of the after-dark sortie-operations would occur between 10:00 p.m. and 7:00 a.m. Some of the training would involve two or more aircraft which would cause the amount of use to vary from night to night. If two or more planes were flying together, the frequency of overflights associated with five sortie-operations would correspondingly diminish.

At any given altitude, the C-130s, CV-22 (in aircraft mode), C-47, and UH-1 aircraft produce lower SELs than do the F-16 aircraft, which train in the airspace. Additionally, with their slower speeds, the onset of the noise would build up more gradually than the sudden onset from a faster jet aircraft at similar altitude, lessening the likelihood of a startle effect. As summarized above, most observers have identified wildlife to respond to noise from helicopters at a greater distance than fixed-wing aircraft and attribute that response to the percussive "whop-whop" noise from the rotors, coupled with a response to the visual aspect of the helicopter, especially when hovering. The percussive rotor noise is more pronounced with a 2-bladed rotor (such as on the UH-1) than a rotor with 4 blades. The CV-22 makes a steady buzzing sound, lacking the percussive helicopter noise signature although engine noise levels increase when power is applied during helicopter mode.

The highest noise levels would occur from terrain-following flight, which would be conducted on the MTRs and from hovering flight by CV-22s and UH-1s, which would take place during water training and near drop zones (see discussion below under "Landing Zones, Drop Zones, and Water Training"). The noise produced from helicopters, CV-22s, and C-130s is less than from an F-16 at the same altitude. Available studies documenting the response of animals to nighttime overflight are relatively few, due to a variety of logistical challenges including the difficulty in observing responses in darkness. Night vision devices have improved the ability to accomplish this, but the resolution of the images is not as high as is possible in daylight.

In general, diurnally active birds (hawks, eagles, waterfowl, most songbirds) would exhibit a greater response to overflight during the daytime than at nighttime and would be expected to exhibit a minimal response to disturbance at night (unless approached very closely), based on observations of biologists conducting studies at night.

Although some reaction (such as alert posture or briefly taking flight or running) to the low-level overflights is possible, overflights directly over any particular area would be relatively infrequent due to the width of the MTRs. There would likely be habituation to the overflight stimulus given the regular use of the MTRs, the gradual increase in sound levels as the aircraft approached, and the lack of perceptible harm from the overflight. For these reasons, the training activity would not be expected to have an observable adverse effect on any species at the population level. Moreover, because the flight path of training aircraft could fall anywhere within the width of the MTR, which are commonly 15 to 20 miles wide, the frequency of overflights in any one area would be

sufficiently low that even a strong response (e.g., flushing, or running) would happen so infrequently that it would not be expected to adversely affect an animal's well-being.

ENDANGERED AND THREATENED SPECIES

Table 5.6-1 lists the federally listed endangered and threatened species as well as proposed and candidate species within the project region. Because project activities in the airspace are primarily associated with overflight and limited on-the-ground or in-water activities of small groups of personnel, habitat disturbance by the project would be very localized and negligible and there would be no adverse effects on plants. This discussion will focus on three of the eight federally listed or candidate wildlife species known from the ROI: the bald eagle, Mexican spotted owl, and lesser prairie-chicken, because these species are known to occur under airspace that would be used by the project. The sand dune lizard, a diurnal species, is known to occur in sandy habitats under the airspace but is not expected to have any reaction to project overflights during daytime and would be underground at nighttime, when most project activities are occurring, and during the cooler months of the year. Effects of project activities would be insignificant and not reach the level at which take occurs. Other species listed under Table 5.6-1 are not expected to be affected by the project because they do not occur under project airspace or would occur so infrequently that the potential for effects from project activities would be discountable.

Bald eagles winter at water bodies locally within the project area. Compared to on-ground or in-water activities (hikers and anglers), aircraft showed the lowest level of response by breeding bald eagles in terms of frequency and duration of response. The most common response to aircraft, including jets, light planes, and helicopters, was no response (67 percent), followed by alert response (29 percent), flight (3 percent), and temporary departure from area (1 percent). Among aircraft, helicopters elicited the highest response frequency and the greatest level of response alert (36 percent); flight (9 percent); departure (2 percent). The median duration of response was 1.0 minute (Grubb and King 1991). Wintering bald eagles showed a strong response (taking flight) when approached closely by boats (ranging from a few meters to 100 meters) or low-flying helicopters (mostly UH-1 at 60-120 meters AGL). This study (Stalmaster and Kaiser 1997) did not evaluate response to fixed wing aircraft, which would have been considerably less than to helicopters, based on observations in many other studies. Occasionally taking flight when closely approached by a helicopter is not expected to adversely affect wintering bald eagles, given the low likelihood of direct overflight, and the potential for acclimation to the overflight of rotary-wing and fixed-wing aircraft. Although specific data on the response of bald eagles to overflight during darkness were not found, a behavioral response by bald eagles to nighttime overflight is expected to be very unlikely given the general unresponsiveness of diurnal birds to nocturnal disturbance described above and the minimum overflight altitudes of 200 feet AGL associated with low-level training on MTRs. Based on these factors we conclude that project related overflights may affect but are not likely to adversely affect wintering bald eagles.

Occupied Mexican spotted owl habitat is present under MTRs (e.g., VR-100/125; IR-113; IR-111) that would be used by the project (e.g., Lincoln National Forest in the Sacramento Mountains; Carson National Forest in the Sangre de Cristo Range). Delaney, Grubb, and Pater (1997) conducted a detailed study on the effects of helicopter noise as well as on the ground disturbances during daylight and nighttime hours. Their findings concurred with other noise disturbance research suggesting that aircraft overflights alone have a negligible effect on raptor reproductive success and young fledged per nest. Adult owls only flushed after their chicks had fledged. This

study included very low level overflight (down to 30 meters AGL). The study found alert responses (head movements) at an average distance of 403 meters. No flushing occurred at a distance of > 105 meters and only 5 percent of spotted owls flushing at distances between 61 and 105 meters. A relatively quick return to predisturbance behavior was consistently found. Habituation (progressively less response with repeated exposures to a given type of disturbance) is suggested by the data but sample sizes were not adequate to demonstrate it statistically. Owls were most active during hours of darkness, with the greatest activity during the three hours following sunset and the three hours preceding dawn. During the nesting season, the peak period of prey deliveries to the nest was during the three hours preceding dawn. Based on Delaney *et al.*'s finding of no substantive evidence that helicopter overflights during the nesting season detrimentally affected success or productivity of Mexican spotted owls, we conclude that the overflights may affect but are not likely to adversely affect Mexican spotted owls.

Lesser prairie-chickens occur under the airspace locally in shrub-grassland habitat. Concerns have been raised that noise during their predawn and early morning communal breeding time could interfere with the breeding displays of males, which involve low frequency sounds known as "booming." Interference of AFSOC training is unlikely because overflight noise produced by the aircraft would be less than for jets and its onset would be gradual, there would be no AFSOC aircraft sonic booms, and overflights would principally be conducted during the early evening hours rather than predawn hours. Based on scheduled training time and projected species behavior, we conclude that the overflights may affect, but are not like to adversely affect, lesser prairie-chickens.

CHAFF AND FLARES

Chaff and flare use would decrease in the Pecos North, Pecos South, and Taiban MOAs (Table 2.3-3), but would increase in R-5104A/B, and R-5105 over Melrose AFR. Chaff use would decrease over the northern portion of VR-100/125. Flares are not authorized in any MTR, and chaff and flares are not assessed for the Mt. Dora or Bronco MOAs.

In the airspace units within which defensive flares are authorized, the minimum altitude for flare release is above 2,000 feet AGL. When the National Fire Danger Rating System indicates high fire conditions, chaff and flare use is limited to above 5,000 feet AGL. Specific issues and potential impacts of chaff and flare on biological resources are discussed below. These issues have been addressed by DoD research (Air Force 1997b, Cook 2002), General Accounting Office review (General Accounting Office 1998), independent review by a Blue Ribbon Panel of experts (Spargo 1999), resource agency instruction, and public concern and perception. Potential effects can be either direct or indirect. Direct effects would be the ingestion or inhalation of chaff filaments or fragments and physical external effects (such as skin irritation). Effects on water and forage quality would be indirect. Fire risk on arid rangelands is the primary concern of flare use. Fire effects can be both direct (i.e., mortality) or indirect (e.g., habitat changes). These issues are evaluated for their potential of occurrence and the effect on biological resources, given occurrence.

Ingestion of Chaff or Flare Residual Materials. The release of chaff and flares results in chaff filaments, plastic sliders and caps, felt spacers, and flare wrapping material falling to the ground. Residual pieces would average one piece per 11 acres per year over the Pecos and Taiban MOAs. Over VR-100/125, average residual material from chaff would be one piece per 552 acres. Chaff filaments are conservatively estimated to be 0.80 gram per acre per year. Because of the nature of disposition and the low rate of application and dispersal of chaff

filaments during defensive training, wildlife and livestock would have little opportunity to ingest chaff filaments or end caps. Although some chemical components of chaff are toxic at high levels, such levels could only be reached through the ingestion of many chaff bundles or billions of chaff filaments. Previous studies have shown that cattle avoided consuming clumps of chaff in their feed (Barrett and MacKay 1972). When calves were fed chaff thoroughly mixed with molasses in the feed, no adverse physiological effects were observed pre- or postmortem. Additionally, given the low proportion of water bodies under airspace assessed for chaff, it would be extremely rare that waterfowl or bottom-feeding animals would encounter chaff fragments or concentrated levels. Overall, it is not expected that wildlife or livestock would encounter or consume chaff or be negatively affected by chaff if it were accidentally ingested.

Another concern expressed by ranchers is related to chaff and flare plastic pieces or wrapping material (similar to stiff, aluminum-coated duct tape) potentially contributing to bovine hardware disease. Hardware disease, or traumatic reticuloperitonitis, results when a cow ingests a foreign object, such as a nail, wire, or metallic object. The object can become lodged in the wall of the stomach and can penetrate into the diaphragm and heart, resulting in pain and infection. In severe cases animals can die without treatment. Treatment consists of antibiotics and/or surgery. Statistics are not readily available, but one study documented that 55 to 75 percent of cattle slaughtered in the eastern U.S. had metallic objects in their stomachs, but the objects did not result in damage (Moseley 2003). Dairy cattle are typically more vulnerable to hardware disease due to the confined nature of dairy operations. Many livestock managers rely on magnets inserted into the cow's stomach to prevent and treat hardware disease. The magnet attracts nails, wires, or other metallic objects, thereby preventing them from traveling to the stomach wall.

The culprit in bovine hardware disease is often a nail or piece of wire greater than 1 inch in length, such as that used to bale hay (Cavedo *et al.* 2004). Although no documented case exists, range cattle or other livestock could feasibly ingest residual materials of the M-206 flares; however, the plastic materials of the end cap and slider and the flexible aluminum wrapping are less likely to result in injury than a metallic object. There have been no reports of livestock ingesting residual chaff or flare materials on lands in and adjacent to Melrose AFR where chaff and flares and grazing have coexisted for over 30 years (Air Force 2001e).

Inhalation of Chaff Filaments. No specific research has been conducted on the potential for chaff inhalation by wildlife, nor have any negative effects been reported for wildlife, livestock, or humans (Air Force 1997b, Spargo 1999). Humans can inhale particles less than 10 microns (0.00039 inch) in diameter deep enough into the lung to cause chronic lung disease (USEPA 1997). Air Force chaff filament size is approximately 0.001 inch (25 microns) in diameter and 0.3 to 1 inch (7,620 to 25,400 microns) in length, which is too large for inhalation. On the ground, chaff degrades over time to aluminum or silica particles that are indistinguishable from ambient soil materials. Although chaff particles on the ground can be degraded in size to less than 10 microns and become indistinguishable from soil fragments of the same size, chaff fragments do not display asbestos-like characteristics and do not pose asbestos-like health risks. The number of degraded or fragmented particles is insufficient to result in disease (Spargo 1999). Therefore, inhalation of chaff filaments with adverse effects to wildlife, livestock, or humans is unlikely.

External Physical Effects. Unfragmented chaff is similar in form and softness to, yet thinner than, very fine human hair. No studies have evaluated or reported on negative effects associated with direct contact to chaff filaments. A field study on an Air Force range did not find chaff filaments in bird nests or animal burrows (Air Force 1997b). On a military range subject to decades of chaff and

flare use, seven nests of the woodrat (also known as a pack rat) (*Neotoma lepida*), a notorious gatherer of odd objects, were reviewed. None was found to contain chaff filaments or end caps. Chaff filaments may be generally unavailable or unattractive to wildlife and no negative effects are expected from direct contact.

Water Quality. The influences of chemical components of chaff and flare on water quality are discussed in detail in Section 4.5.3.1. Confined aquatic habitats may be affected if there were a potential for large-scale accumulation and decomposition of chaff fibers or dud flares. Wetland areas are a small percentage (< 0.5 percent) of the area to be exposed to chaff and flare release under the Proposed Training or alternatives. Most wetlands and water bodies are within the Pecos River Valley. Because chaff would be broadly distributed with low density in any one area, it is unlikely that chaff would be detectable or significantly accumulate within confined water bodies.

The component of chaff that has the potential to negatively affect soil or water chemistry is aluminum, which tends to break down in acidic and highly alkaline environments. Aluminum is the most abundant metallic element in the earth's crust and is an abundant constituent of soils. Laboratory and field analyses (Air Force 1997b) indicate that the pH of water in the soil or in a water body is the primary factor that determines the stability of the aluminum coating of chaff. The coating is the most soluble and likely to release aluminum if the soil or water pH is less than 5.0 (extremely acidic) or greater than 8.5 (strongly alkaline). In arid conditions such as those found in the ROI, soil pH tends to be neutral to high, but there is usually not enough water in the soil to react with the aluminum (Air Force 1997b). Water bodies in the ROI are neutral to slightly alkaline, less than the threshold necessary to degrade the aluminum coating. Chaff that falls into surface water would be chemically stable. No impact to water bodies would be anticipated, even in a highly unlikely event such as an entire clump of undispersed chaff falling into a small, confined water body.

Data on the chemical properties of the soils in the five counties that underlie most of the airspace in which chaff can be dispersed were reviewed. These include Chaves (NRCS 2002b), De Baca (NRCS 2002c), Guadalupe (NRCS 2002d), Lincoln (NRCS 2002e), and Roosevelt (NRCS 2002a) counties. According to these data, there are three soil series that have a pH in the surface layers ranging between 7.9 and 9.0. These soil series represent a very small percentage of the total area that could be affected, and all but one have a very low potential for soluble chemicals in the soil being lost to surface runoff or leaching into groundwater. The low percentage of soils in the ROI with a high enough pH to react with aluminum, in combination with the low soil water content, results in conditions that would be extremely improbable for aluminum concentrations to be produced from chaff particles that weather on the ground.

Under normal pH, the decomposition of chaff is extremely slow. Only under very high or low pH could the aluminum in chaff become soluble and potentially toxic (Air Force 1997b). Few organisms would be present in water bodies with such extreme pH levels. Given the small amount of diffuse or aggregate chaff material that could possibly reach water bodies and the moderate pH of regional water bodies, water chemistry would not be expected to be affected.

The magnesium in flares can be toxic at extremely high levels, a situation that could occur only under repeated and concentrated use in localized areas. Flare ash would disperse over wide areas; thus, no impact is expected from the magnesium in flare ash. The probability of an intact dud flare falling to the ground during training is exceedingly low (<1 percent) (Air Force 2001d). The probability of an intact flare falling into an aquatic system is much smaller, given

the very low proportion of water bodies in the ROI. Since toxic levels would require several dud flares to fall in one water body, no effect of flares on water quality would be expected.

Forage Quality. Given the exceedingly low concentrations of chaff deposition under the airspace, coupled with the non-reactive, arid, neutral-to-alkaline environment of the ROI, mobility of aluminum would not be expected to occur. Aluminum would likely remain inactive in an elemental state and be indistinguishable from ambient soils. Plants would not be expected to uptake any increased concentrations of aluminum. Therefore, no additional aluminum would enter the food chain or affect plant growth under the Proposed Training or alternatives.

Fire Potential. Fire risk and fire-frequency are a concern in arid environments. Fires can result in livestock and property losses. Although native vegetation in the Southwest is considered fire-adapted, past and current land-use practices, in combination with drought and invasive species, have altered fire regime and ecosystem processes (Brown 1994). Ecosystem changes include (1) the introduction and spread of invasive and exotic plants, which promotes the spread and intensity of fire or become established following fire; (2) habitat fragmentation by fire, leading to increased vulnerability of isolated populations; and (3) increased wind erosion of soil following fire. Therefore, even though most native species of the high plains are adapted to and even benefit from wildfire, any fire could result in direct losses and indirect negative effects.

Vegetation growth affects fire potential. During years with above normal or exceptional levels of precipitation, the overall fire risk may vary from the regional norm. When green, the vegetation reduces fire risk and when dry it increases the risks of fire. Such variations in fire risk normally occur during a natural multi-year cycle. Above normal levels of vegetation were cited as a contributing factor in the November 2005 fire that spread off of Melrose AFR.

The percentage of flares that malfunction is small (<1 percent probability for all categories of malfunction) (Air Force 2001d). The extremely rare dud flare that does not ignite at release and falls intact to the ground contains magnesium, which is thermally stable and requires a temperature in excess of 1,200°F for ignition. Self-ignition of a dud flare on the ground is highly unlikely under natural conditions. Cannon AFB has a fully staffed and equipped fire department and mutual aid agreements with fire departments in the region.

LANDING ZONES, DROP ZONES, AND WATER TRAINING

This section discusses the effect of activities in the LZs, which include Helicopter Landing Zones (HLZs), DZs, and water training within the airspace, including the activities of on the ground (or on the water) teams prior to, during, and after each exercise. Biological effects of establishment and operation of a landing zone and drop zones on Melrose AFR are discussed above in Section 4.6). As stated in Section 2.3.4, "LZ, DZ, or water training areas outside of Cannon AFB or Melrose AFR boundaries cannot be determined prior to a decision to beddown AFSOC assets at Cannon AFB. These locations are subject to review by Air Force real property personnel and required property ownership and environmental conditions must be evaluated before a state, federal, or private property could be leased or otherwise agreed to or used for off-base or off-range training."

Once a decision to beddown at Cannon AFB has been made, then the search for sites, discussions with landowners, and tiered environmental compliance can be conducted. It is assumed that LZs supporting fixed-wing aircraft outside of Melrose AFR would be established on existing runways within the ROI. LZs and DZs would require minimal site preparation and could be established within the airspace on lands owned or leased by the federal government

(Table 2.3-1). Additionally, drops of personnel or equipment could be accomplished over water (e.g., a lake or reservoir). See Section 5.5.2 for discussion of existing lake conditions.

LZs or DZs would most likely be established in agricultural or grazing land. Effects on vegetation and soils would depend on the nature of the site, conditions during use, and the degree of repeated use. Vehicular access, human foot traffic, and landing of helicopters, CV-22s, or air-dropped materials would have short-term effects on vegetation and soils. Repeated traffic over the same site would lead to local reduction in vegetative cover and increased susceptibility of soils to wind or water erosion and compaction. These effects could be reduced or avoided by preparation of sites that would receive repeated use to protect the soils. Wildlife would be expected to avoid the activity by taking cover or temporarily leaving the immediate vicinity, resuming their activities upon completion of the training exercise. Effects would be very localized, temporary, and less than significant.

Water Training could involve personnel and boats accessing the site prior to a personnel drop for safety of personnel and/or later retrieval of dropped personnel and equipment. No CWA Section 404 permit would be required for water training. Activities would occur during the mission itself and during recovery of personnel and materials for transport back to Cannon AFB. Support vehicles (light trucks, vans) and support boats would use existing infrastructure including roads, parking areas, and launch ramps. Typically there would be one training event a week in a given lake during spring to fall, water levels and weather permitting. A typical event would last 4 to 5 hours. A typical event could include one to two boats launched from existing ramps, a C-130 or a CV-22 aircraft fly over several times, and 3 to 5 drops with 7 to 10 Special Operations personnel dropped into the lake with each drop. These events could be during day or night, but when they are at night they would generally avoid lights from campers and homes along the shore. For safety and operational realism, drops would be toward the middle of the lake, away from shorelines and trees. After the drop, the Special Operations personnel would be expected to move to shore in a dark area of the lake and proceed covertly on foot to the objective. Either a vehicle or a CV-22 would come in to pick them up to complete the mission. Where they would land and where the Special Operations personnel come ashore would have to be surveyed at each lake similar to the survey for the other LZ/DZ locations. They would do such surveys sometime over the next 3 years before any CV-22s are assigned to Cannon. Preparation of separate environmental analysis, tiered from this EIS, would be expected for each LZ/DZ site.

