CAFB01

NEW MEXICO ENVIRONMENT DEPARTMENT
ENVIRONMENTAL REVIEW COMMENT FORM

Glenn

TO: James Bearzi (Robert Dinwiddie)

FROM: GEDI CIBAS
OFFICE OF THE SECRETARY
HAROLD RUNNELS BUILDING
P.O. BOX 26110
SANTA FE, NM 87505-4182
Tel.: 827-2176 Fax: 827-2836
gedi_cibas@nmenv.state.nm.us

DATE: 8-1-01

PROJECT TITLE: DEA: Cannon Air Force Base, Defensive Training Initiative

NMED FILE NO.: 1489 ER

SAI NO.: —

A. *Please review the attached document and return your comments to me (1) in hard copy AND (2) electronically, via E-mail or diskette (using WORD format), by no later than* 8-20-01

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(1) All requirements or conflicts with NMED laws and regulations of which you know;

(2) All deficiencies or inaccuracies in the information provided which prevent an adequate environmental assessment of the project;

(3) If applicable, whether the anticipated accomplishments of the proposal justify the requested funding;

(4) Other information which may be helpful to understand the environmental impact of the project (e.g., other environmental problems in the vicinity, other project impacts, problems which may develop for which no specific NMED law and regulations apply, and so on).

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(1) Use its above-stated **NMED FILE NO.** when referring to the project.

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COMMENTS:

GC Revised 8/99

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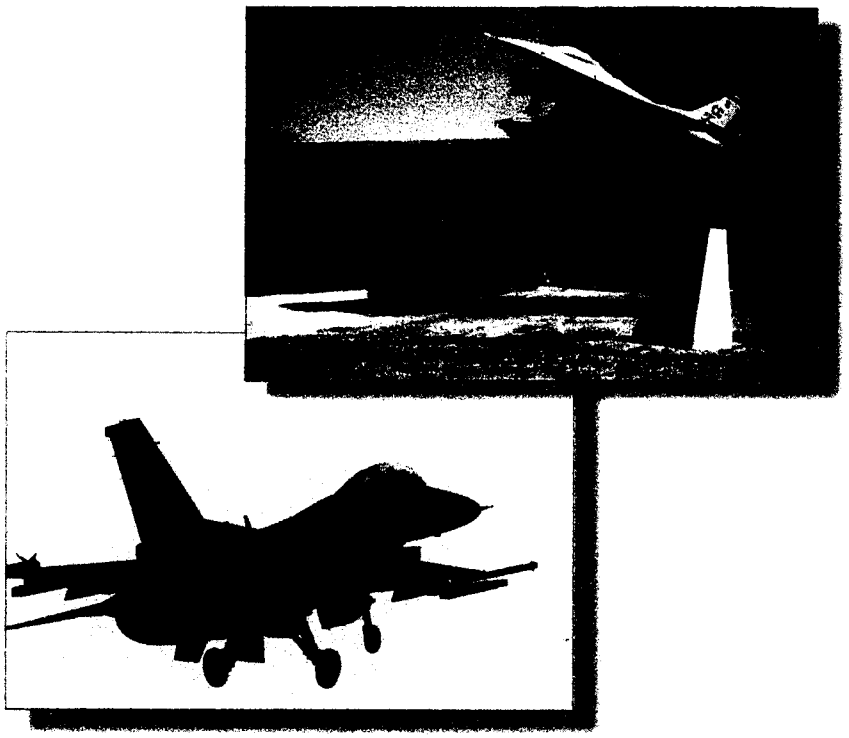
DRAFT

Defensive Training Initiative Environmental Assessment



Cannon Air Force Base, New Mexico
July 2001

ORGANIZATION OF THIS DOCUMENT

This document is arranged into seven major chapters:

Chapter 1 provides the purpose and need for the proposed action.

Chapter 2 provides a description of the proposed action and alternatives.

Chapter 3 describes the existing environmental baseline for the area underlying Cannon airspace. This section addresses nine specific resource categories. For each, the discussion briefly defines the resource, identifies the region of influence, operations, and documents the resource's existing condition.

Chapter 4 provides the analysis of potential environmental consequences as a result of the proposed action.