Activities during daylight would be expected to temporarily disturb wildlife in the immediate vicinity and could cause migrating or wintering waterfowl to flush or swim away from the immediate vicinity of the activity. Training activities could result in species reactions similar to those occurring as the result of rapid motorboat or jet skis. Perched raptors (e.g., migrating/wintering bald eagles, osprey) would be expected to fly to another perch if closely approached by boats, personnel on the ground, or C-130 or CV-22 aircraft discharging personnel. Activities taking place at night could cause similar responses by these species but would generally require a closer approach to elicit a response at nighttime compared to daytime. Hovering flight by CV-22s or UH-1s associated with some water training would increase the magnitude and duration of the noise exposure and would be more likely to cause a response by species such as waterfowl or raptors that may be in the area. If there were a response to the training activity, the most likely response would be movement of birds to another part of the lake during the activity and would not be expected to represent an adverse effect. Over time, in the absence of direct threats, it is possible that some degree of habituation

would occur. The degree of response would be species-specific and individuals of a given species could show variation in their response. The response of wildlife to project activities would be well within the range of responses to a wide variety of human and non-human stimuli and would not be expected to result in adverse effect due to the infrequency of the activities and the low degree of expected response.

The only federally listed endangered or threatened species likely to be present during AFSOC water training is the bald eagle, which occurs during winter at each of the reservoirs likely to be used for the training. It is only present during the winter months, with numbers peaking in January, when AFSOC water training would be infrequent or not occur. Given the low level of the anticipated response coupled with the infrequency of the training at a given locality, effects on bald eagles would be insignificant and not be expected to reach the level of take. Therefore, it is concluded that the action may affect but is not likely to adversely affect the bald eagle.

5.6.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. Airspace use would be solely by transient aircraft. There would be minimal use of the MTRs and the MOAs, mostly by jet aircraft (F-16s and B-1Bs) that currently use it. There would be little or infrequent nighttime use of the MTRs and nighttime use of the Pecos and Taiban MOAs would average about 1 sortie-operation per flight day. Nighttime use of the Bronco and Mt. Dora MOAs would be infrequent.

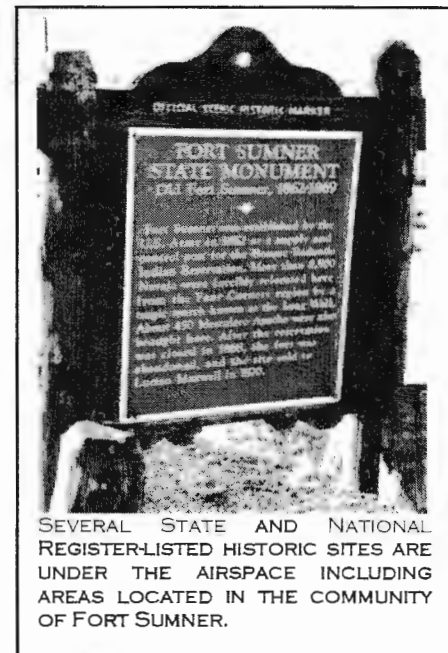
5.7 CULTURAL RESOURCES

5.7.1 DEFINITION OF RESOURCE

Cultural resources underneath the airspace conform to the same definitions as for Cannon AFB (Section 3.7.1). To summarize, cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. Historic properties (as defined in 36 CFR 60.4) are significant archaeological, architectural, or traditional resources eligible for listing, or listed in, the National Register of Historic Places (NRHP). Historic properties are evaluated for potential adverse impacts from an action, as are significant traditional resources identified by American Indian tribes or other groups.

The ROI for cultural resources consists of the areas that lie beneath the airspace, as illustrated in Figure 5.1-2.

There are seven Apachean-speaking tribes thought to have inhabited the southwestern portion of the United States and the Northern portion of Mexico; of these seven, it is believed that the Mescalero Apache and the Jicarilla Apache were the primary inhabitants of the area underlying the affected airspace (Opler 1983; Tiller 1983). The Mescalero Apache native lands were generally located in the southern portion of the affected airspace extending well into northern Mexico. At the time of European contact, the lands of the Mescalero were extensive, being defined by a series of mountain ranges with peaks greater than 12,000 feet, separated by flats and valleys. The differences in elevation are marked by noticeable changes in flora, fauna, and



climate. In the mountain regions, winters are severe with very short growing seasons, which made cultivation difficult. The flats were generally hot and dry, making cultivation almost impossible until the introduction of irrigation. The striking differences in topography and climate had a great and lasting influence on the political and economic development and structure of the Mescalero, who until the later part of the historic period, remained in small hunter-gatherer groups scattered throughout their territory (Opler 1983).

The Jicarilla aboriginal lands were generally located in the northern portion of the airspace extending as far north as south-central Colorado. It is believed that the Jicarilla migrated into the southwest between A.D. 1300 and 1500, although their route of migration is much in dispute. The Jicarilla Apache native lands consist of the Southern Rockies, which extend from north-central New Mexico north into southern Colorado, and east into the high plains country, which is defined by mesas, plateaus and intermontane basins. Similar to the Mescalero native lands, the elevational changes are drastic, ranging from 14,000 feet in the Rockies to 3,800 feet in some of the valleys (Tiller 1983).

Although the Apachean-speaking groups that migrated south into the region settled into separate locations, they preserved much of their Athapaskan culture. Eventually, many of these groups such as the Mescalero and the Jicarilla were influenced by contact with other native groups such as the Pueblos, and later by the introduction of the horse. These influences led to a change in culture towards a more sedentary life style (Tiller 1983).

By the early 1600s, Apachean groups occupied the region on a permanent basis. Apache occupation continued until the mid-18th century when the Comanche people entered the region. Comanche raids against eastern Pueblo and Spanish settlements led to military campaigns by the Spanish, defeating the Comanches in the 1780s. Kiowa groups also traversed the region, using the same lands as the Comanche for hunting and raiding from the 1790s until the 1870s (Air Combat Command [ACC] 2004).

Commerce between the U.S. and a Mexico newly independent from Spain was instrumental in bringing American settlers to the region in the early to mid-19th century. Traveling the Santa Fe Trail, business interests came into increasing conflict with the Apache and other tribes along the route, resulting in the construction of forts. During the Mexican-American war of 1846-1848, American troops traveled west along the Santa Fe Trail as did troops during the American Civil War. Once New Mexico became American territory, trade continued to flourish and traffic included travelers on their way to the gold fields of California (National Park Service 2004). The Santa Fe Trail also provided a link to the Old Spanish Trail, which connected New Mexico to the markets in California and Mexico.

In 1810, a treaty between the Spanish and the Mescalero Apache included a reservation for the Mescalero. The treaty was renewed by the Mexican government in 1832 (Rothman 1998). In the following decades, Mescalero encounters with the American military led to short-term treaty and reservation arrangements. In 1863, under General James H. Carleton, Colonel Christopher "Kit" Carson forced some 400 Mescalero Apache to walk approximately 200 miles from Fort Stanton to Fort Sumner. Later that year, over 8,000 Navajo from the Canyon de Chelly in eastern Arizona were forced to march over 300 miles to the Bosque Redondo Reservation at Fort Sumner (Banks 1998). From 1863 to 1868, as many as 9,000 Navajo people (Dineh) and more than 400 Mescalero Apache were incarcerated at the Bosque Redondo Reservation (ACC 2004). The forced movement of the Dineh to Fort Sumner is memorialized in Navajo history as "The Long Walk."

In 1868, the Navajo Treaty was signed at Fort Sumner, conceding the right of the Dineh to live on their homelands to the west (Museum of New Mexico 2001a). After a period of instability following the Civil War, a new reservation was established in 1873 for the Mescalero and Chiricahua Apache at its present location near the Sacramento Mountains (Rothman 1998) southwest of the area of potential effect, as well as the establishment of a new reservation for the Jicarilla Apache north of the area of potential effect (New Mexico Blue Book 2004).

Currently, the Mescalero and Chiricahua Apache Indian reservation occupies approximately 460,000 acres and is home to 3,000 tribal members (New Mexico Blue Book 2004). The Jicarilla Apache Indian Reservation is also home to approximately 3,000 members and consists of approximately 750,000 acres (New Mexico Blue Book 2004).

The Goodnight-Loving trail followed the Pecos River valley, through Fort Sumner to markets in states to the north; the Stinson Trail entered the region from Texas to the east. Growth in the cattle ranching industry was driven, in part, by the expansion of railroads throughout the region (ACC 2004). Small towns grew up along the rail lines, including Clovis, Melrose, and others in the Cannon AFB area. North of the ROI lie the remnants of Route 66, now largely replaced by other highways. This historic route once connected Chicago to Santa Monica, California.

PALEONTOLOGICAL RESOURCES

Paleontological resources, usually thought of as fossils, include the bones, teeth, body remains, traces, or imprints of plants and animals preserved in the earth through geologic time. Paleontological resources also include related geological information, such as rock types and ages. All fossils offer scientific information, but not all fossils offer noteworthy scientific information. Fossils generally are considered to be scientifically noteworthy if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Although experienced paleontologists generally can predict which rock formations may contain fossils and what types of fossils may be found, based on the age of the formation and its depositional environment, predicting the exact location where fossils may be found is not possible.

5.7.2 EXISTING CONDITIONS

Record searches of both the New Mexico State Register of Cultural Properties and the NRHP indicate that there are NRHP and state-listed properties throughout the counties underlying project MOAs and MTRs. Table 5.7-1 lists only the airspace where such properties are located. It also lists properties in the vicinity of LZ/DZ areas of interest. As Table 5.7-1 indicates, listed properties in De Baca County include the De Baca County Courthouse, which was constructed in 1917; the Fort Sumner Railroad Bridge, which was constructed in 1906; the Rodrick Drug Store; the Fort Sumner Women's Club; and the Fort Sumner Ruins. Fort Sumner was constructed in 1863 as a resettlement center for the Navajo and Apache Indians. Fort Sumner, near what had been the Bosque Redondo Indian Reservation, is also a New Mexico State Monument and has been identified as a Registered Cultural Property by the State of New Mexico. In addition to NRHP and state-listed cultural resources under project MOAs, there are also archaeological, architectural, or traditional resources that are either eligible or potentially eligible for the NRHP under the MTRs.

**TABLE 5.7-1. STATE AND NATIONAL REGISTER-LISTED
PROPERTIES UNDER AIRSPACE
(PAGE 1 OF 2)**

	<i>County</i>	<i>Property</i>	<i>Location</i>	<i>State Register</i>	<i>NRHP</i>
Airspace					
Mt. Dora MOA, New Mexico	Union	Clayton Public Library	Clayton	X	X
		Clayton Public Schools NRHD	Clayton	X	X
		Eklund Hotel	Clayton	X	X
		Herzstein Memorial Museum (Methodist Episcopal Church	Clayton	X	
		Rabbit Ears (Clayton Complex NHL	Clayton	X	X
		Union County Courthouse	Clayton	X	X
		Folsom Hotel	Folsom	X	X
		Folsom Museum	Folsom	X	
		Stadler Mercantile	Grenville	X	
	Colfax	Dorsey, Stephen W. Mansion	Abbott	X	
		Folsom Man site NHL	Folsom	X	X
	Mora	Farmers & Stockmans Bank	Wagon Mound	X	
		Santa Clara Hotel	Wagon Mound	X	X
		Wagon Mound/Santa Clara Canyon, NHL	Wagon Mound	X	X
	Harding	(maybe: Bueyeros School)	Bueyeros	X	X
		(maybe: Sacred Heart Church)	Bueyeros	X	
Mt. Dora MOA, Colorado	Las Animas	Trinchera Cave Archaeological District	Trinchera vicinity	X	X
Pecos MOA, New Mexico	De Baca	De Baca County Courthouse	Fort Sumner	X	X
		Fort Sumner Railroad Bridge	Fort Sumner	X	X
		Fort Sumner Ruins, State Monument	Fort Sumner	X	X
		Rodrick Drug Store	Fort Sumner	X	
		Fort Sumner Women's Club	Fort Sumner	X	X
	Chaves	(maybe Causey Ranch House)	Caprock	X	
	Lea	Rattlesnake Draw Site	Buckeye	X	
		Lea County Courthouse	Lovington	X	X
		Pyburn House & Assoc. Structures (maybe Monument Springs Site)	Lovington Monument	X	X

**TABLE 5.7-1. STATE AND NATIONAL REGISTER-LISTED
PROPERTIES UNDER AIRSPACE
(PAGE 2 OF 2)**

	<i>County</i>	<i>Property</i>	<i>Location</i>	<i>State Register</i>	<i>NRHP</i>
Drop Zones and Landing Zones					
W of IR-107, New Mexico	San Miguel	Bell Ranch HQ	Conchas	X	X
		Conchas Dam	Conchas	X	
		Conchas Dam Historic District	Conchas Dam	X	
		Indian Writings	Conchas Lake	X	
Near Logan, New Mexico	Quay	McFarland Brothers Bank	Logan	X	
		Shollenbarger Mercantile Company building	Logan	X	
Near Cannon AFB, New Mexico	Curry	Clovis Baptist Hospital	Clovis	X	X
		Clovis Central Fire Station	Clovis	X	X
		Clovis City Hall and Fire Station 1908	Clovis	X	X
		Clovis Post Office (Old)	Clovis	X	X
		Curry County Courthouse	Clovis	X	X
		Dillon, Dr. Fred A. House	Clovis	X	X
		First Methodist Church of Clovis	Clovis	X	
		Hotel Clovis	Clovis	X	X
		Railway Express Agency Building	Clovis	X	X
		Santa Fe Passenger Depot	Clovis	X	X

No Indian reservations underlie the Pecos, Bronco, or Mt. Dora MOAs (Bureau of Indian Affairs 1998). The Mescalero Apache Reservation is near IR-113. Native American groups with historic ties to the area include the Mescalero Apache, Jicarilla Apache, Comanche, and Navajo. The Mescalero Apache Reservation is approximately 50 miles southwest of the Pecos MOAs near Ruidoso, New Mexico. The Jicarilla Apache Reservation is about 150 miles northwest of the Pecos MOAs and is near IR-111. The Comanche Reservation is in Lawton, Oklahoma, outside the airspace ROI.

In the 1960s, the Fort Sumner State Monument was placed near the Old Fort Sumner Museum to commemorate the signing of the peace treaty with the Navajo people 100 years earlier (Banks 1998). Fort Sumner State Monument is an NRHP-listed site of significant cultural activity. Throughout the year, the Monument is host to Navajo visitors who conduct ceremonies and prayer services to commemorate The Long Walk and their confinement at Bosque Redondo. Fort Sumner State Monument is currently protected by a Noise Sensitive Area that has been effective in reducing noise impacts from overflights (personal communication, Smith 2005). As part of the ongoing process to turn the routes associated with The Long Walk into a National Historic Trail, ground-breaking for a more extensive Bosque Redondo Memorial began in November of 2003. Another point of interest, although not listed on the State or National Registers, is Billy the Kid's gravesite near the Old Fort Sumner Museum.

No NRHP or state-listed properties are located under the following Airspace: Mt. Dora Texas and Oklahoma; Pecos MOA in Lincoln and Guadalupe Counties; Bronco MOA in New Mexico and Texas; Taiban MOA, VR-100/125, R-5104A and B, and R-5105. No NRHP or state-listed properties are located near the Drop Zones and Landing Zones in Harding County, in the zones in Guadalupe, De Baca, or Roosevelt Counties. In Curry county, only the zone near Cannon AFB has properties, listed in Table 5.7-1.

Four water training locations are under consideration, all of which are New Mexico State Parks: Conchas Lake, Santa Rosa Lake, Sumner Lake, and Santa Rosa Lake (Figure 2.3-3). No NRHP-listed historic properties occur within the boundaries of any of the state parks proposed as water training locations. However, there are cultural properties listed on the New Mexico State Register of Cultural Properties (SRCP) at Conchas Lake State Park in San Miguel County (Table 5.7-1). Also, cultural properties — both archaeological and historical — have been documented at all four parks that may be eligible for the NRHP or SRCP.



SEVERAL STATE REGISTER-LISTED CULTURAL PROPERTIES ARE LOCATED AT CONCHAS LAKE STATE PARK INCLUDING THESE PETROGLYPHS. (NMEMNRD 2006).

There are a number of state or federally recognized trails underlying or within the vicinity of the affected airspace. The primary trail that partially underlies the affected airspace is known as The Long Walk, which is discussed in detail in Section 3.6.2.1. Other trails that do not directly underlie the affected airspace include the Santa Fe trail to the west, which links Santa Fe and Mexico; the Turquoise Trail, which links Albuquerque and Santa Fe, located to the north of the airspace ROI; the Old Spanish Trail to the northwest of the ROI, which links Los Angeles and Santa Fe; and historic Route 66, which linked Chicago and Santa Monica, California. The Goodnight-Loving and Stinson Trails are not officially recognized by either the state or federal government.

NATIVE AMERICAN CONSULTATION AND COORDINATION

The Air Force has initiated contact with the Comanche Tribe of Lawton, Oklahoma; Jicarilla Apache Tribe of Dulce, New Mexico; Kiowa Tribe of Carnegie, Oklahoma; Apache Tribe of Andarko, Oklahoma; and the Mescalero Tribe of Mescalero, New Mexico to identify potential concerns associated with the Proposed Training (Appendix C).

PALEONTOLOGICAL RESOURCES

Three of the proposed water training locations have exposures of geologic strata known to contain fossilized fauna and flora specimens.

Conchas Lake contains rocks of the Jurassic and Upper Triassic Periods. The southern margins of the lake have exposures of the Upper Triassic Santa Rosa Formation sandstones in which fossils have been found (New Mexico Energy, Minerals, and Natural Resources Department [EMNRD] 2006).

Santa Rosa Lake contains rock exposures of the Triassic Anton Chico Formation (New Mexico Bureau of Geology and Mineral Resources 2006) in which an amphibian fossil has been found, although not near the lake. Upper Triassic Santa Rosa Formation strata are also found at Santa Rosa Lake, and fossilized tree branches, leaves, and other plant remains have been found in the local sandstones and mudstones (New Mexico Bureau of Geology and mineral Resources 2006).

Sumner Lake has exposures of the Santa Rosa Formation from which fossilized flora specimens have been discovered. Also occurring at Sumner Lake are exposures of the Middle Triassic Moenkopi formation in which fossil amphibians have been found elsewhere (New Mexico Bureau of Geology and mineral Resources 2006).

5.7.3 ENVIRONMENTAL CONSEQUENCES**5.7.3.1 PROPOSED TRAINING OF AFSOC ASSETS**

A number of NRHP and state register-listed properties underlie the various pieces of airspace included in the Proposed Training (refer to Table 5.7-1). The Proposed Training includes only one potential change in the airspace environment, consisting of adding an unmanned aerial system (UAS) corridor between Cannon AFB and the Melrose AFR restricted airspace to allow the transit of UAS aircraft. No NRHP-listed properties lie beneath the proposed corridor. Because there would be no change in the noise or visual environment for historic properties beneath the existing or proposed airspace, there would be no effects.

LZ/DZ locations will be designated for AFSOC training. Once LZ/DZ locations have been identified, the Air Force will comply with Section 106 of the National Historic Preservation Act (NHPA) by determining the presence or absence of historic properties, determining whether the Proposed Training will have an effect on any properties that may be present, and either avoid, minimize or mitigate any impacts to such properties.

Cultural properties—both archaeological and historical—that may be eligible for the NRHP or SRCP have been documented at parks associated with all four lakes under consideration for water training locations. All cultural resources within park boundaries are subject to federal cultural resource protection laws. In order to avoid adverse impacts to cultural resources, training activities within the parks should be coordinated with the State Park Resources Planner and the New Mexico Historic Preservation Division.

Paleontological resources have been reported at Conchas Lake State Park (New Mexico EMNRD 2006), and the other three potential water training locations have the potential to contain fossils from the Middle and Upper Triassic Period. So long as the proposed water training exercises are restricted to the water of the lakes and the boat ingress and egress points are conducted at already established boat ramps or other recreational access locations, there is a very low probability that paleontological resources would be adversely impacted.

Although no traditional cultural resources have been identified in the project area, a portion of the Long Walk National Historic Trail also passes beneath the Pecos MOA airspace to Fort Sumner. Current conditions for all resources include overflights by military and civilian aircraft, including flights at supersonic speeds above 30,000 feet MSL. Neither the noise nor the visual presence of these overflights have affected the NRHP eligibility of the resources.

The Goodnight-Loving Trail passes through the Pecos MOA, the Mt. Dora MOA, and is crossed by several MTRs on its way from Texas north to Colorado. The Santa Fe National Historic Trail also crosses underneath the Mt. Dora MOA from west to east. Both trails pass beneath existing airspace, and neither is affected by the air traffic. Increased low-level flights on the MTRs could be noticed by groups replicating historic travel on these trails should an active campsite coincide with a low-level overflight.

5.7.3.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, no AFSOC flights would occur. There would be a reduction in the use of existing airspace, including noise or visual environment, and a reduction in aircraft overflights and use as the 27 FW F-16s were deactivated. Cannon AFB would continue to consult with the New Mexico and other State Historic Preservation Offices (SHPOs) to manage any impacts that might be identified underneath the airspace.

5.8 LAND USE AND RECREATION

5.8.1 DEFINITION OF RESOURCE

Land use addresses general land use patterns, land ownership, land management plans, and special use areas under existing military training area. General land use patterns characterize the types of uses within a particular area such as agricultural, rangeland, military, and urban areas. Land ownership is a categorization of land according to type of owner. The major land ownership categories include private, state and, federal. Federal lands are described by the managing agency, which may include the USFWS, the U.S. Forest Service, Bureau of Land Management, or DoD. Land management plans prepared by agencies are used to establish appropriate goals for future use and development. As part of this process, sensitive land use areas were designated by agencies as being worthy of more rigorous management.

Recreation resources consider outdoor recreational activities that take place away from the residences of participants. This includes natural resources and man-made facilities that are designated or available for public recreational use in remote areas. The scarcity of water bodies results in all public reservoirs and lakes in the New Mexico area serving as recreational sites.

The ROI for land use and recreation consists of all the lands under the existing training airspace which includes the Pecos MOA, Mt Dora MOA, Bronco MOA, and the MTRs. Land use under R-5104 and R-5105 is covered in Section 4.8

5.8.2 EXISTING CONDITIONS

PECOS MOA

Military training airspace covers a vast area characterized by high plains and grasslands with sparse vegetation and few permanent bodies of water. The area underlying the airspace includes portions of Guadalupe, Torrance, Roosevelt, San Miguel, Lincoln, De Baca, Chaves, Quay, and Curry counties.

Lands under the special use airspace are primarily flat terrain with broad expanses of treeless, short grass prairie. The landscape reflects the predominant use of the land for grazing and agriculture. It is characterized by crop and rangelands, infrequent one or two-story residences, and outbuildings. Santa Rosa and Sumner Lakes, outside the SUA, are manmade impoundments of the Pecos River that interrupt the vast semi-arid plains. Some forested areas occur along the western edges of the study area.

The majority of the land under the airspace is privately held (Figure 5.8-1). The majority of the public land that would be affected by the Proposed Training is administered by the Bureau of Land Management. Public lands managed by the Bureau of Land Management typically provide a variety of recreational experiences such as hiking, caving, camping, hunting, and nature viewing.

As shown in Table 5.8-1, approximately 99 percent of the land under the MOAs is used for rangeland and agriculture. The remaining land (less than 1 percent) is designated as forest, water, wetland, developed, or urbanized land. Residences exist within the community of Fort Sumner, as well as on large acreages. An average density within the total project area is about one person per square mile (U.S. Census 2000b). Section 5.9 provides further discussion of population data under the airspace.

**TABLE 5.8-1. EXISTING LAND USE UNDER MOAS AND MTRS
USED BY THE 27 FW (IN ACRES)**

MOA/MTR	Agriculture	Forest	Rangeland	Water/ Wetland	Urban/ Built-Up Land	Total
Bronco MOA	2,147,725	0	2,184,910	9,870	23,815	4,366,320
Mt. Dora MOA	244,665	253,525	2,846,945	5,995	8,770	3,359,900
Pecos MOA	16,635	430	1,975,175	4,615	1,430	1,998,285
Taiban MOA	780	0	198,590	495	40	199,905
IR-107	311,085	490,090	4,419,015	16,460	7,780	5,244,430
IR-109	130,255	750,115	3,074,655	5,620	3,765	3,964,410
IR-111	216,710	883,120	3,184,015	5,635	5,215	4,294,695
IR-113	198,895	464,400	3,677,220	6,430	2,660	4,349,605
VR-100/125	159,700	490,985	5,067,150	5,515	10,040	5,733,390
VR-108	168,850	506,930	2,774,645	15,100	5,625	3,471,150
VR-114	919,510	279,075	3,927,240	21,720	8,065	5,155,610

Source: Air Force 1995.

Under the existing and proposed airspace, private ownership accounts for approximately 78 percent, with a variety of state, Native American, military, and other federal interests overseeing the remainder of the land. Federal lands in the ROI are managed by the Bureau of Land Management and the Air Force. Land status is depicted on Figure 5.8-1.

The Bureau of Land Management's Roswell Approved Resource Management Plan (RMP) and Record of Decision (ROD) present a plan for managing all public land administered by the Bureau of Land Management in the Roswell Resource Area. The Roswell Resource Area includes about 1,490,000 acres encompassing all counties under the MOA airspace except for a portion of Chaves County (Bureau of Land Management 1997a). This portion of Chaves County is included in the Carlsbad Approved RMP Amendment and ROD (Bureau of Land Management 1997b). The RMP covers a wide variety of natural and cultural resource management areas. The Carlsbad RMP Amendment and ROD relate to general land management and use determinations for management of oil and gas resources in the Carlsbad Resource Area. Management of the land is guided by De Baca and Chaves counties.

State lands underlying the Pecos MOA airspace include the Fort Sumner State Monument, approximately 10 miles southeast of Fort Sumner. This monument is an improved destination with restroom and visitor facilities, historic exhibits, and guided tours.

Noise Sensitive Areas are defined in the Flight Information Publication reviewed by military pilots for their training missions. Sensitive noise receptors have been identified under the airspace. Citizens seeking information about military overflights contact Cannon AFB Public Affairs directly. The Pecos North Low MOA is restricted to 1,500 feet AGL over Fort Sumner and its associated airport. This "bubble" in the airspace is designed to avoid sensitive receptors in the area.

Recreational uses in this area vary from hunting and fishing to hiking and biking, as well as off-highway vehicle use. Hunting on public lands under the current and proposed airspace fall within the jurisdiction of the New Mexico Department of Game and Fish (NMDGF). Hunting seasons vary by sporting arm (i.e., rifle, bow, or muzzleloader) and species per state. In general, open seasons (i.e., any sporting arm) for deer are two separate periods of three to four days in November, while bow-only seasons are in September and January.

Mt. Dora MOA

Counties under Mt. Dora are identified in Section 5.9.2. In general, this area is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Land in the area is owned and managed by a variety of entities, including private owners, the states of New Mexico and Texas, and various federal agencies. The primary land use outside population centers is livestock grazing (Air Force 2006). This MOA overlies the communities of Clayton, Roy, Abbott, and Mt. Dora. Approximately 6,000 people live under the Mt. Dora MOA.

Special use land management areas that underlie this MOA are listed in Table 5.8-2 and include Capulin Volcano National Monument, Chisos Lake State Park, Kiowa National Grassland, and Rita Blanca National Grassland. In addition, segments of the Santa Fe National Historic Trail are located under this MOA. These recreational areas provide a wide range of recreational opportunities, including hiking, camping, fishing, picnicking, wildlife viewing, and boating. In general, recreational use tends to be greatest from the spring to fall months.

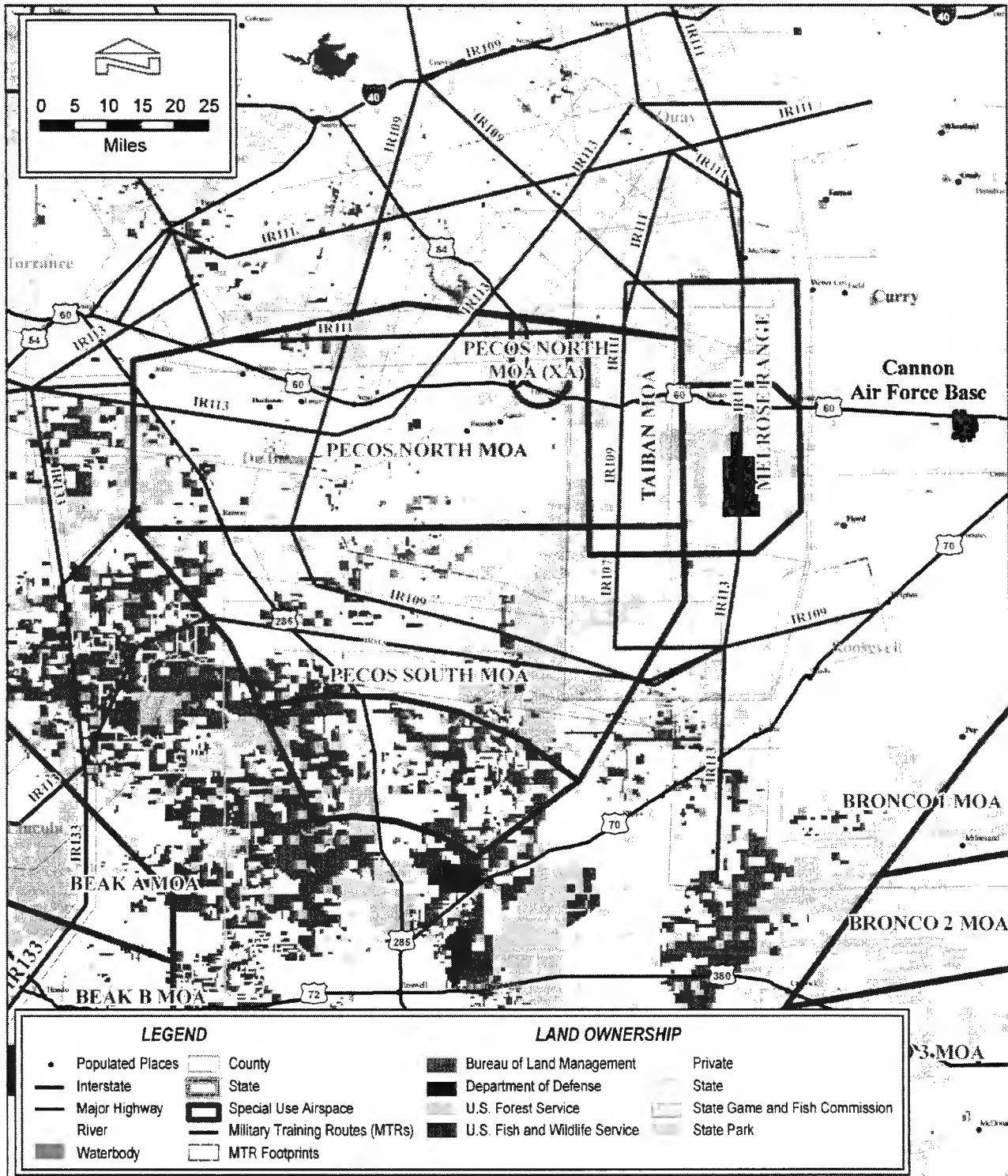


FIGURE 5.8-1. LAND OWNERSHIP UNDER THE PECOS MOA

**TABLE 5.8-2. SPECIAL USE LAND MANAGEMENT AREAS UNDER
MOAS AND MTRS USED BY THE 27 FW
(PAGE 1 OF 2)**

<i>Land Use Area</i>	<i>Type</i>	<i>MTR/MOA</i>	<i>Acreage</i>
Capitan Mountains	National Forest Wilderness	IR-113 VR-100/125	12,010 25,038
Capulin Volcano	National Monument	IR-107, VR-108, and Mt. Dora MOA	840 (each)
Carson	National Forest	IR-109 IR-111	204,015 137,175
Chamas River Canyon	National Forest Wilderness	IR-109	26,105
Chicosa Lake	State Park	IR-107 VR-108 Mt. Dora MOA	115 470 475
Cibola	National Forest	IR-113 VR-100/125	29,960 17,940
Cimarron Canyon	State Park	IR-109	33,000
Clayton Lake State Park	State Park	Mt. Dora MOA	471
Comanche	National Grassland	IR-107	59,230
Conchas Lake	State Park	IR-107 VR-108 and VR-114	1,255 1,545 (each)
Fort Sumner	National Monument	Pecos MOA	119,000
Jicarilla Apache	Indian Reservation	IR-109	64,600
Kiowa	National Grassland	IR-107 VR-108 Mt. Dora MOA	165,280 134,320 305,420
Lincoln	National Forest	IR-113 VR-100/125	104,610 109,770
Little Black Peak Carrizozo	Wilderness Study Area	IR-113	21,905
Melrose AFR	Military Reservation	IR-107, IR-111, and IR-113	22,000 (each)
Muleshoe	National Wildlife Refuge	Bronco MOA	5,415
Pecos	National Forest Wilderness	IR-111	93,315
Rio Chama	Wild and Scenic River Wilderness Study Area	IR-109 IR-109	13,260 3,425
Rio Grande	Wild and Scenic River	IR-109	6,375
Rita Blanca	National Grassland	Mt. Dora MOA	29,250
Sabinoso	Wilderness Study Area	IR-109 IR-111	12,275 3,745
Salinas Pueblo Missions	National Monument	IR-113 and VR-100/125	750 (each)
San Pedro Parks	National Forest Wilderness	IR-109	3,335
Santa Fe	National Forest	IR-109 IR-111	88,515 192,540

**TABLE 5.8-2. SPECIAL USE LAND MANAGEMENT AREAS UNDER
MOAS AND MTRS USED BY THE 27 FW
(PAGE 2 OF 2)**

<i>Land Use Area</i>	<i>Type</i>	<i>MTR/MOA</i>	<i>Acreage</i>
Sumner Lake	State Park	IR-109	410
		IR-111	7,575
		IR-113	8,430
		VR-100/125	11,835
		Pecos MOA	665
Taos	Indian Reservation	IR-109	8,000
Valley of Fires	State Park	IR-113	550
Villanueva	State Park	IR-111	1,655
Wheeler Peak	National Forest Wilderness	IR-109	345
White Sands Missile Range	Military Reservation	IR-113	4,650

Source: Air Force 1995.

Approximately 95 percent of the land under the Mt. Dora MOA airspace associated with this alternative is public and privately owned rangeland used primarily for livestock grazing (Figure 5.8-2). Approximately 12 percent of the remaining land is forested. Agricultural uses make up approximately 4 percent; surface water/wetland and urban/built-up areas make up less than 1 percent each. Private ownership accounts for approximately 78 percent of the land underlying the affected airspace with a variety of state, U.S. Forest Service, and other federal interests overseeing the remainder of the land below the airspace (Air Force 2006b).

BRONCO MOA

The Bronco MOA covers approximately 6,820 square miles in eastern New Mexico and northwestern Texas. Counties under the Bronco MOA are identified in Section 5.9.2. An estimated 88,300 persons live under the Bronco MOA. In general, this area is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Land in the area is owned and managed by a variety of entities, including private owners, the states of New Mexico and Texas, and various federal agencies. The primary land use outside population centers is livestock grazing (Air Force 2006).

Land use under the Bronco MOA is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Approximately 97 percent of land use outside population centers is livestock grazing and agriculture. Land is owned and managed primarily by private owners. The State of New Mexico and the USFWS manage the remaining lands (Figure 5.8-3). Designated special land uses are limited to the Muleshoe National Wildlife Refuge administered by the USFWS.

MTRs AND OUTSIDE CANNON AFB SCHEDULED AIRSPACE

Approximately 93 percent of the land under MTR airspace is used for rangeland and agriculture. Approximately 6.5 percent of the land is forest, water, or wetland, and approximately 0.4 percent is developed or urbanized land.

Private ownership accounts for approximately 86 percent of the land underlying the affected airspace with a variety of state, military, and other federal interests overseeing the remainder of the land below the airspace. Federal lands in the ROI are managed by the Bureau of Land Management and the DoD. Santa Rosa and Sumner lakes are owned and operated by the U.S. Army Corps of Engineers (USACE) (USACE 2001). The Bureau of Land Management's Roswell RMP applies to all land underlying MTR airspace except for land in Torrance County. Land in Torrance County is managed under the Bureau of Land Management's Rio Puerco RMP (Bureau of Land Management 1986). Table 5.8-2 lists special land use management areas under the MTRs.

As presented in Section 2.3.4, AFSOC also proposes water training and there are four area lakes that could meet training requirements. The year-round lakes are Conchas, Sumner, and Ute, and Santa Rosa is a seasonal location (refer to Figure 5.8-4). Their attributes are described in Physical Resources, Section 5.5.2. Each of these lakes is surrounded by large open areas, including public land areas. Some of the lakes also have residential development in the vicinity. AFSOC training activities would be proposed within the State Parks located at each lake, where they would avail themselves of the boat ramps and beaches.

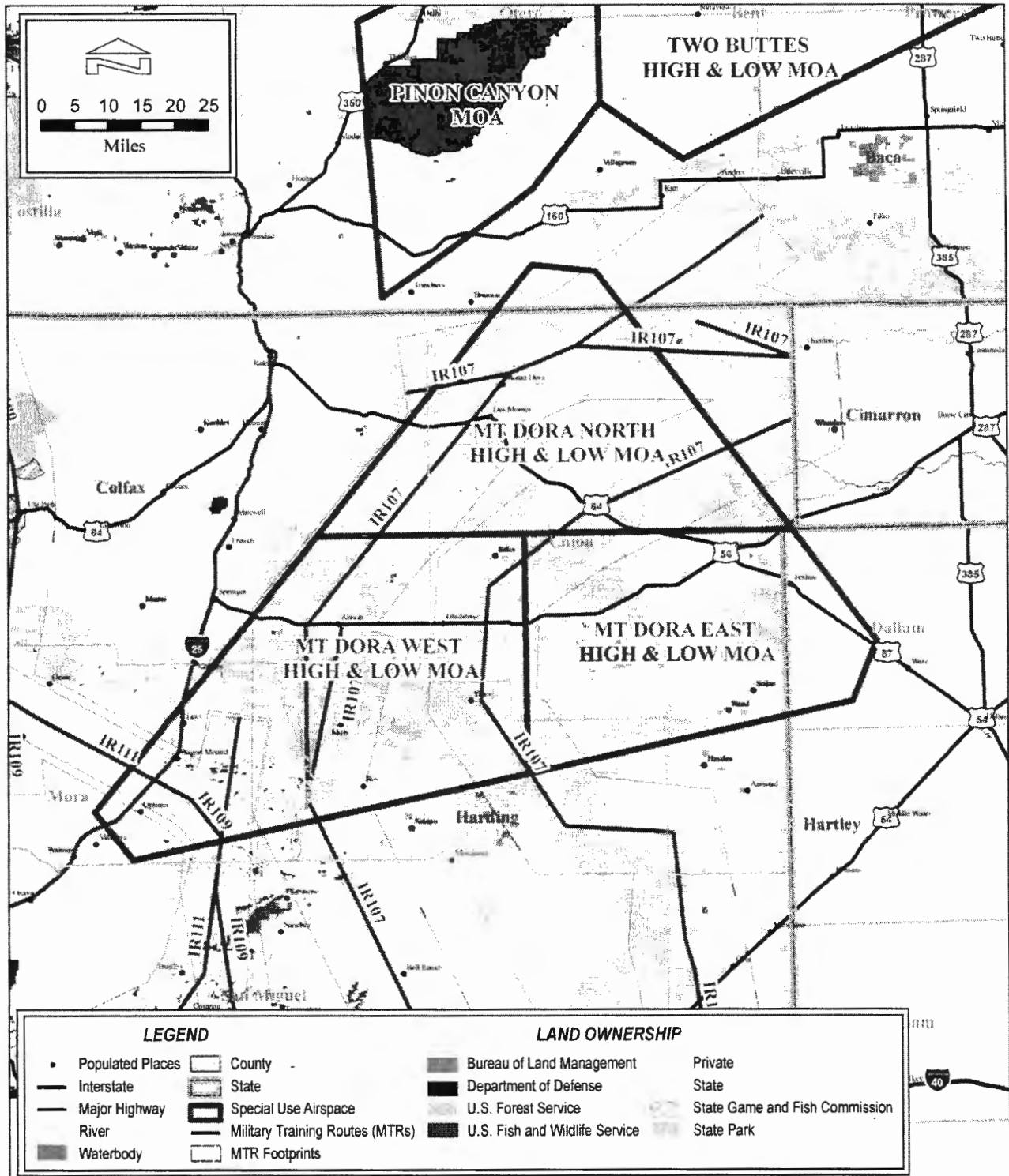


FIGURE 5.8-2. LAND OWNERSHIP UNDER THE MT. DORA MOA

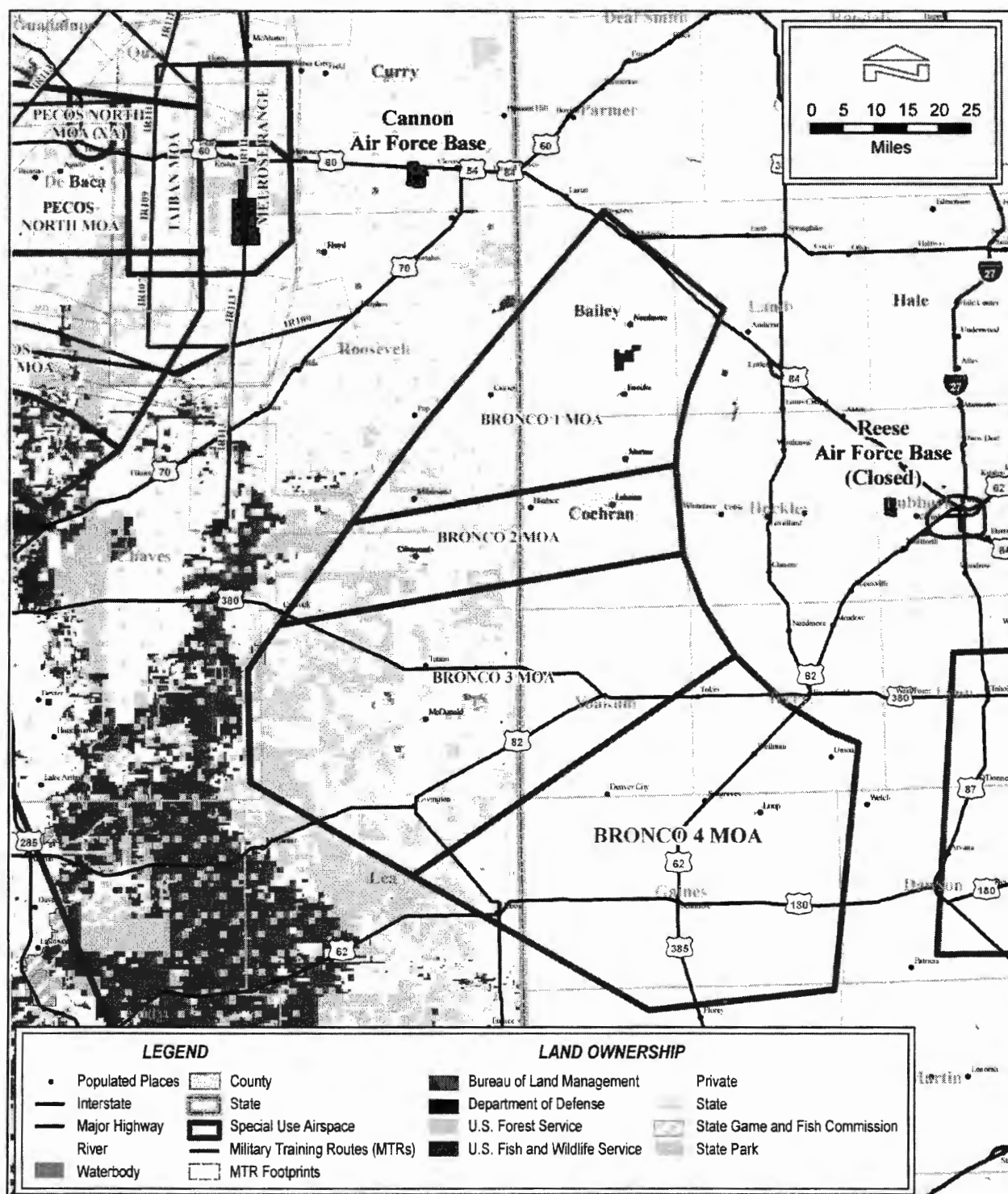


FIGURE 5.8-3. LAND OWNERSHIP UNDER THE BRONCO MOA

***AFSOC ASSETS BEDDOWN AT CANNON AFB, NEW MEXICO EIS
5.0 TRAINING AIRSPACE AFFECTED ENVIRONMENT AND
ENVIRONMENTAL CONSEQUENCES***

Each park is open 24 hours a day and offers a wide variety of recreational opportunities that may be summarized as follows:

Conchas Lake State Park is approximately 290 acres. There are camping and picnicking facilities, as well as a variety of boating amenities (ramps, marina, etc.).

Santa Rosa Lake State Park is approximately 500 acres in size. It offers camping at 76 developed sites and 25 electric sites. Picnic facilities are available, as well as a number of hiking trails. Boating, swimming, wind surfing, and waterskiing are popular activities.

Sumner Lake State Park comprises approximately 6,700 acres. It offers 50 developed camp sites and 18 electric sites. A visitor center and group shelter are also available. In addition to the popular fishing and swimming opportunities, hiking and mountain bike trails are also available.

Ute Lake State Park is approximately 1,500 acres and offers a marina and hosts a variety of water sport activities. Camping amenities include 142 developed sites, 77 electric sites, a visitor center, and group shelter.



UTE LAKE RECREATION IS REPRESENTATIVE OF ACTIVITIES ON THE LAKES PROPOSED FOR WATER TRAINING.

5.8.3 ENVIRONMENTAL CONSEQUENCES

5.8.3.1 PROPOSED TRAINING OF AFSOC ASSETS

Five general areas of concern regarding land use under the airspace were identified during scoping for this EIS. These areas of concern are as follows:

- Would the Proposed Training or an alternative affect land access?
- Would restrictions on property occur, including restrictions on use as a result of AFSOC training?
- Would the Proposed Training or an alternative interfere with the building of wind farms, radio, or cellular phone transmission towers, or similar structures?
- Would low-level overflights or chaff and flares affect residents or cattle operations?
- Would refueling operations affect biological or land use resources?

These and other land use and recreational aspects are discussed below.

Land under the Cannon AFB-scheduled airspace is predominantly agriculture or range land. There would be no anticipated change in general land use patterns, land access, land ownership, land management plans, and special use areas for the lands underlying the MOAs or MTRs. AFSOC training within the airspace would not place restrictions on private property under the MOAs or MTRs. The Proposed Training would involve a change in aircraft and a change in airspace use. Changes in airspace use have not historically affected land uses and are not anticipated to affect existing land usage. Military aircraft currently train throughout the Cannon AFB-managed airspace. Land uses such as wind farms and towers that have height and land requirements would be identified and avoided by AFSOC aircraft during training. Structures in excess of 200 feet currently have FAA warning requirements. These requirements would apply to new structures under or outside military training airspace. These requirements would not affect wind energy generation.

The change in use of training airspace would be expected to increase ambient noise levels along the MTRs (see Section 5.2). In no case does the resulting average noise level approach the 55 dB identified by the USEPA as being protective of the public health and welfare (USEPA 1974). Some public concern was expressed that the changes in noise levels may affect property values. Although the increased noise could be an annoyance, noise levels would not approach the 65 dB level identified around airports as locations where modifications may be implemented to reduce interior noise levels.



AGRICULTURE IS THE DOMINANT INDUSTRY IN COUNTIES UNDER THE TRAINING AIRSPACE WITH 93 PERCENT OF THE LAND IN AGRICULTURE, PREDOMINANTLY GRAZING.

Areas of Critical Environmental Concern (ACECs) and Special Recreation Management Areas (SRMAs) under the airspace would not likely be affected by the AFSOC overflights for the following reasons. Sites currently under the Pecos MOA where the airspace floor is 500 feet AGL have been designated as environmental management areas with active military training overflights. Sites under MOAs would have a slightly lower noise level as turboprop aircraft replace jets. Areas under the MTRs where there is an estimated ambient noise level of 25 to 36 dB would be expected to detect increased noise levels. As noted in Section 5.2, AFSOC will coordinate with land management or other resource agencies to increase avoidance of sensitive areas. Access to land would remain unaffected. Management of these resources would continue as at present.

Recreational hunting was identified as a concern by participants during scoping for this EIS. Approximately 89 percent of the pronghorn antelope taken annually are on private property. Hunters pay for hunting rights on the ranches under the airspace and at least one rancher was heard to say that he netted more income annually from antelope than he did from cattle. Since ranches under the existing airspace with jet overflights currently have successful recreational hunting, it is not likely that hunting on ranches under C-130 or CV-22 overflights would be detrimentally affected. In the extremely rare case of a low-flying aircraft causing game to startle during a hunt, the hunter would likely be annoyed. Even in such a case, land used for recreation activities such as hunting would not overall be affected by AFSOC training aircraft in the MOAs or MTRs.

AFSOC training would not change general land use patterns, land ownership, land management plans, or special use areas on the lands underlying this airspace. Access to recreation areas or public/private land under the MOAs and MTRs would continue as under current conditions. Agriculture, the predominate land use, would not require a change in land management.

Military aircraft currently use RR-188 chaff and M-206 (or equivalent) defensive flares within the Pecos MOA complex. Other flares and ordnance can also be used in Restricted Airspace over the Melrose AFR. In airspace outside the Restricted Airspace, including the Pecos and Taiban MOAs, and the Sumner ATCAA, only RR-188 chaff and M-206 flares have been assessed for use. Under the Proposed Training, the use of RR-188 chaff and M-206 defensive flares by AFSOC aircraft in the currently assessed airspace would also be authorized.

There would be no anticipated change in general land use patterns, land ownership, land management plans, or special use areas for the lands underlying the airspace associated with chaff and flare use. The proposed AFSOC training decreases the total chaff or flare use within the airspace. The release of chaff and flare end caps, aluminum coated mylar, or other residual

materials together would average less than one piece per 11 acres per year over the Pecos and Taiban MOAs. Over VR-100/125, average residual material from chaff would be one piece per 552 acres. Although the likelihood of encountering any chaff or flare residual components is low, if such were found it could result in annoyance to the observer. Participants at scoping meetings expressed annoyance at finding residual flare and chaff materials on private property.

Chaff fibers are extremely difficult to discern from naturally occurring materials found in the area (Air Force 1997b). Chaff fibers break down to the consistency of background materials. Animals do not typically consume chaff, and it is unlikely that modern chaff or its residual components would accumulate in sufficient quantities to impact land uses, affect recreational resources, or even be found. In rare instances, chaff does not deploy correctly and rather than disperse in a large cloud, the fibers may clump together and fall to the ground. When this occurs, tufts or clumps of chaff can be discernible to the naked eye. These tufts may catch on vegetation or blow across the landscape with the wind. Tufts may stay together or separate into individual fibers to some degree as the wind blows. Depending upon the context, the chaff may appear to resemble naturally occurring tufted seed pods or be viewed as foreign material.

During scoping meetings, participants expressed concern regarding potential detrimental effects to property values due to the presence of chaff or flare residual components or a fire hazard of flares. Use of chaff and flares would be directly correlated to the pilot's response to a threat within the airspace. Residual deposition of chaff or flare end cap materials would be the result of altitude of chaff use, wind directions, and wind speeds. Due to the dispersal nature of deployed chaff and flares, the average wind in the area, wind at altitudes, and the altitude at which chaff and flares are deployed, chaff or flare materials could be carried on wind currents outside, and, possibly, back inside the airspace. This analysis assumes that all chaff and flare end caps would fall on lands under the airspace. This conservative assumption could produce a higher annual concentration of chaff or flare materials than may actually be experienced under the airspace.

With regard to both chaff and flares, the likelihood of adverse impacts associated with these elements is low. For example, in the proposed and existing airspace, chaff concentrations would be less than approximately 0.80 gram per acre per year. Fewer than an estimated one flare would be dispensed annually in the Pecos airspace complex over each 80 acres.

Fire risk and the damaging effects of fire were identified as issues during scoping. AFSOC aircraft use of live 105 mm cannon fire and other munitions increase the risk of fire. AFSOC proposes to relocate personnel at Melrose AFR and increase fire management and fire response capabilities. Activities would include an increase in fire breaks and additional fire management practices. Agreements with neighboring communities would support joint fire control.

The risk of fire associated with flare use is extremely low compared to other potential sources of fire (e.g., lightning). Existing environmental conditions and potential fire hazard in the region are accounted for in current property values. A significant on and off Melrose AFR fire was started by a practice bomb deployed by a B-1B in November 2005. In the event of a military training-caused fire, the Air Force has established procedures for damage claims reimbursement. Section 4.3, Safety, further discusses fire.

Chaff and flare use are widely dispersed when used within MOAs (Air Force 1997b), reducing the potential for encountering residual components on private residences or within sensitive land use areas. Fort Sumner State Monument and a variety of ACECs and SRMAs underlie the existing

airspace already designated for both chaff and flare use. Chaff or flare residual components have not been identified in these areas of public visitation at a level that would disturb scenic quality or diminish the recreation experience. Chaff or flare use is unlikely to change land use patterns, land ownership, or land management practices.

Potential land use effects from fuel loss during refueling was mentioned at scoping. Of particular concern was potential refueling over red and yellow cedar trees under the Mt. Dora MOA. These trees have a limited habitat and are very susceptible to fire. AFSOC refueling operations could occur in the Mt. Dora MOA. The amount of jet fuel lost during an AR is normally less than a gallon. The refueling normally occurs at altitudes where that amount of fuel would vaporize before reaching the ground. AFSOC aircraft have the ability to jettison fuel in an emergency situation, but they do not regularly jettison fuel and emergency situations with the C-130 aircraft are very infrequent. As noted in Section 3.3, the C-130 has an excellent safety record. Land use impacts from refueling or other loss of fuel are not expected as a result of the proposed AFSOC beddown.

The proposed water training activities would not result in changes to land use patterns. The training activities would not require permanent disturbance to the lake or surrounding lands. Similarly, ownership of these areas would not change due to the temporary and transient nature of the activity.

Water training could have a temporary effect on recreational use of reservoirs and lakes. Safety provisions would be required to exclude recreational boating or other activities in the area of an AFSOC water training exercise during the exercise. Noise from night exercises could affect, disturb, or annoy some campers on the shores of the lakes. Other individuals camping, in homes, or at recreational sites near the water training location could view initial water training exercises with interest. Recreationalists visiting the lakes could view the training exercise as comparable to a private air show brought to them by AFSOC. Longer term residents could view the continued regular night water training exercises as an annoyance.

Therefore, it is likely that management plans would require amendment to address the potential disruption caused by 4 or 5 drops a month on a lake (more than one could occur per sortie). The timing and extent of these activities would be coordinated with Park Superintendents to ensure that they occur during low visitation (not holiday weekends, for example) and in locations that already allow disturbance and access to the shore. Permits for low-flying aircraft and to use the lakes for training would be required.

5.8.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. The Cannon-based F-16s would depart by 2008, but MTRs and MOA use would continue. Land ownership under this alternative would remain the same and noise levels would decrease under the airspace.

5.9 SOCIOECONOMICS

5.9.1 DEFINITION OF RESOURCE

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and regional industries. Changes to these

fundamental socioeconomic components can influence other resources such as housing availability, utility capabilities, and community services.

Agriculture is the dominant industry in the area under the proposed airspace. Much of the socioeconomic activity, including employment and related services provided by communities adjacent to the airspace, is related to ranching and more intensive agriculture such as dairies and irrigated cropland.

The following section considers a demographic analysis of the affected region under the airspace and a general description of regional economic activity in eastern New Mexico.

5.9.2 EXISTING CONDITIONS

The ROI for socioeconomics related to the Cannon AFB scheduled airspace consists of 23 counties in three states. This airspace overlies rural areas in east-central New Mexico, the western panhandle of Texas, and the southeast corner of Colorado (see Figure 5.1-2). The ROI counties associated with each airspace element are listed in Table 5.9-1.

TABLE 5.9-1. COUNTIES WITH LAND AREA UNDER THE AFFECTED AIRSPACE

<i>Airspace</i>	<i>Counties with Land Area Under Airspace (by State)</i>	
Bronco MOA	New Mexico Texas	Chaves, Lea, Roosevelt Andrews, Bailey, Cochran, Dawson, Gaines, Hockley, Lamb, Terry, Yoakum
Mt. Dora MOA	Colorado New Mexico Texas	Las Animas Colfax, Harding, Mora, Union Dallam
Pecos MOA	New Mexico	Chaves, De Baca, Guadalupe, Lincoln, Roosevelt
Taiban MOA	New Mexico	De Baca, Roosevelt
Melrose AFR	New Mexico	Curry, Quay, Roosevelt

5.9.2.1 POPULATION CHARACTERISTICS

Throughout this section, the term "affected area" refers to the specific land area under the MOA and MTR airspaces. These airspaces typically include only portions of each ROI county. Generally speaking, population centers in the ROI counties tend to be situated outside of the airspace. Consequently, county-level data tends to be dominated by the socioeconomic characteristics of communities outside the training airspace. More detailed data, at the census block group level, is available regarding certain demographic characteristics, including total population. Based on the acreage within each county under the airspace, estimates of the population and population density associated with each airspace element were developed (Table 5.9-2).

**TABLE 5.9-2. ESTIMATED POPULATION AND DENSITY
UNDER THE AFFECTED AIRSPACE**

<i>Airspace</i>	<i>Acres</i>	<i>Population</i>	<i>Population Density (per square mile)</i>
Bronco MOA	4,779,360	88,300	11.8
Mt. Dora MOA	3,710,883	6,012	1.0
Pecos MOA	2,170,909	2,236	0.7
Taiban MOA	199,364	89	0.3
Aggregate MTRs	37,327,857	34,696	0.6

Source: U.S. Census Bureau 2000a.

The Cannon AFB-scheduled airspace associated with AFSOC beddown assets has been in existence for many years. Because military airspace is typically configured to avoid densely populated and metropolitan or urban areas, such airspace by design tends to be located over rural and less developed areas. Population under the training airspace is typically scattered and relatively low in density compared to urbanized areas. Training airspace generally seeks to avoid population concentrations to the maximum extent possible.

The total potentially affected population under the Bronco, Mt. Dora, Pecos, and Taiban MOA airspaces is estimated to be 96,637 persons. An additional approximately 35,000 persons are estimated to reside under the MTR. Population change over the past decade has varied greatly across the 23 counties. Overall, the ROI counties have experienced less population growth than the three-state region over the same period. Average population density under the individual airspace elements ranges from a high of 11.8 persons per square mile under the Bronco MOA, to a low of 0.3 persons per square mile under the Taiban MOA. With the exception of Bronco, population density averages are 1.0 person or fewer per square mile under the affected airspace. Even this figure tends to overstate the actual density on the majority of the affected land area because much of the affected population is concentrated in small communities under the airspace. For comparison, population densities in the states of New Mexico and Texas are 15.4 and 79.6 persons per square mile, respectively. Population density in the U.S. averages 79.6 persons per square mile, the same as Texas.

5.9.2.2 ECONOMIC ACTIVITY

A number of factors have influenced economic activity and employment in New Mexico in recent years, contributing overall to moderate growth despite some industry-specific declines. Since the early 1990s, New Mexico's numerous U.S. military sites and related enterprises have experienced reduced federal defense spending, resulting in a loss of more than 8,500 jobs in the past decade (University of New Mexico 2001). The mining and manufacturing sectors, particularly copper and potash mining and textile manufacturing, declined during the 1990s, losing hundreds of relatively high-wage jobs. High-tech manufacturing, on the other hand, has shown growth since 1990. Employment in this sector, which contributed an estimated 30,000 total jobs in 2000, has helped offset federal job losses during the same period.

The 1990s were a period of expansion for the ranching industry in New Mexico, particularly dairy operations. Agriculture, food processing and food-related industries together employ over 100,000 people in New Mexico and contribute \$2 billion in annual crop and livestock sales

(NMDA 2004). Milk production in New Mexico has increased 400 percent since 1990, ranking the state 7th in the nation in milk production, 5th in the nation in production per cow, and first in the nation in herd size (New Mexico State University 2004). The dairy industry has noticeably grown in the past decade in Chaves, Curry, and Roosevelt counties (see Section 3.8.2.3).

Additional industry trends in recent years include the influx of call centers to the state, due to favorable legislation, and the growth of the gaming industry, particularly Native American-owned casinos. By 2000, these two industries contributed 12,000 and 6,000 jobs, respectively (University of New Mexico 2001). There also were substantial job gains in the retail sector due to the proliferation of Wal-Marts across the state. While job growth was moderate overall, the losses in relatively high-paying federal, mining, and manufacturing jobs compared to the gains in high-tech manufacturing and relatively low-paying call center, gaming, and retail jobs resulted in slow growth in the state's average wage level.

AGRICULTURE

Agriculture represents an important component of New Mexico's economy and to the economy under the affected airspace. Livestock grazing is the dominant agricultural activity under the airspace. Annual crop and livestock sales in the state amount to \$2 billion (New Mexico Department of Agriculture 2004). Farming employment and related food processing and food service jobs comprise 10 percent of state employment. A variety of agricultural commodities are produced on New Mexico's farms and ranches, including beef, chile, corn, milk, apples, lamb, sorghum, wheat, peanuts, and wool. In addition to its direct contributions to state output and employment, agricultural activity in New Mexico supports a number of secondary industries, including those associated with farm equipment, feed, and fertilizer.

Milk and other dairy products are the largest income generators for New Mexico farmers and ranchers. New Mexico ranks 7th in the nation in terms of overall milk production, up from 30th in 1990. Three of the seven ROI counties (Chaves, Curry, and Roosevelt) rank among the top four milk-producing counties in the state and in the top 20 dairy counties in the nation (New Mexico Department of Agriculture 2004). The dairy industry provides additional contributions to local and regional economies from the hiring of labor and the purchase of feed and other farm supplies. New Mexico dairies provide 4,000 annual jobs, with an estimated payroll of \$81 million, and are among the largest consumers of New Mexico-grown feed crops. Dairy operations in New Mexico include 194 dairy farms, nine fluid milk plants, four cheese plants, one condensed powdered milk plant, and one ice cream plant.

OIL AND GAS DEVELOPMENT

New Mexico is among the nation's leading developers of extractive energy resources. The state ranks 2nd in natural gas production and 5th in crude oil production, with proven natural gas and oil reserves ranked 3rd and 4th in the country, respectively. There are about 21,800 active oil-producing wells in New Mexico, and 23,300 active gas-producing wells. Total crude oil production in the state in 2002 was 67.4 million barrels and total natural gas production was 1,625 billion cubic feet (New Mexico EMNRD 2003).

Oil and gas development occurs in Chaves and Roosevelt counties. Over 90 percent of the oil and gas production in these two counties occurs to the south, outside the area under the affected airspace. There are 200 oil-producing wells and 1,800 gas-producing wells located in the affected area, representing 4 percent of active wells in the state. These wells produced

86,000 barrels of crude oil and 1,967 million cubic feet of natural gas in 2003, accounting for 0.13 percent of the state's total oil and gas output (New Mexico Oil Conservation Division 2003).

Gross oil and gas revenues, in the form of taxes and royalties, contributed approximately 20 percent to the state's General Fund in recent years: \$500 million in 2002 (New Mexico EMNRD 2003). Wells on lands in the affected area account for less than 1 percent of this total contribution. Oil and gas extraction activities employ about 3,500 persons in the state and an estimated 100 persons in Chaves and Roosevelt counties. Of the total two-county employment, it is likely that fewer than ten are directly associated with oil- and gas-producing wells under the affected airspace.

WIND POWER

Wind power generation is a renewable source of electricity that produces power without depleting water resources, producing emissions or generating solid waste. Commercial wind power generation in the U.S. currently is concentrated in the western and central states. Development of wind energy facilities in these states primarily reflects state policies designed to encourage their development rather than the state's wind energy potential. California has the most installed wind power capacity but its potential is less than one-seventh New Mexico's potential (New Mexico EMNRD 2000). New Mexico ranks 5th in the nation in annual wind energy potential, estimated at 497 megawatts (New Mexico State University 2007).

Four commercial scale wind turbines, with a combined capacity of 2.64 megawatts, are located near Texico in Curry County. The New Mexico Wind Energy Center is the world's fourth largest wind generation facility consisting of 136 turbines with a production capacity of 204 megawatts of energy, or enough electricity to power 100,000 typical homes (Public Service Company of New Mexico 2004). Each of the 136 turbines is powered by blades 110 feet in length and sits atop a 210-foot tower. The Center is located about 20 miles northeast of Fort Sumner on 9,600 acres of private and state-owned land in De Baca and Quay counties. In 2000, the Wind Center was expected to generate \$40 million in regional economic benefits over the next 25 years through lease payments to private landowners, payments in lieu of taxes, and worker salaries (New Mexico EMNRD 2000).



WIND TURBINES ARE LOCATED UNDER
SELECTED MTRS AND WOULD BE AVOIDED BY
AFSOC.

Other wind generation facilities occur in the vicinity of Cannon AFB. Caprock Wind Ranch is located near San Jon. It has 80 turbines and a capacity of 80 megawatts. San Juan Mesa, near Elida, has 120 turbines and a generation capacity of 120 megawatts. The Argonne Mesa project in Guadalupe County, with 90 turbines and a generation capacity of 90 megawatts, went online at the end of 2006 (New Mexico State University 2007).

New Mexico State University Agricultural Science Center supports a wind monitoring project 13 miles north of Clovis. The center erected a 50-meter meteorological tower in November 2006 and has begun collecting site-specific wind data. The project will evaluate the potential for further wind energy generation in east-central New Mexico (New Mexico State University 2007).

5.9.3 ENVIRONMENTAL CONSEQUENCES

5.9.3.1 PROPOSED TRAINING OF AFSOC ASSETS

The socioeconomic impact analysis addresses the potential effects of the proposed airspace use and chaff and flare use on the social and economic resources of the ROI. These social and economic resources are defined in terms of population and economic activity.

Issues and concerns involving socioeconomic resources were identified during public scoping. Concerns related to property values, economic pursuits, damage to structures, and safety. Public concern was expressed regarding potential detrimental environmental conditions associated with low-level overflights that could reduce land values in the affected area. There was concern that wildlife and livestock in the affected areas may be vulnerable to noise and fire hazard, leading to negative economic impacts to the agriculture and recreation industries. Concerns were raised regarding potential hazards to structures or activities associated with oil and gas extraction and wind power generation. The risk of fire damage to rangelands and area infrastructure, including livestock and fences, was identified as a concern. Potential safety issues related to joint airspace military training use and general aviation flight were identified as public concerns. Concerns were expressed that wind farms and training could have potentially detrimental effects on each other. Existing and any new wind farms would be mapped on airspace maps and avoided by training aircraft. This is the same procedure as currently applied for towers or oil or gas well drilling rigs that could project into training airspace. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training.



PUBLIC CONCERN HAS BEEN EXPRESSED REGARDING POTENTIAL EFFECTS ON LAND VALUES UNDER THE AIRSPACE.

Based on the issues and concerns noted during scoping, potential socioeconomic impacts were evaluated related to three elements: (1) changes in airspace use, (2) disturbances from overflights, and (3) chaff and flare use.

CHANGES IN AIRSPACE USE

Changes to use of MOA and MTR airspace associated with AFSOC training would increase the number of low-altitude aircraft flights throughout the airspace. The AFSOC missions frequently require low-altitude and lights out navigation training. Concern was expressed during scoping that such low-altitude lights out training could increase the risk to general aviation using the airspace.

AFSOC aircraft normally fly at 250 to 1,000 feet AGL on MTRs with training to 100 feet AGL and missions of four to five hours. During night missions, these altitudes would be below altitudes used by general aviation. No potential impact would be anticipated. During daylight missions, low-altitude general aviation aircraft such as agricultural aircraft could be encountered at training altitudes. The C-130 and CV-22 have both a pilot and co-pilot and fly at speeds that support see-and-avoid procedures during daylight (and night) operations.

As explained in Section 5.3.2, there is little or no potential for structural damage to windmills from level flight of AFSOC aircraft flying at or above 250 feet AGL and there is very low potential for a maneuvering aircraft at 100 feet to create the wind vortex level at exactly the

point where a windmill would be located. Continued and projected transient users of Cannon AFB scheduled airspace also include larger aircraft such as B-1B and B-52 aircraft. Under normal flight conditions and all but rare atmospheric conditions, wake vortices from low altitude flights fail to generate sufficient velocities to damage structure and vehicles or to pose a hazard to people or animals on the surface. Under infrequent circumstances, such as unusual aircraft maneuvers, damage could occur (Jurkovich and Skujins 2007).

Neither the C-130 nor the CV-22 is expected to fly for long periods at 100 feet AGL. In most cases, this would be expected to occur when the aircraft crosses a higher topographic feature. Stock windmills are typically located in lower topographic areas where the groundwater is closer to the surface. However unlikely, if damage resulted in a stock windmill no longer pumping, this may not be discovered immediately and could result in loss of water for grazing or other animals. Although unlikely, if damage occurred, it could have an undetermined economic impact on a ranching operation subject to the damage. The Air Force has established procedures for damage claims that begin by contacting Cannon AFB Public Affairs Office.

AR of AFSOC aircraft could occur on designated refueling tracks at both tactical altitude as low as 1,000 feet AGL and strategic altitudes between 5,000 feet AGL or higher. AR could last from a few minutes to a few hours if different AFSOC aircraft cycle to the KC-135/10 tanker at 5,000 feet AGL or higher. This refueling could be with or without lights. Tactical refueling would occur at altitudes below those used by general aviation at night. Strategic refueling would occur on an identified refueling racetrack. The altitudes and identified locations for refueling would provide general aviation information to reduce any potential for impacts. No significant impacts are anticipated from refueling.

The width of the MTRs, the AFSOC goal to avoid populated areas, and the avoidance of airfields would further reduce the risk for AFSOC aircraft and general aviation interaction. No significant socioeconomic impacts are anticipated as a result of changed airspace use by AFSOC training aircraft in the MTRs or MOAs.

NOISE DISTURBANCES

The duration of training flights would increase from the F-16 average flight of 1.5 hours to the C-130 and CV-22 average flight times of five and four hours. Increased training in the MOAs and on the MTRs would result in higher levels of noise. Noise levels in Pecos, Mt. Dora, and Taiban MOAs would increase, however they would not be expected to exceed Day-Night Average Sound Level (L_{dn}) 55 dB. Animals in these areas are expected to be temporarily more sensitive to noise due to lower previous exposure. Humans would be exposed to higher noise levels than currently experienced. The typical human response to noise effects associated with aircraft overflights is annoyance. Noise levels on selected MTR segments could increase from an existing <30 to 36 dB to 40 to 49 dB. The USEPA has identified a Day-Night Average Sound Level (L_{dn}) of 55 dB to be a level protective of the public health and welfare. This represents a threshold below which adverse noise effects are generally not expected. AFSOC training seeks to avoid areas of population concentration or lights. Nevertheless, some homes in rural areas would be overflown by training aircraft. The change from low ambient noise conditions to increased noise from low-altitude night overflights would be expected to annoy some residents.

Concern was expressed at public hearings that noise conditions may negatively affect wildlife and livestock in particular. Five cases of loss or injury to penned livestock under the Pecos MOA complex have been attributed to low-flying jet aircraft between 1994 and 2005. Wildlife and livestock have demonstrated that they can habituate to regular noises such as low-level

flights and impulse noise from munitions. The levels of noise anticipated as a result of AFSOC aircraft could startle penned individual livestock, but are not expected to result in biological effects that would impair overall animal populations.

Individual low-altitude overflights by slower turboprop aircraft would not be expected to have the same startle effect as low-altitude jet aircraft. C-130s or CV-22s flying in aircraft mode would present an audible and visible signature to which species would quickly become habituated. Despite habituation, low-altitude overflights could result in short-term negative impacts to wildlife, livestock, or humans (e.g., increased heart rate, flight, potential injury). The low population of less than one person per square mile in the remote affected area and the change from jet to turboprop aircraft make it highly unlikely that flight activity associated with AFSOC training would result in any significant social or economic impacts. It is possible that an individual or animal could be startled by an overflight at a specific time and place, but such an event would be difficult to predict given the rural nature of the area, the dispersed nature of flight operations, and the large airspace area. This is particularly the case with approximately 75 percent of the training activity occurring during after dark hours and up to 40 percent of the training occurring between 10:00 p.m. and 7:00 a.m. Speculation regarding potential injury to humans as a result of startle reaction to an overflight has not been supported by any documented incidents or studies.

During scoping, AFSOC personnel offered to implement a procedure to brief Cannon AFB-based pilots when ranchers notify them of concentrations of cattle during roundups. A Public Affairs telephone number would be distributed through ranching organizations to support avoidance of low-level overflights during sensitive roundup periods. AFSOC would use rancher-provided information in the scheduling of other users of the MOAs and MTRs.

Recreational hunting for game mammals and birds was identified as a concern by participants in scoping comments. Approximately 89 percent of the pronghorn antelope taken annually are on private property. Hunters pay for hunting rights on the large ranches under the airspace. Since ranches under the existing airspace with jet aircraft overflight currently have successful recreational hunting, it is not likely that hunting on ranches under the new or expanded airspace would be detrimentally affected by turboprop aircraft overflights. In the extremely rare case of a low flying aircraft causing a game species to startle during a hunt, the results would likely be temporary annoyance to the hunter. Land used for recreational activities such as hunting would not be affected by AFSOC overflights. Overall, economic impacts to the recreation and agriculture industries as a result of overflights or noise are not anticipated under the Proposed Training to beddown AFSOC assets.

Munitions use on Melrose AFR would result in impulse noise that would not produce overpressures of sufficient magnitude that could cause damage to property or structures off the range. The noise levels and vibrations anticipated to occur as a result of munitions use could result in annoyance to residents within audible range of the target areas.

There is little to suggest that overflights on the MTRs would impact land values in the affected area. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Pecos airspace and under existing MTRs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values than an increase in MTR use.

Recreational and long-term users of the four lakes within 100 miles of Cannon AFB could experience increased noise and disturbance from water training. Socioeconomic impacts could be reduced by scheduling water training during daylight or before 10:00 p.m. to avoid extensive nighttime disturbance. Avoidance of lakes during high-use recreational times, such as holiday weekends, would reduce exposure of individuals to unwanted noise. The increased noise levels associated with water training are not expected to approach the annual average of 40 to 49 dB, similar to some MTR segments. The increased activity could be initially viewed as interesting, but the activity could be viewed as an annoyance as training continues. Rotating training missions among locations and combining missions to perform several exercises sequentially during one day-night period could limit the exposure to noise and any resulting annoyance. There is little likelihood of land values being affected by the changes in airspace or airspace use associated with the Proposed Training.

Outdoor structures such as water towers, wind turbines, and radio towers are routinely subject to wind loads in excess of normal wake turbulence from low-altitude C-130 or CV-22 overflights (see Section 5.3.3.1). In the unlikely event of property damage due to Air Force activity, the Air Force has established procedures for damage claims. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training.

CHAFF AND FLARE USE

Chaff and flare use in the existing airspace would continue as under current conditions. The volume of chaff and flare use is projected to decrease with AFSOC training in the airspace.

Through numerous studies, chaff has never been found to be specifically harmful to wildlife, domestic animals, or humans. Chaff dispenses widely when ejected from aircraft and can travel for long distances before settling to the ground. Once settled to the surface of the earth, chaff breaks down to constituent parts indistinguishable from soil. Chaff is highly unlikely to accumulate in quantities that would result in any negative impact to surface conditions on land or water. Furthermore, it is highly unlikely that chaff debris or residual flare components would accumulate in sufficient quantities to affect property values or land uses. Some individuals could express annoyance if a chaff or flare end cap, wrapper, or other residual material were found on their property or at a recreation location, but this is not expected to affect land values or regional economics.

M-206 flares are designed to be fully consumed before reaching the ground. Flare use in existing airspace would be reduced from current conditions. The risk of fire as a result of flare use is minimal due to the low failure rate and procedures that require flare use above 2,000 feet AGL. When the National Fire Danger Rating System indicates high fire condition, chaff and flare use is limited to above 5,000 feet AGL. Concerns with fire of any cause are real and the use of flares minimally increases fire risk. Any additional fires of a non-natural source may adversely affect vegetation, injure wildlife or livestock, and destroy property such as fences and outbuildings. On November 30, 2005, a practice bomb released by a B-1B aircraft at the Melrose AFR started a fire that burned 26,000 acres of grazing and farmland and damaged or destroyed privately owned structures, fencing, wells, livestock, animal feed, and crops. These impacts were not the result of a flare, but any potential loss of forage, livestock, or infrastructure due to fire could result in economic impacts to affected landowners. The Air Force follows established procedures for claims in the event that an Air Force-caused fire should occur and subsequently damage livestock or infrastructure.

SUMMARY CONSEQUENCES

The airspace use and related activities associated with AFSOC training within the airspace are not expected to have any significant adverse impacts on the human, social, or economic resources of the region. Recreational land use, ranching operations, wind energy operations, oil and gas exploration and production, and other economic pursuits are not expected to experience any limitations or negative effects as a result of beddown of AFSOC assets. Cannon AFB would continue to work with federal, state, and local agencies to identify the impacts caused by the development of tall structures to Cannon AFB operations and training. Noise associated with increased low-altitude training, particularly night training, would likely be viewed as a significant impact by residents under the MTRs.

5.9.3.2 NO ACTION ALTERNATIVE

No Action would result in no movement of AFSOC assets to Cannon AFB although AFSOC would maintain and operate the properties. No Action would continue use of the airspace MOAs and MTRs as described under existing conditions. NMANG and transient users would train in the airspace after the 27 FW at Cannon AFB was disestablished.

5.10 ENVIRONMENTAL JUSTICE

5.10.1 DEFINITION OF RESOURCE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to the extent permitted by law and appropriate, and consistent with the agency's mission, (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

For purposes of this analysis, minority, low-income and youth populations are defined as follows:

- *Minority Population:* Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.
- *Low-Income Population:* Persons living below the poverty level.
- *Youth Population:* Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the U.S. Bureau of the Census. Total and minority population figures are based on recent demographic data released from Census 2000 (Census 2000a). The census does not report minority population, per se, but reports population by race and by ethnic origin. These data were used to estimate minority populations potentially affected by implementation of the Proposed Training. Low-income and youth population figures were also drawn from the Census 2000 Profile of General Demographic Characteristics (Census 2000a).

Environmental justice analysis applies to adverse environmental impacts. Potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the human population are anticipated, otherwise no analysis is required. The same is true for analysis of special risks to children, which would be driven by adverse environmental impacts. If adverse impacts are not anticipated, no special risk to children analysis is required. Environmental factors assessed in relation to determination of environmental justice concerns often include air quality, safety, hazardous materials, and noise. In the event that adverse environmental impacts to the human population were anticipated, the effects would be identified and the impact footprint would be mapped for the specified ROI.

5.10.2 EXISTING CONDITIONS

The ROI for environmental justice related to the Special Use Airspace consists of 23 counties in three states that contain land area under the airspace associated with the AFSOC proposal. This affected airspace overlies rural areas in east-central New Mexico, the western panhandle of Texas, and the southeast corner of Colorado (see Figure 5.1-2). The ROI counties associated with each airspace element are listed in Table 5.10-1.

TABLE 5.10-1. COUNTIES WITH LAND AREA UNDER THE AFFECTED AIRSPACE

<i>Airspace</i>	<i>Counties with Land Area Under Airspace (by State)</i>	
Bronco MOA	New Mexico Texas	Chaves, Lea, Roosevelt Andrews, Bailey, Cochran, Dawson, Gaines, Hockley, Lamb, Terry, Yoakum
Mt. Dora MOA	Colorado New Mexico Texas	Las Animas Colfax, Harding, Mora, Union Dallam
Pecos MOA	New Mexico	Chaves, De Baca, Guadalupe, Lincoln, Roosevelt
Taiban MOA	New Mexico	De Baca, Roosevelt
Aggregate MTRs	New Mexico	Fly through all above counties.

Disadvantaged groups within the ROI, which include minority and low-income populations, are specifically considered in order to assess the potential for disproportionate occurrence of impacts (see Table 5.10-2). Minority persons represent a range of 7.9 percent of the population under Melrose AFR airspace to a high of 46.2 percent under Bronco MOA. With the exception of Melrose, minorities represent greater than 30 percent of the population in the affected areas. Under all airspace units, Hispanic or Latino persons represent the largest minority group. Relative to state levels, minority populations under the Special Use Airspace represent a smaller portion of the total population. Minorities account for 55.3 and 50.2 percent of the population in New Mexico and Texas, respectively. A very small segment of Mt. Dora MOA extends into Las Animas County, Colorado. In Colorado, minorities comprise 27.5 percent of the population.

Low-income populations, also defined as those individuals living under the poverty level, account for a low of 7.3 percent of the Taiban MOA population and a high of 18.7 percent of the Bronco MOA population. The population of New Mexico has a comparable poverty status, with 18.4 percent of the population identified as low-income. The low-income population in Colorado and Texas account for 10.0 percent and 16.2 percent of the state populations, respectively. Youth populations represent approximately 25 percent of the population under the training airspace.

TABLE 5.10-2. ENVIRONMENTAL JUSTICE DATA

	2000 Population	MINORITY POPULATION		LOW-INCOME POPULATION		YOUTH POPULATION	
		Number	Percent	Number	Percent	Number ¹	Percent
Bronco MOA	88,300	40,820	46.2	16,533	18.7	23,000	26.0
Mt. Dora MOA	6,012	2,343	39.0	521	8.7	1,443	24.0
Pecos MOA	2,236	837	37.5	309	13.8	552	24.7
Taiban MOA	89	29	32.4	7	7.3	22	25.0
Aggregate MTRs	34,696	19,745	56.9	5,739	16.5	9,700	28.0
State of New Mexico	1,819,046	1,005,932	55.3	334,704	18.4	509,333	28.0
State of Texas	20,851,820	10,467,614	50.2	3,377,995	16.2	5,817,658	27.9

Note: 1. Estimated based on county data.

Source: U.S. Census 2000a

5.10.3 ENVIRONMENTAL CONSEQUENCES

5.10.3.1 PROPOSED TRAINING OF AFSOC ASSETS

Table 5.10-2 can be used to identify areas of potential impact. The AFSOC beddown and subsequent training would be expected to increase impulse noise in the Taiban MOA but this would not be expected to have a disproportionate effect upon minorities or low-income populations. Aircraft noise from overflight, especially night overflight, would increase under the MTRs. The northern MTRs scheduled by Cannon AFB are generally representative of the Pecos and Mt. Dora MOA populations, and are not disproportionately minority or low-income when compared with the State of New Mexico as a whole. The aggregate MTR population does exhibit a slightly higher minority population than the state; however, the difference is less than 3 percentage points and would not be considered inconsistent with rural agricultural portions of the state. Youth population percentages under the New Mexico airspace are somewhat lower than the State of New Mexico.

Under the Bronco MOA, minority populations are somewhat lower than the states of New Mexico and Texas. Low-income populations are comparable to the percentage of low-income persons in New Mexico and are somewhat higher than the low-income population in the State of Texas.

Overall, populations affected by increased overflight on the MTRs are not disproportionately minority or low-income. No disproportionate impacts are expected on minority or low-income populations. Low-altitude overflights would be widely dispersed and would not be expected to impact children.

5.10.3.2 NO ACTION ALTERNATIVE

Under No Action, there would be a reduction in military training overflight in the airspace when the 27 FW depart Cannon AFB. Overflights on the MTRs and in the airspace would continue as NMANG and transients trained in the airspace. The overall effect of No Action within the MOA and MTR airspaces would be a reduction in overflights and a corresponding reduction in noise.

6.0 CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS

6.1 CUMULATIVE EFFECTS

Council on Environmental Quality (CEQ) regulations and 32 Code of Federal Regulations (CFR) Part 989 stipulate that the cumulative effects analysis in an Environmental Impact Statement (EIS) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7).

The first step in assessing cumulative effects involves identifying and defining the scope of other actions and their interrelationship with the Proposed Action or alternatives (CEQ 1997). The scope must consider other projects that coincide with the location and timetable of the Proposed Action and other actions. Cumulative effects analyses evaluate the interactions of multiple actions.

This chapter identifies relevant past, present and reasonable foreseeable actions. These include military actions in the region as well as other federal actions. Non-federal actions are also identified and discussed. An analysis of how the impacts of the identified actions might be affected by those resulting from the Proposed Action for each of the environmental resources is also presented. The chapter concludes with a discussion of the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity and irreversible and irretrievable commitment of resources.

6.1.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

6.1.1.1 CANNON AIR FORCE BASE AND OTHER MILITARY ACTIONS

Recent past and present military actions in the region were considered as part of the baseline or existing conditions in the region of influence (ROI). As presented in Table 6.1-1, these actions were considered for their relevance to the beddown of Air Force Special Operations Command (AFSOC) assets at Cannon Air Force Base (AFB) and Melrose Air Force Range (AFR).

Each environmental document or other information regarding the actions was reviewed to consider the implication of each action and its synergy with the Proposed Action. Of particular concern were potential overlap in affected area, and project timing. As depicted in Table 6.1-1, not all actions are relevant to the beddown of AFSOC assets.

The F-16s were based at Cannon AFB in 1995. In 2001, the use of defensive countermeasures throughout Cannon airspace was assessed. In 2003, Cannon AFB was authorized to use white phosphorus rockets on Melrose AFR. In 2004, an Environmental Assessment (EA) of infrastructure development and improvement projects at Cannon AFB and Melrose AFR was prepared to address the Wing Infrastructure Development Outlook (WINDO) plan. Current base and range use, as well as current aircraft operations were considered for this EIS, as presented in Chapter 2.0.

TABLE 6.1-1. PAST AND PRESENT MILITARY ACTIONS

Action	Documentation ¹	Relevance to AFSOC
Proposed Force Structure Changes and Related Actions at Cannon AFB, New Mexico	United States Air Force (Air Force) 1995	No
Proposed Force Structure and Foreign Military Sales Actions	Air Force 1998	No, a management action only
Defensive Training Initiative (DTI)	Air Force 2001e	Yes, affects use of defensive countermeasures within the airspace
Use of White Phosphorus Rockets at Melrose AFB, New Mexico	Air Force 2003	Yes, affects munitions use at Melrose AFB
The Deactivation of German Air Force F-4F Aircraft Operations at Holloman AFB, New Mexico	Air Force 2004c	No
Cannon AFB WINDO Plan	Air Force 2004d	Yes, affects infrastructure at Cannon AFB
Decision by the Republic of Singapore to terminate training operations at Cannon AFB	N/A – Foreign Military Decision	No, baseline conditions evaluated in this document reflect departure of aircraft
Base Realignment and Closure (BRAC) Act of 2005 decision to include Cannon AFB on the closure list unless other missions for the base are identified	Department of Defense (DoD) 2005	Yes, recommended Cannon AFB remain open as an enclave until at least 31 December 2009 unless other missions assigned
Realistic Bomber Training Initiative	Air Force 2006b	Yes, changes use of Mt. Dora airspace proposed for scheduling by AFSOC
Transforming the 49 th FW Combat Capability, Holloman AFB	Air Force 2006c	No, assesses beddown of F-22A at Holloman AFB. Holloman AFB airspace not proposed for use by AFSOC.

REASONABLY FORESEEABLE ACTIONS

Cumulative analysis also requires consideration of reasonably foreseeable actions. The Final New Mexico Training Range Initiative (NMTRI) EIS was made available to the public on October 20, 2006. The EIS analyzes the potential environmental consequences of providing more realistic training opportunities for the 27th Fighter Wing (27 FW) and the New Mexico Air National Guard (NMANG) in Cannon AFB-managed airspace. NMTRI includes modifying the configuration of existing airspace in the Pecos Military Operations Area (MOA) complex, creating new airspace in the vicinity of the Pecos MOA complex, authorizing supersonic flight above 10,000 feet above mean sea level (MSL) in the complex, or about 5,000 to 6,000 feet above ground level (AGL), and expanding the use of defensive countermeasures (chaff and flares) into the new and modified airspace. The Proposed Action and the Preferred Alternative would expand the size, operational altitudes, and usefulness of the Pecos MOAs and associated Air Traffic Control Assigned Airspace (ATCAA).

A Record of Decision (ROD) for the NMTRI EIS was signed on 13 February 2007. The ROD states that the Air Force, after considering the potential environmental consequences of the Proposed Action and alternatives as well as other factors related to national defense, including current military operational needs, has decided to implement Alternative A, the Preferred Alternative. Pursuant to the ROD, the Air Force has requested the Federal Aviation Administration (FAA) to proceed with processing and coordinating the NMTRI airspace proposal. Also, as directed by the ROD, the 27 FW has prepared a mitigation plan (in accordance with 32 CFR Part 989.22(d)) relative to the use of chaff and flares. The resulting provisions of the mitigation plan, as well as the airspace modifications to Cannon-managed airspace, are relevant for the AFSOC based aircraft.

NMTRI is intended to support the existing training mission of New Mexico F-16 aircrews as well as transient users. These aircrews will need airspace adequately sized and configured for worldwide deployment under their Aerospace Expeditionary Force (AEF) responsibilities. Although the 27 FW will be deactivated, planes assigned to the 150th Fighter Wing (150 FW) of the NMANG and transient aircraft, including the B-1B aircraft, would continue to train in Cannon's airspace and use Melrose AFR. The 150 FW currently flies approximately 960 sorties in the Melrose, Pecos, and Taiban airspace. As stated in a letter dated August 11, 2006, the 150 FW expects their usage to "increase approximately 25 percent if the Cannon fighter jets are dispersed" (Air National Guard 2006).

The NMANG is proposing to create the Smitty MOA underneath the current CATO MOA, which is 60 miles southwest of Albuquerque. An EA was prepared and a Finding of No Significant Impact was signed in autumn 2006. Creation of this new MOA would not affect Cannon AFB or its airspace, although it may affect the NMANG use of the Pecos MOA complex.

Holloman AFB completed an EA and a Finding of No Significant Impact was signed in 2006, transforming the 49th Fighter Wing's combat capability by replacing the F-117A and T-38A aircraft with 36 (plus 4 back-up) F-22A aircraft. These aircraft will use New Mexico airspace associated with Holloman AFB. There is an overlap of airspace to be used by AFSOC, in the vicinity of the Beak MOAs (refer to Figure 5.1-1). AFSOC aircraft will utilize area Military Training Ranges (MTRs) including VR-100, VR-108, VR-114, VR-125, IR-107, IR-109, IR-111, and IR-113. Portions of VR-100/125 and IR-113 occur within the Beak MOA and underlying the Cowboy ATCAA. The Beak A, B, and C MOAs, the Beak ATCAA, and the Cowboy ATCAA are

all projected for use by the F-22A. This will result in some increased subsonic noise, as well as sonic booms.

Cannon AFB completed an EA evaluating the Air Force housing privatization initiative and a Finding of No Significant Impact was signed in 2003. The contractor for this project would manage, upgrade, demolish, and construct family housing units for Cannon AFB over a 50-year period. A new housing market analysis is currently underway to determine the current market given the new AFSOC mission for Cannon AFB. The Housing Requirements and Market Analysis was completed in January 2007. The Housing Privatization project is currently ongoing and scheduled to close in 2008.

6.1.1.2 OTHER FEDERAL ACTIONS

Other past, current, and future federal actions in the area could also contribute to cumulative effects of the Proposed Action or alternatives. Federal agencies with jurisdiction within the ROI include the Bureau of Land Management, Bureau of Reclamation, United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), FAA, Federal Highway Administration, and Federal Energy Regulatory Commission. Potential actions within the area and occurring in the same time frame as the beddown of AFSOC assets were identified and considered in preparation of this EIS.

BUREAU OF LAND MANAGEMENT

The Bureau of Land Management manages large areas of land in the vicinity of Cannon AFB and Melrose AFB (refer to Figures 5.8-1, 5.8-2, and 5.8-3). Activities on Bureau of Land Management land include livestock grazing, oil and gas development, and recreation. The Roswell Field Office published its *Resource Management Plan* in 1997 (Bureau of Land Management 1997a). The Bureau of Land Management completed an EA for its *Fire and Fuels Management Plan Amendment*; the Decision Record was signed in September 2004.

UNITED STATES FISH AND WILDLIFE SERVICE

The USFWS is currently preparing an EA to evaluate the proposed release of northern aplomado falcons (*Falco femoralis*) in eastern New Mexico and west Texas. It is currently not known whether aplomado falcons would be released in the ROI.

BUREAU OF RECLAMATION

The Bureau of Reclamation operates the Carlsbad hydroelectric project, which includes Santa Rosa (a USACE dam), Sumner, Brantley, and Avalon dams on the Pecos River. The Bureau of Reclamation continues mechanical clearing of salt cedar (*Tamarisk* spp.), an exotic and invasive shrub. The goal of this project is to restore native riparian vegetation communities along the Pecos River.

6.1.1.3 NON-FEDERAL ACTIONS

Non-federal actions include State of New Mexico, county, and private projects. General ongoing state activities include oil, gas, and grazing leases on state trust lands, land exchanges, road projects, and improvements to state parks.

Some land development projects are occurring under the airspace. Such projects include the construction of the Bosque Redondo Memorial at Fort Sumner to commemorate the "Long Walk" of some 8,000 Navajo People from their homeland to life in captivity at Bosque Redondo during the 1860s. The Memorial will include an exhibit space, resource rooms, and educational

facilities as a forum for interpretation of the fort and surrounding reservation (Museum of New Mexico 2001). Fort Sumner is under the existing Pecos MOA.

Wind energy development continues to be an important industry in New Mexico; New Mexico is ranked 5th in the U.S. for wind power potential. The New Mexico State University Agricultural Science Center is currently evaluating the potential for further wind energy generation in east central New Mexico. The center (13 miles north of Clovis) erected a 50-meter meteorological tower in November 2006 and has begun collecting site-specific wind data (New Mexico State University 2007).

There are plans to extend the Clovis Municipal Airport's runway to accommodate more corporate aircraft, larger turboprop planes, and 30-passenger regional jets. Once the runway is extended by 1,800 feet to 8,000 feet, roundtrip flights to Dallas-Fort Worth and Houston, Texas, could be offered at the Clovis airport. The city purchased land for an extension in 1998. The airport currently offers roundtrip flights to Denver and Albuquerque through Great Lakes Airlines on airplanes that accommodate approximately 19 passengers. Construction for the runway extension will occur between April 2007 and October 2007. Ultimately, airport officials want to extend the runway to 8,800 feet to support 100-passenger flights. Federal funds will be used for the majority of the 1,800-foot extension, with the city supplying 2.5 percent, or about \$1,500, and the state supplying another 2.5 percent. The total cost of the project is estimated at \$60,000 (Clovis News Journal 2006)

ConAgra Trade Group, Inc. and Carlyle/Riverstone Renewable Energy Infrastructure Fund are applying for an air quality permit from the New Mexico Environment Department to operate a 110-million-gallon-a-year ethanol plant at the highway site near ConAgra's existing Peavey Co. West grain handling facility. Once operational, the plant is projected to require 50 new positions at the plant and 50 to 75 indirect jobs in service of the plant. The Clovis plant would be the largest producer of ethanol in New Mexico. Public meetings on the proposed development occurred on November 9, 2006 at the Clovis Civic Center.

6.1.2 CUMULATIVE EFFECTS ANALYSIS

The following analysis examines how the impacts of the actions presented above might be affected by those resulting from the Proposed Action, whether such a relationship would result in potentially significant impacts not yet identified when the Proposed Action or alternative are considered together, and identifies what those impacts might be.

AIRSPACE AND RANGE MANAGEMENT, NOISE, AND SAFETY

The cumulative actions identified in Section 6.1.1 may affect airspace and range management, noise, and safety. As described in Section 2.3, AFSOC intends to use military training airspace in proximity to Cannon AFB. Should a ROD be filed for an action alternative described in the NMTRI EIS, and the FAA charts the airspace, the Pecos MOA complex would be modified. AFSOC aircraft could avail themselves of this modified airspace for their aircraft.

NMTRI assessed the impacts of the 27 FW and the NMANG F-16s, as well as transient users on the Pecos MOA complex. Chapter 5.0 of this EIS presents the impacts of the array of AFSOC aircraft, the F-16 aircraft associated with the NMANG 150 FW (since the 27 FW will be disestablished), as well as the on-going transient users within the Pecos, Taiban, Mt. Dora, and Bronco MOAs, and several MTRs. The cumulative effect that remains to be analyzed is the potential for the activities presented in Chapter 5.0 of this EIS to be distributed in the larger

Pecos MOA complex, when the NMTRI airspace is charted. The result of this could be noise levels for most of the Pecos MOA complex less than those presented in Section 5.2.3, because NMTRI would enable a larger volume of airspace for the aircraft to train. Noise levels, if the Pecos MOAs were expanded under NMTRI, could change from current conditions. An increase could be noticed if the areas were used for AFSOC training and low-level flights. Even with AFSOC using propeller aircraft, NMANG and transient jet aircraft would be expected to dominate noise conditions in these areas. Cumulative noise levels would not be expected to exceed those described in the NMTRI EIS.

The AFSOC action when combined with the replacement of F-117 and T-38s by F-22A's should not result in noise levels in excess of the 31.3 decibels (dB) projected for the Beak MOAs and Cowboy ATCAA.

PHYSICAL AND BIOLOGICAL RESOURCES

Impacts associated with the AFSOC project relate to ground-disturbing activities associated with construction and munitions use, primarily on Cannon AFB and Melrose AFR respectively. Both physical and biological resources will be impacted by the AFSOC Proposed Action and alternatives, as described in Chapters 3.0, 4.0, and 5.0 of this EIS; however, since no cumulative actions have been identified for these specific project areas, no additional cumulative impacts are anticipated.

CULTURAL RESOURCES

There are no projected adverse effects to cultural resources as a result of the EIS Proposed Action and alternatives. Issues and concerns related to cultural resources should not add to any adverse effects to cultural resource resulting from other projects, either recently completed, ongoing or proposed within the project area

Any federal project that includes ground disturbing activities has the potential to adversely affect cultural resources and is subject to National Environmental Policy Act (NEPA) compliance and Section 106 consultation. Such projects include construction, including wind farms, pipelines, or other facilities; highway work; or any other ground-disturbing undertaking that affects public land.

LAND USE, RANCHING, TRANSPORTATION, AND RECREATIONAL RESOURCES

Land use impacts associated with this action relate to land management on Melrose AFR. Actions identified above that occur at Melrose AFR consist of the use of white phosphorus rockets and reduced F-16 training resulting from BRAC actions. The increased personnel and construction activity that might coincide with other local projects, such as the airport and ethanol plant projects, will likely be absorbed in the local transportation network. Recreational resources should not see a cumulative impact from these projects.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

No anticipated cumulative consequences beyond those described for the Proposed Action are expected to have any significant adverse impacts separately or cumulatively on minority or low-income communities. The incremental effects of this proposal, in combination with potential impacts associated with the reasonably foreseeable future actions described in the previous sections, would also not be expected to have any cumulative effects on children.

6.2 OTHER ENVIRONMENTAL CONSIDERATIONS

6.2.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

CEQ regulations (Section 1502.16) specify that environmental analysis must address "...the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity." Special attention should be given to impacts that narrow the range of beneficial uses of the environment in the long-term or pose a long-term risk to human health or safety. This section evaluates the short-term benefits of the proposed alternatives compared to the long-term productivity derived from not pursuing the proposed alternatives.

A short-term use of the environment is generally defined as a direct consequence of a project in its immediate vicinity. Short-term effects could include localized disruptions and higher noise levels in some areas. Beddown of AFSOC assets will result in short-term uses of the environment due to the extent of the construction activities on both Cannon AFB and Melrose AFB. Multiple construction projects are proposed. Depending on their location, humans and animals cumulatively experience somewhat increased levels of noise in some areas. Humans and animals would continue to be exposed to one sonic boom per 5 days (or one per 4 days toward the center of the airspace from NMANG and transient aircraft training). Off-base or off-range aircraft noise levels would be generally below the United States Environmental Protection Agency (USEPA)-identified level of 55 dB. Noise effects would be short term and would not be expected to result in permanent damage or long-term changes in wildlife and livestock productivity or habitat use.

The beddown of AFSOC assets largely involves improvements to existing military lands and some change in airspace use. It should not impact the long-term productivity of the land. Cumulative use of chaff and flares would be less than existing use and would not negatively affect the long-term quality of the land, air, or water. Changes in the aircraft mix using the existing airspace would not be projected to affect long-term productive use of natural resources.

6.2.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA CEQ regulations require environmental analyses to identify "...any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented" (40 CFR Section 1502.16). Primary irreversible effects result from permanent use of a nonrenewable resource (e.g., minerals or energy). Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., disturbance of a cultural site) or consumption of renewable resources that are not permanently lost (e.g., old growth forests). Secondary impacts could result from environmental accidents, such as accidents or fires. Natural resources include minerals, energy, land, water, forestry and biota. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber and soil.

For the AFSOC assets beddown, most impacts are short-term and temporary, or longer lasting but negligible. Short-term reactions of wildlife or livestock could include temporary shifts in habitat use or activity, but long-term habituation is expected. Military training necessarily

involves consumption of nonrenewable resources, such as gasoline for vehicles and jet fuel for aircraft. Cumulatively, training operations would increase from current levels, so increased military energy consumption is expected. No irreversible or irretrievable effects are expected for cultural resources or other natural resources, including land and water.

Direct and secondary impacts to natural resources could occur as a result of live munitions use on Melrose AFR. Additional aggressive fire management practices would be introduced to reduce the risk of an accidental fire exiting Melrose AFR. While any fire can affect agricultural resources, wildlife, and habitat, the increased fire management procedures should reduce the risk of fire hazard due to AFSOC and cumulative military operations.

7.0 COMMENTS AND RESPONSES

This chapter contains comments received from federal, state, and local agencies, and the general public during the public comment period for the Draft Environmental Impact Statement (EIS). The 45-day public review process began with the publication of the Notice of Availability (NOA) of the Draft EIS in the *Federal Register* on March 30, 2007. Either a hard copy or compact disc (CD) of the Draft EIS was distributed to individuals who requested a copy and to agencies and repositories that are required to have a copy. Appendix C includes a list of the libraries and repositories that were provided a hard copy or CD of the Draft EIS for the purpose of making the document available for public review. The Draft EIS also was posted on the World Wide Web at <http://www2.afsoc.af.mil/fonsi>, the Air Force Special Operations Command (AFSOC) website, which is accessible to the public.

In accordance with the National Environmental Policy Act (NEPA), public and agency comments were reviewed and incorporated into this Final EIS. The United States Air Force (Air Force) has considered these public and agency comments in the decision making process. This chapter presents the comments from the public meetings and other comments received during the public review process that occurred following publication and distribution of the Draft EIS. Public meetings are a regulatory requirement of the Council on Environmental Quality (CEQ) regulations implementing the NEPA and Air Force Instruction (AFI) 32-7061, as promulgated in 32 Code of Federal Regulations (CFR) Part 989, (Environmental Impact Analysis Process).

Public comment was encouraged at each of the three public meetings in April 2007. It was noted that these comments would be published in the Final EIS (and that providing personal information on those comments was considered consent to publish it). It was noted that these comments would be published in the Final EIS. It was also noted in various Privacy Advisory's included in the public meeting information brochure, the briefing given at the public meetings, as well as the written comment forms and speaker registration cards that providing personal information on those comments was considered consent to publish it. A copy of the Privacy Advisory published on the internal title page of the Draft EIS is included in Appendix C. Public notification materials included newspaper display ads, press releases, public service announcements, postcards, flyers, and the Headquarters AFSOC website. The formal public comment period ended on May 14, 2007.

This chapter includes a narrative description of the Air Force comment and response process, a directory of commenters, copies of public comments, transcripts, agency comments, and associated response codes and responses.

7.1 COMMENT RECEIPT AND REVIEW

Comment Receipt: Comments on the Draft EIS included both written correspondence and verbal comments received during the 45-day public comment period. All comments received during that period are included in the Comments section following the directory.

Comment Review: In accordance with 40 CFR 1503.4, comments were assessed and considered as follows:

- Each letter or verbal comment was assigned an identification number and each comment letter and each individual's verbal comments was read and reviewed carefully.
- Within each comment letter or verbal statement, substantive comments were identified and bracketed. Three guidelines were used for determining substantive comments:

1. The comment questioned the proposed action, alternatives, or other components of the AFSOC Assets Beddown at Cannon Air Force Base, New Mexico EIS.
 2. The methodology of the analysis or results was questioned.
 3. The use, adequacy, or accuracy of data was questioned.
- The bracketed comments were reviewed by environmental resource specialists who drafted the responses. In some cases, similar comments were assigned the same response. If the same comment was repeated within the same letter or verbal comments, it was bracketed the first time it appeared.
 - The individual bracketed comments were assigned a response code. These responses are organized alphabetically and may be found in the Responses section immediately following the comments.

Comment Organization: The comment letters are printed in numerical order and are organized into three sections:

- Written comments and submitted letters - public written comments begin with 001.
- Public meeting transcripts and summaries - verbal comments begin with 2000.
- Agency letters - agency written comments begin with 3001.

7.2 LOCATING YOUR COMMENTS AND RESPONSES

A directory (Table 7-1) to locate your name begins on page 7-3. As noted on the public displays, sign-in and comment sheets, providing your name in the EIS process meant that you understood that your name and comment would be made a part of the public record for this EIS. An identification number was assigned to your comment letter and is located in the upper right hand corner of the letter or next to your name in the verbal comment.

Table 7-1 provides an alphabetical listing of commenters by last name. Look for your last name in the first column and note the letter/commenter identification number in the fourth column. This is a number that was assigned to your comment and appears on your letter or next to your verbal comments.

Written comments, submitted letters, public meeting transcripts, and agency letters are located immediately following the directory (beginning on page 7-5). All substantive comments within each comment letter and verbal comment were bracketed and given a response code. Response codes are printed next to the bracket in the right margin of the comments. Every bracketed comment has a corresponding response. Each response is designed to be read along with the comment it addresses. Air Force responses to comments are located immediately following the comment section (see page 7-123). They are organized alphabetically by response code. The first page of the responses provides a key to the response codes.

The responses refer to both the Draft EIS and Final EIS documents, as appropriate. For example, if the commenter suggests a deficiency in the Draft document, the response may refer to the Draft EIS for clarification. If the Final EIS includes amended information, the reader will be directed to that section of the Final EIS.

Public and agency involvement is an important part of the NEPA process, and all letters and their associated comments whether bracketed or not are taken into consideration by the Air Force in its decision making process.

TABLE 7-1. DIRECTORY OF COMMENTERS

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>	<i>Letter #/ Commenter #</i>	<i>Date of Comment</i>	<i>Response Code</i>
		Fort Sumner Community Development Corporation	012	4/17/2007	GE-1
Ashley	Jeff		016	5/11/2007	SA-4, LU-2, PR-1
Beck	Robert		2018	4/19/2007	GE-1
Birdsong	Ronnie		2005	4/17/2007	GE-1
Blakeley	D. Ray		003	4/14/2007	LU-1
Blakeley	D. Ray		2020	4/19/2007	LU-1
Boyce	Garth		2016	4/19/2007	GE-1
Boyce	Garth	Town of Clayton	3001	4/9/2007	GE-1
Buzard	Kendell		009	4/18/2007	PR-1
Carruthers	Kent		2003	4/17/2007	GE-1
Carter	Powhatan		2009	4/18/2007	GE-1
Carter, III	Powhatan, Joe Steele, Tommy Roybal	County of DeBaca	3006	4/17/2007	GE-1
Chavez	Juan		2007	4/18/2007	GE-1
Chavez	Juan	Village of Fort Sumner	3005	4/10/2007	GE-1
Davis	Chad		005	4/17/2007	SA-1, SA-2
Davis	Sharon		006	4/17/2007	GE-1
Davis	Tom		004	4/17/2007	GE-1
Elliott	A.S.	El Bigote Cattle Co., LLC, Gottomittee Ltd.	015	5/11/2007	NP-2, SA-3, NP-1, NO-1, LU-3, LU-4, DO-4, SA-4
Frost	Everett		2010	4/18/2007	GE-1
Gates	Billy		002	4/7/2007	DO-1, AM-1, BI-2, SA-3
Greathouse	Betty		008	4/18/2007	BI-1
Grider	Paul		017	5/11/2007	SA-2, SA-4, LU-2
Gutierrez	Gina	ENMR Plateau	014	5/10/2007	GE-1
Heringa	J.W.		2019	4/19/2007	DO-3
Ingle	Stuart		2015	4/18/2007	GE-1
Jansky	Michael	U.S. Environmental Protection Agency, Region 6	3008	5/11/2007	GE-1
Lansford	David		2001	4/17/2007	GE-1
Lansford	David	City of Clovis	3003	4/17/2007	GE-1
Leslie	Lonnie		2004	4/17/2007	GE-1
Leslie	Lonnie & Everett Frost	Local Growth Management Organization	011	4/18/2007	GE-1
Lopez	Dennis		2002	4/17/2007	GE-1
Lopez	Dennis	Roosevelt County,	3002	4/17/2007	GE-1

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>	<i>Letter #/ Commenter #</i>	<i>Date of Comment</i>	<i>Response Code</i>
		Office of Finance & Administration			
Luce	D.W.		019	5/14/2007	SA-2
Luce	Dennis & Donna		018	5/14/2007	LU-2
Luce	Donna		010	4/18/2007	BI-2, LU-2
Luce	Donna		2014	4/18/2007	DO-2
Moore	Brian K.	State of New Mexico, House of Representatives	3000	4/23/2007	GE-1
Ortega	Orlando		2000	4/17/2007	GE-1
Ortega	Orlando		2008	4/18/2007	GE-1
Ortega, Jr.	Orlando	City of Portales	3004	4/15/2007	GE-1
Pyle	Lance		2006	4/17/2007	GE-1
Pyle	Lance	Village of Melrose	3009	5/7/2007	GE-1
Robertson	Van		2017	4/19/2007	BI-2
Scott	Hanson		2012	4/18/2007	GE-1
Sparks	Allen		2011	4/18/2007	GE-1
Sparks	Allen		2013	4/18/2007	GE-1
Spencer	Stephen	U.S. Department of the Interior, Office of Environmental Policy and Compliance	3007	5/7/2007	GE-1
Thompson	Micah		007	4/17/2007	GE-1
Vick	Carl		001	4/4/2007	GE-1
West	William	The Citizens Bank of Clovis	013	4/25/2007	GE-1

APPENDIX A
CHARACTERISTICS OF CHAFF

APPENDIX A CHARACTERISTICS OF CHAFF

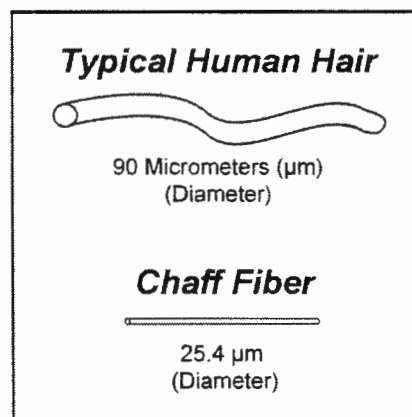
Training chaff is currently authorized in the existing restricted airspace (R-5104 and R-5105), Pecos and Taiban MOAs, and VR-100/125. When released from an aircraft, chaff initially forms a sphere, then disperses in the air. The chaff effectively reflects radar signals in various bands (depending on the length of the chaff fibers) and forms a very large image or electronic "cloud" of reflected signals on a radar screen. The aircraft is obscured from radar detection by the cloud, which allows the aircraft to safely maneuver or to leave an area. Since chaff can obstruct radar, its use is coordinated with the Federal Aviation Administration (FAA). Training chaff has D and E band dipoles removed to avoid interference with FAA radar.

CHAFF COMPOSITION

The chaff used during training consists of extremely small strands (or dipoles) of an aluminum-coated crystalline silica core. The chaff components (silica, aluminum, and stearic acid) are generally prevalent in the environment. Silica (silicon dioxide) belongs to the most common mineral group, silicate minerals. Silica is inert in the environment and does not present an environmental concern with respect to soil chemistry. Aluminum is the third most abundant element in the earth's crust, forming some of the most common minerals, such as feldspars, micas, and clays. Natural soil concentrations of aluminum ranging from 10,000 to 300,000 parts per million have been documented (Lindsay 1979). These levels vary depending on numerous environmental factors, including climate, parent rock materials from which the soils were formed, vegetation, and soil moisture alkalinity/acidity. The solubility of aluminum is greater in acidic and highly alkaline soils than in neutral pH conditions. Aluminum eventually oxidizes to Al_2O_3 (aluminum oxide) over time, depending on its size and form and the environmental conditions. Stearic acid is an animal fat that degrades when exposed to light and air.

The chaff fibers have an anti-clumping agent (Neofat - 90 percent stearic acid and 10 percent palmitic acid) to assist with rapid dispersal of the fibers during deployment (Air Force 1997). Chaff is made as small and light as possible so that it will remain in the air long enough to confuse enemy radar. The chaff fibers are approximately the thickness of a human hair (i.e., generally 25.4 microns in diameter), and range in length from 0.3 to over 1 inch. The weight of chaff material in the RR-188 cartridge is 95 grams (Air Force 1997).

A single bundle of chaff consists of the filaments in an 8-inch long rectangular tube or cartridge, a plastic piston, a cushioned spacer and a 1-inch by 1-inch plastic end cap that falls to the ground when chaff is dispensed. The spacer is a spongy material (felt) designed to absorb the force of release. Figure 1 illustrates the components of a chaff cartridge. Table 1 lists the components of the silica core and the aluminum coating. Table 2 presents the characteristics of RR-188 chaff.



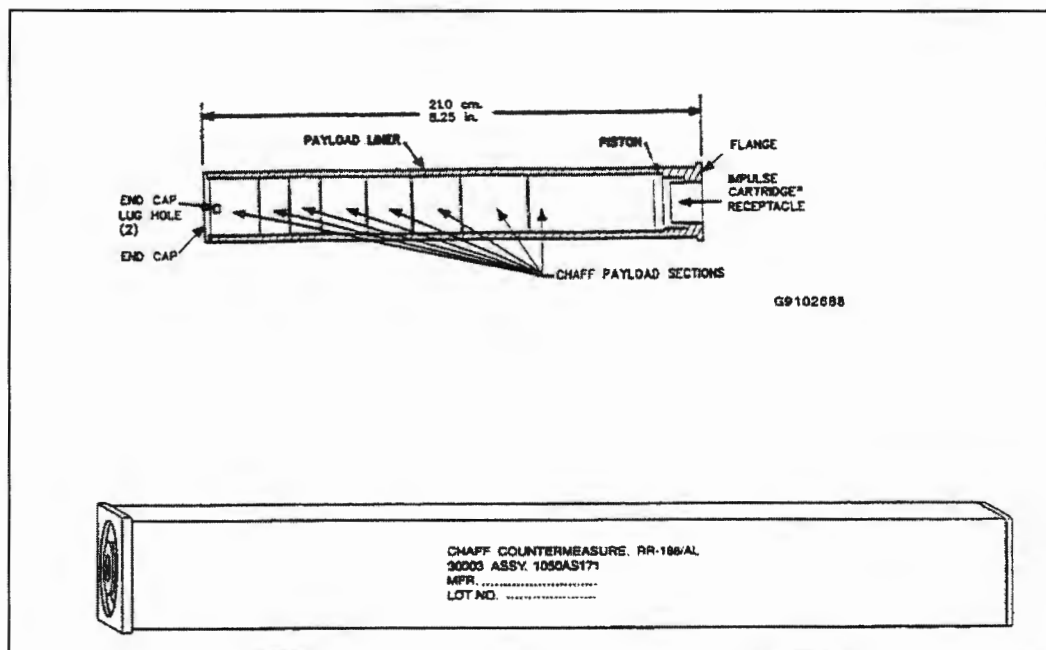


FIGURE 1. RR-188/AL CHAFF CARTRIDGE (SOURCE: AIR FORCE 1999)

TABLE 1. COMPONENTS OF RR-188 CHAFF

<i>Element</i>	<i>Chemical Symbol</i>	<i>Percent (by weight)</i>
Silica Core		
Silicon dioxide	SiO ₂	52-56
Alumina	Al ₂ O ₃	12-16
Calcium Oxide and Magnesium Oxide	CaO and MgO	16-25
Boron Oxide	B ₂ O ₃	8-13
Sodium Oxide and Potassium Oxide	Na ₂ O and K ₂ O	1-4
Iron Oxide	Fe ₂ O ₃	1 or less
Aluminum Coating (Typically Alloy 1145)		
Aluminum	Al	99.45 minimum
Silicon and Iron	Si and Fe	0.55 maximum
Copper	Cu	0.05 maximum
Manganese	Mn	0.05 maximum
Magnesium	Mg	0.05 maximum
Zinc	Zn	0.05 maximum
Vanadium	V	0.05 maximum
Titanium	Ti	0.03 maximum
Others		0.03 maximum

Source: Air Force 1997

TABLE 2. CHARACTERISTICS OF RR-188 CHAFF

<i>Attribute</i>	<i>RR-188</i>
Aircraft	A-10, F-15, F-16
Composition	Aluminum coated glass
Ejection Mode	Pyrotechnic
Configuration	Rectangular tube cartridge
Size	8 x 1 x 1 inches (8 cubic inches)
Number of Dipoles	5.46 million
Dipole Size (cross-section)	1 mil (diameter)
Impulse Cartridge	BBU-35/B
Other Comments	Cartridge stays in aircraft; less interference with FAA radar (no D and E bands)

Source: Air Force 1997

CHAFF EJECTION

Chaff is ejected from aircraft pyrotechnically using a BBU-35/B impulse cartridge. Pyrotechnic ejection uses hot gases generated by an explosive impulse charge. The gases push the small piston down the chaff-filled tube. A plastic end cap is ejected, followed by the chaff fibers and the piston. The plastic tube (or payload liner) remains within the aircraft. Debris from the ejection consists of two, 1-inch square pieces of plastic 1/8-inch thick (i.e., the piston and the end cap) and a felt spacer. Table 3 lists the characteristics of BBU-35/B impulse cartridges used to pyrotechnically eject chaff. The impulse cartridge is consumed to deploy the chaff.

**TABLE 3. BBU-35/B IMPULSE CHARGES
USED TO EJECT CHAFF**

<i>Component</i>	<i>BBU-35/B</i>
Overall Size	0.625 inches x 0.530 inches
Overall Volume	0.163 inches ³
Total Explosive Volume	0.034 inches ³
Bridgewire	Trophet A 0.0025 inches x 0.15 inches
Initiation Charge	0.008 cubic inches 130 mg 7,650 psi boron 20% potassium perchlorate 80% *
Booster Charge	0.008 cubic inches 105 mg 7030 psi boron 18% potassium nitrate 82%
Main Charge	0.017 cubic inches 250 mg loose fill RDX ** pellets 38.2% potassium perchlorate 30.5% boron 3.9% potassium nitrate 15.3% super floss 4.6% Viton A 7.6%

Source: Air Force 1997

Upon release from an aircraft, chaff forms an electronic cloud approximately 30 meters in diameter in less than one second under normal conditions. Quality standards for chaff cartridges require that they demonstrate ejection of 98 percent of the chaff in undamaged condition, with a reliability of 95 percent at a 95 percent confidence level. They must also be able to withstand a variety of environmental conditions that might be encountered during storage, shipment, and operation.

Table 4 lists performance requirements for chaff.

TABLE 4. PERFORMANCE REQUIREMENTS FOR CHAFF

<i>Condition</i>	<i>Performance Requirement</i>	
High Temperature	Up to +165 degrees Fahrenheit (°F)	
Low Temperature	Down to -65 °F	
Temperature Shock	Shock from -70 °F to +165 °F	
Temperature Altitude	Combined temperature altitude conditions up to 70,000 feet	
Humidity	Up to 95 percent relative humidity	
Sand and Dust	Sand and dust encountered in desert regions subject to high sand dust conditions and blowing sand and dust particles	
Accelerations/ Axis	G-Level	Time (minute)
Transverse-Left (X)	9.0	1
Transverse-Right (-X)	3.0	1
Transverse (Z)	4.5	1
Transverse (-Z)	13.5	1
Lateral-Aft (-Y)	6.0	1
Lateral-Forward (Y)	6.0	1
Shock (Transmit)	Shock encountered during aircraft flight	
Vibration	Vibration encountered during aircraft flight	
Free Fall Drop	Shock encountered during unpackaged item drop	
Vibration (Repetitive)	Vibration encountered during rough handling of packaged item	
Three Foot Drop	Shock encountered during rough handling of packaged item	

Note: Cartridge must be capable of total ejection of chaff from the cartridge liner under these conditions.

Source: Air Force 1997

POLICIES AND REGULATIONS ON CHAFF USE

Current Air Force policy on use of chaff and flares was established by the Airspace Subgroup of Headquarter (HQ) Air Force Flight Standards Agency (AFFSA) in 1993 (Memorandum from John R. Williams, 28 June 1993). It requires units to obtain frequency clearance from the Air Force Frequency Management Center and the FAA prior to using chaff to ensure that training with chaff is conducted on a non-interference basis. This ensures electromagnetic compatibility between the FAA, the Federal Communications Commission (FCC), and Department of Defense (DoD) agencies. The Air Force does not place any restrictions on the use of chaff provided those conditions are met (Air Force 1997).

AFI 13-201, U.S. Air Force Airspace Management, September 2001. This guidance establishes practices to decrease disturbance from flight operations that might cause adverse public reaction.

It emphasizes the Air Force's responsibility to ensure that the public is protected to the maximum extent practicable from hazards and effects associated with flight operations.

AFI 11-214 (22 December 2005) specifies that chaff is to be armed only in an approved airspace. Aircrews may employ flares over government-owned and controlled property and over-water Warning Areas with no minimum altitude restrictions when there is no fire hazard (unless a higher altitude is specified in range orders). If a fire hazard exists, minimum altitudes will be maintained in accordance with the applicable directive or range order. A minimum flare employment altitude of 2,000 feet AGL over non-government owned or controlled property is prescribed unless specified otherwise in governing regulations.

Air Operations Rules and Procedures, 22 December 2005. This instruction prescribes the rules and procedures for employing flares in training areas over government-owned or controlled property and over other than government-owned or controlled property."

CJCSM 3212.02B, Performing Electronic Attack In the U.S. and Canada for Tests, Training, and Exercises, 15 October 2003, as well as published range orders, applies to employment of chaff in the U.S. and Canada.

REFERENCES

- Air Force. 1997. *Environmental Effects of Self-Protection Chaff and Flares*. Prepared for Headquarters Air Combat Command, Langley Air Force Base, Virginia.
- _____. 1999. *Description of the Proposed Action and Alternatives (DOPAA) for the Expansion of the Use of Self-Protection Chaff and Flares at the Utah Test and Training Range, Hill Air Force Base, Utah*. Prepared for Headquarters Air Force Reserve Command Environmental Division, Robins AFB, Georgia.
- _____. 2000. *Additional Information and Analysis of Proposed Use of Defensive Chaff in the Airspace Known as the Carrabelle and Compass Lake Work Areas (Military Operations Areas)*. Prepared for the U.S. Air Force Air Education and Training Command (AETC). Tyndall Air Force Base, Florida.

APPENDIX B
CHARACTERISTICS OF FLARES

APPENDIX B CHARACTERISTICS OF FLARES

M-206 self-protection flares are currently used in the Pecos and Taiban MOAs above 2,000 feet above ground level (AGL) and the restricted areas. Other types of flares can be used along with other munitions at Melrose AFR. Self-protection flares are magnesium pellets that when ignited, burn for a short period of time (i.e., 3.5 to 5 seconds) at 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the exhaust of an aircraft, and therefore, attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. This appendix describes flare composition, ejection, and associated regulations.

FLARE COMPOSITION

Self-protection flares are primarily mixtures of magnesium and Teflon (polytetrafluoroethylene) molded into rectangular shapes (Air Force 1997). Longitudinal grooves provide space for materials that aid in ignition such as the following:

- First fire materials: potassium perchlorate, boron powder, magnesium powder, barium chromate, Viton A, or Fluorel binder.
- Immediate fire materials: magnesium powder, Teflon, Viton A, or Fluorel
- Dip coat: Magnesium powder, Teflon, Viton A or Fluorel

M-206 flares are wrapped with an aluminum-filament-reinforced tape and inserted into an aluminum (0.03 inches thick) case that is closed with a felt spacer and a small plastic end cap (Air Force 1997). The top of the case has a pyrotechnic impulse cartridge that is activated electrically to produce hot gases that push a piston, the flare material, and the end cap out of the aircraft into the airstream. The M-206 flare is 8 inches long and 1 square inch in cross-section. Table 1 provides a description of M-206 flare components. Typical flare composition and debris are summarized in Table 2. Figure 1 is an illustration of an M-206 flare.

TABLE 1. DESCRIPTION OF M-206 FLARES

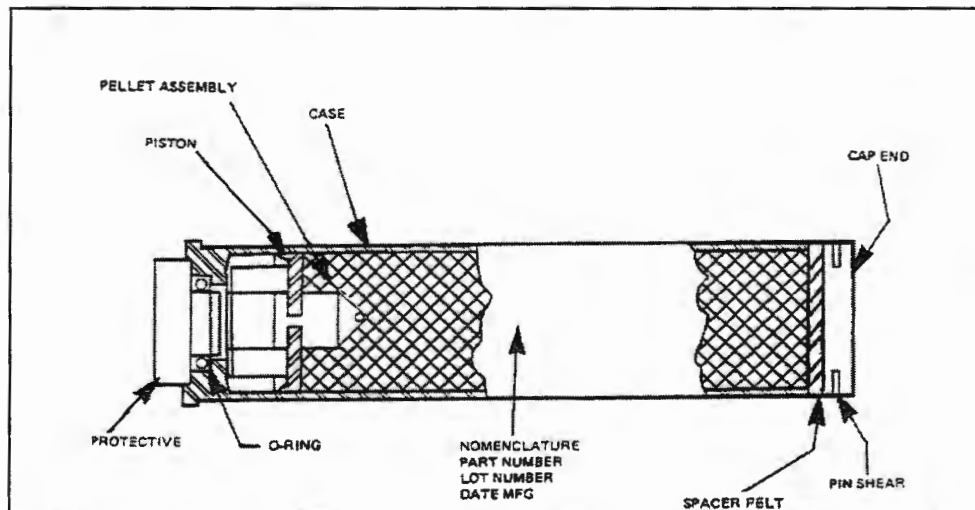
<i>Attribute</i>	<i>M-206</i>
Aircraft	A-10, AC-130, C-17, F-16
Mode	Parasitic
Configuration	Rectangle
Size	1 x 1 x 8 inches (8 cubic inches)
Impulse Cartridge	M-796
Safety and Initiation Device	None
Weight (nominal)	6.8 oz
Comments	Simulator version (T-1) uses potassium chlorate, powdered sugar, and yellow dye smoke charge

Source: Air Force 1997

TABLE 2. TYPICAL COMPOSITION OF M-206 SELF-PROTECTION FLARES¹

<i>Part</i>	<i>Components</i>
Combustible	
Flare Pellet	Polytetrafluoroethylene (Teflon) $(-[\text{C}_2\text{F}_4]_n - n=20,000 \text{ units})$ Magnesium (Mg) Fluoroelastomer (Viton, Fluorel, Hytemp)
First Fire Mixture	Boron (B) Magnesium (Mg) Potassium perchlorate (KClO_4) Barium chromate (BaCrO_4) Fluoroelastomer
Immediate Fire/ Dip Coat	Polytetrafluoroethylene (Teflon) $(-[\text{C}_2\text{F}_4]_n - n=20,000 \text{ units})$ Magnesium (Mg) Fluoroelastomer
Assemblage (Residual Components)	
Aluminum Wrap	Mylar or filament tape bonded to aluminum tape
End Cap	Plastic (nylon)
Felt Spacers	Felt pads (0.25 inches by cross section of flare)
Piston	Plastic (nylon, tefzel, zytel)

Source: Air Force 1997

**FIGURE 1. M-206 FLARE (SOURCE: AIR FORCE 1997)**

FLARE EJECTION

M-206 is a parasitic-type flare that uses an M-796 impulse cartridge (Air Force 1997). It is ignited in the aluminum case before it leaves the aircraft. Holes in the piston permit igniter gases to contact the first fire mixture on top of the flare pellet. The parasitic type flare is less likely to produce duds. Flares are tested to ensure they meet performance requirements in terms of ejection, ignition, and effective radiant intensity. If a sample produces a number of failures that exceeds the upper control quality assurance acceptance level (approximately 99 percent must be judged reliable for ejection, ignition, and intensity), the entire flare lot is returned to the manufacturer. Flare failure would occur if the flare failed to eject, did not burn properly, or failed to ignite upon ejection. For training use within the airspace, a dud flare would be one that successfully ejected but failed to ignite. That probability of a dud is projected to be .01 percent. Table 3 describes the components of M-796 impulse charges.

TABLE 3. COMPONENTS OF M-796 IMPULSE CHARGES

<i>Component</i>	<i>M-796</i>
Overall Size	0.449 x 0.530 inches
Overall Volume	0.104 cubic inches
Total Explosive Volume	0.033 cubic inches
Bridgewire	Trophet A 0.0025 inches (diameter)
Closure Disk	scribed disc, washer
Initiation Charge	
Volume	0.011 cubic inches
Weight	100 mg
Compaction	5,500 psi
Composition	20% boron 80% calcium chromate
Booster Charge	
Volume	0.011 cubic inches
Weight	70 mg
Compaction	5,500 psi
Composition	18% boron 82% potassium nitrate
Main Charge	
Volume	0.011 cubic inches
Weight	185 mg
Compaction	Loose fill
Composition	Hercules HPC-1 (~40% nitrocellulose)

Source: Air Force 1997

The flare burn-out rate is shown in Table 4. Defensive flares typically burn out in 3.5 to 5 seconds. However, specific defensive flare burn-out rates are classified. Table 4 is based on ideal conditions that assume zero aerodynamic drag and a constant acceleration rate of 32.2 feet per second per second.

$$D = (V_o * T) + (0.5 * (A * T^2)) \setminus$$

Where:

D = Distance

Vo = Initial Velocity = 0

T = Time (in Seconds)

A = Acceleration

TABLE 4. FLARE BURN-OUT RATES

<i>Time (in Sec)</i>	<i>Acceleration</i>	<i>Distance (in feet)</i>
0.5	32.2	4.025
1.0	32.2	16.1
1.5	32.2	36.225
2.0	32.2	64.4
2.5	32.2	100.625
3.0	32.2	144.9
3.5	32.2	197.225
4.0	32.2	257.6
4.5	32.2	326.025
5.0	32.2	402.5
5.5	32.2	487.025
6.0	32.2	579.6
6.5	32.2	680.225
7.0	32.2	788.9
7.5	32.2	905.625
8.0	32.2	1030.4
8.5	32.2	1163.225
9.0	32.2	1304.1
9.5	32.2	1453.025
10.0	32.2	1610

Note: Initial velocity is assumed to be zero.

M-206 FLARE RESIDUAL MATERIALS

Residual flare materials are those that are not completely consumed during ignition and fall to the ground. Unlike a dud flare, which is projected to be a 1 in 10,000 event, residual flare materials are deposited on the ground after each flare deployment. For the M-206 flare, residual materials consist of a plastic end cap, a piston, one or two felt spacers, and a piece of aluminum-coated wrapper. The wrapper may be partially consumed during ignition, so the wrapping residual material could range in size from the smallest size, 1 inch x 1 inch, to the largest size, 2 inches x 13 inches. The size of the residual wrapping material would depend upon the amount

of combustion that occurred as the flare was deployed. Even a parasitic M-206 flare that begins burning as it is ejected may not completely consume the aluminum-coated Mylar wrapping around the flare pellet.

After ignition, residual components of the M-206 flare have high surface to mass ratios and are not judged capable of damage or injury when they impact the surface. The weight of flare residual materials was of environmental interest in case the materials represented a safety risk. The M-206 piston and felt cushion together weigh approximately 0.0043 pounds. The M-206 wrapping materials have a high surface-to-weight ratio and do not fall with much force.

AFI 11-214 (22 December 2005) prohibits using flare systems except in approved areas with intent to dispense, and sets certain conditions for employment of flares. Flares are to be armed only in an approved airspace. Aircrews may employ flares over government-owned and controlled property and over-water Warning Areas with no minimum altitude restrictions when there is no fire hazard (unless a higher altitude is specified in range orders). If a fire hazard exists, minimum altitudes will be maintained in accordance with the applicable directive or range order. A minimum flare employment altitude of 2,000 feet AGL over non-government owned or controlled property is prescribed unless specified otherwise in governing regulations.

POLICIES AND REGULATIONS ADDRESSING FLARE USE

Air Force policy on flare use was established by the Airspace Subgroup of Headquarters (HQ) Air Force Flight Standards Agency (AFFSA) in 1993 (Memorandum from John R. Williams, 28 June 1993) (Air Force 1997). This policy permits flare drops over military-owned or controlled land and in Warning Areas. Flare drops are permitted in Military Operations Areas (MOAs) and Military Training Routes (MTRs) only when an environmental analysis has been completed. Minimum altitudes must be adhered to. Flare drops must also comply with established written range regulations and procedures.

AFI 11-214 (22 December 2005) prohibits using flare systems except in approved areas with intent to dispense, and sets certain conditions for employment of flares. Flares are to be armed only in an approved airspace. Aircrews may employ flares over government-owned and controlled property and over-water Warning Areas with no minimum altitude restrictions when there is no fire hazard (unless a higher altitude is specified in range orders). If a fire hazard exists, minimum altitudes will be maintained in accordance with the applicable directive or range order. A minimum flare employment altitude of 2,000 feet AGL over non-government owned or controlled property is prescribed unless specified otherwise in governing regulations.

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit	EOD	Explosive Ordnance Disposal
µg/m³	micrograms per cubic meter	EPCRA	Emergency Planning and Community Right-to-Know Act
1 SOW	1 st Special Operations Wing	ERP	Environmental Restoration Program
608 6505	6 th Special Operations Squadron	ESA	Endangered Species Act
27 FW	27 th Operations Support Squadron	FAA	Federal Aviation Administration
140 FBW	27 th Fighter Wing	FAM	Forward Area Manifold
150FW	140 th Fighter Bomber Wing	FID	Foreign Internal Defense
A/D	150 th Fighter Wing	FL	Flight Level
AADT	Approaches and Departures	FS	Feasibility Study
ACAM	Average Annual Daily Traffic	FY	Fiscal Year
ACC	Air Conformity Applicability Model	FYDP	Future Years Defense Program
ACEC	Air Combat Command	GCS	Ground Control Station
ACM	Area of Critical Environmental Concern	GPS	Global Positioning System
AEF	Asbestos-Containing Material	HAP	High Accident Potential
AFB	Aerospace Expeditionary Force	HAZMART	Hazardous Materials Pharmacy
AFCEE	Air Force Base	HE	high explosive
AFI	Air Force Center for Environmental Excellence	HLZ	Helicopter Landing Zone
AFR	Air Force Instruction	IAP	Initial Accumulation Point
AFSOC	Air Force Range	IFR	Instrument Flight Rule
AGE	Air Force Special Operations Command	IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
AGL	Aerospace Ground Equipment	IFR	Instrument Flight Rule
AHAS	Above Ground Level	INRMP	Integrated Natural Resources Management Plan
AICUZ	Avian Hazard Advisory System	IR	Instrument Route
Air Force	Air Installation Compatible Use Zone	IRSSS	Improved Remote Strafe Scoring System
AMU	United States Air Force	KIAS	Knots Indicated Airspeed
AOC	Aircraft Maintenance Unit	LANTIRN	Low Altitude Navigation and Targeting Infrared for Night
AOI	Area of Concern	L _{dn}	Day-Night Average Sound Level
AOI	Airfield Operating Instruction	L _{dn}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
APZ	Accident Potential Zone	L _{max}	Maximum Sound Level
AQCR	Air Quality Control Region	LOA	Letter of Agreement
AR	Aerial Refueling	LOS	Level of Service
ARTCC	Air Route Traffic Control Center	LRGCS	Launch and Recovery Ground Control Station
AST	aboveground storage tank	LSV	low speed vehicle
ATC	Air Traffic Control	LZ	Landing Zone
CAA ATCAA	Air Traffic Control Assigned Airspace	MAJCOM	Major Command
BAI	Animal Unit	MBTA	Migratory Bird Treaty Act
BASH	Backup Aircraft Inventory	MGD	million gallons per day
BMP	Bird-Aircraft Strike Hazard	MILCON	military construction
BP	Best Management Practice	MLRA	Major Land Resource Area
BRAC	Before Present	mm	Millimeter
CAA	Base Realignment and Closure	MOA	Military Operations Area
CDNL	Clean Air Act	MOGAS	motor gasoline
CEQ	C-Weighted Day-Night Sound Level	MOU	Memoranda of Understanding
CERCLA	Council on Environmental Quality	mph	miles per hour
CFR	Comprehensive Environmental Response, Compensation, and Liability Act	MR_NMAP	Military Operating Area and Range Noise Model
cfs	Code of Federal Regulations	MSL	Mean Sea Level
CO	cubic feet per second	MTR	Military Training Route
COA	carbon monoxide	NA NSR	Nonattainment Area New Source Review
CP	Certificate of Waiver or Authorization	NAAQS	National Ambient Air Quality Standards
CRMP	Closed Pattern	NEPA	National Environmental Policy Act
CSAR	Cultural Resources Management Plan	NESHAPS	National Emission Standards for Hazardous Air Pollutants
CWA	Combat Search and Rescue	NFA	No Further Action
CZ	Clean Water Act	NFPA	National Fire Protection Association
dB	Clear Zone	NHPA	National Historic Preservation Act
dba	Decibel	nm	Nautical Mile
dbc	A-weighted decibel	NMAAQ5	New Mexico Ambient Air Quality Standards
DD	C-weighted decibel	NMAC	New Mexico Administrative Code
DEAD	Decision Document	NMANG	New Mexico Air National Guard
DERA	Destruction of Enemy Air Defense	NMAQB	New Mexico Air Quality Bureau
DoD	Defense Environmental Restoration Act	NMARNG	New Mexico Army National Guard
DRMO	Defense Department	NMDGF	New Mexico Department of Game and Fish
DTI	Defense Reutilization and Marketing Office	NMED	New Mexico Environment Department
DZ	Defensive Training Initiative	NMNHP	New Mexico Natural Heritage Program
EA	Drop Zone	NMRPTC	New Mexico Rare Plant Technical Council
EC	Environmental Assessment	NMTRI	New Mexico Training Range Initiative
EIS	Electronic Combat	NMWQCC	New Mexico Water Quality Control Commission
EMNRD	Environmental Impact Statement		
EO	Energy, Minerals, and Natural Resources Department		
	Executive Order		

NO ₂	nitrogen dioxide	UTBNI	Up To But Not Including
NOA	Notice of Availability	UXO	unexploded ordnance
NOI	Notice of Intent	VFR	Visual Flight Rule
NOTAM	Notice to Airmen	VOC	Volatile Organic Compound
NO _x	nitrogen oxides	VORTAC	Very High Frequency Omni-directional Radio
NPDES	National Pollutant Discharge Elimination System		Range and Tactical Navigation Aid
NRCS	Natural Resources Conservation Service	VR	Visual Route
NRHP	National Register of Historic Places	WINDO	Wing Infrastructure Development Outlook
NSA	Non-Standard Aircraft	WISS	Weapons Impact Scoring System
NSPS	New Source Performance Standards	WRCC	Western Regional Climate Center
NSR	New Source Review		
NVG	Night Vision Goggles		
NWR	National Wildlife Refuge		
O ₃	ozone		
O&M	Operations and Maintenance		
OSHA	Occupational Safety and Health Administration		
P.L.	Public Law		
P/CG	Pilot Controller Glossary		
P2 Program Plan	Pollution Prevention Program Plan		
PAI	Primary Aircraft Inventory		
Pb	lead		
PM ₁₀	particulate matter less than or equal to 10 micrometers in diameter		
PM _{2.5}	particulate matter less than or equal to 2.5 micrometers in diameter		
POL	petroleum, oil, and lubricant		
ppm	parts per million		
PPSL	Predator Primary Satellite Link		
PSD	Prevention of Significant Deterioration		
PVC	polyvinyl chloride		
QD	quantity-distance		
RCO	Range Control Officer		
RCRA	Resource Conservation and Recovery Act		
RFI	Resource Conservation and Recovery Act Facility Investigation		
RI	Remedial Investigation		
RMP	Resource Management Plan		
ROD	Record of Decision		
ROI	Region of Influence		
SAR	synthetic aperture radar		
SCS	Soil Conservation Service		
SCUBA	Self-Contained Underwater Breathing Apparatus		
SEAD	Suppression of Enemy Air Defenses		
SECDEF	Secretary of Defense		
SEL	Sound Exposure Level		
SERE	Survival, Evasion, Resistance, and Escape		
SF	square feet		
SHPO	State Historic Preservation Office		
SI	Sampling Investigation		
SID	Standard Instrument Departure		
SIP	State Implementation Plan		
SO ₂	sulfur dioxide		
SOF	Special Operations Forces		
SOW	Special Operations Wing		
SO _x	sulfur oxides		
SPCC	Spill Prevention Control and Countermeasures		
SR	Slow Route		
SRCP	State Register of Cultural Properties		
SRMA	Special Recreation Management Area		
SSL	soil screening levels		
STS	Special Tactics Squadron		
SUA	Special Use Airspace		
SVOC	Semivolatile Organic Compound		
SWMU	Solid Waste Management Unit		
SWPPP	Storm Water Pollution Prevention Plan		
TAC	Tactical Air Command		
TPY	tons per year		
U.S.	United States		
UAS	Unmanned Aerial System		
USACE	United States Army Corps of Engineers		
USC	United States Code		
USDA	United States Department of Agriculture		
USEPA	United States Environmental Protection Agency		
USFWS	United States Fish and Wildlife Service		
USSOCOM	United States Special Operations Command		
UST	underground storage tank		