Chapter 5 describes the cumulative effects of the proposed action with other projects in the local area and describes any irreversible and irretrievable commitment of resources.

Chapters 6 and 7 provide the references cited, persons and agencies contacted, and the preparers and contributors of this document.

Appendices

A Characteristics of Chaff
B Characteristics of Flares
C Agency and Public Correspondence
D Relevant Statutes, Regulations, and Guidelines
E Federally Listed and Candidate Plant and Animal Species and Species of Concern
F Flare Safety Information

DRAFT
FINDING OF NO SIGNIFICANT IMPACT

DEFENSIVE TRAINING INITIATIVE

1.0 NAME OF ACTION

Implementation of the Defensive Training Initiative for Cannon Air Force Base (AFB), New Mexico.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The United States Air Force (Air Force) proposes to implement the Defensive Training Initiative, which would provide for F-16 aircraft based at Cannon Air Force Base, New Mexico, to train with chaff and flares as defensive countermeasures within existing New Mexico military airspace. This airspace includes the Pecos Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), Taiban MOA, Sumner ATCAA, and Restricted Areas R-5104/5105. Defensive training with chaff only is proposed for the northern portion of Military Training Routes Visual Routes (VRs)-100/125.

This Environmental Assessment (EA) examined the environmental consequences of increasing both the level and scope of defensive training for F-16 aircrews assigned to the 27th Fighter Wing (27 FW) at Cannon AFB, New Mexico.

Two action alternatives were considered to support this proposal. The Air Force's preferred alternative, Alternative A, would permit the use of chaff and flares in the Pecos MOA/ATCAA, Taiban MOA, and the Sumner ATCAA, and the Restricted Areas. The northern portion of VRs-100/125 is proposed for defensive training using chaff only. Flares would not be released lower than 2,000 feet above ground level (AGL), and chaff would not be released lower than 500 feet AGL.

The second alternative, Alternative B, would permit defensive countermeasure use in the same MOAs and ATCAAs as Alternative A, but would not include chaff use in the northern portion of VRs-100/125.

Airspace above Melrose AFR would continue to be used for defensive training for both Alternative A or B and would remain the sole training asset supporting expenditure of chaff and flares for the 27 FW under Alternative C, the No Action Alternative.

3.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Environmental issues and concerns identified during scoping have been grouped into nine environmental resources for analysis in this EA. A summary of these results is as follows.

Airspace: Chaff and flare use under all alternatives would not result in any changes to the airspace structure or any increases in sortie operations. Training chaff does not interfere with Federal Aviation Administration air traffic control radars or NEXRAD weather radar systems. Should interference occur, procedures are outlined in a Letter of Agreement with the Albuquerque Air Route Traffic Control Center and include real-time direction to cease dispensing chaff.

Safety: For both Alternatives A and B, no consequences from the increased volume or handling of chaff and flares at Cannon AFB would result. The minimum training flare release altitude of 2,000 feet AGL within the MOAs provides a 1,675-foot buffer for flare burnout to help ensure on-the-ground fires would not result. As an additional precaution, flare use would be modified or discontinued when fire risk is high. There is less than a one percent chance that a dud flare would fall to the ground under the airspace producing a remote safety risk of a dud being mishandled by an individual unfamiliar with handling flares. Public education programs would increase awareness and reduce potential risk. There are no safety risks associated with the use of chaff.

Materials Management: For both Alternatives A and B, the use of chaff and flares would increase. There would be a 13-times increase in chaff use and a 16-times increase in flare use. Adequate storage facilities exist on Cannon AFB to support this requirement. For Alternative A, an average of 0.14 grams (0.005 ounces) of chaff/acre/year would be released in the northern portion of VRs-100/125 and 1.71 grams (0.06 ounces) of chaff/acre/year would be released in the MOAs/ATCAAs and portions of R-5104/5105. In addition, an average of one flare/year would be released per 73 acres in the MOAs/ATCAAs and portions of R-45104/5105. For alternative B, there would be no chaff released in the northern portions of VRs-100/125. The flare ratio and use area would be the same as for alternative A. There would be an estimated 1.87 grams (0.07 ounces) of chaff/acre/year released within the MOAs/ATCAAs and portions of R-5104/5105. The one-inch by one-inch end caps that fall to the ground are small and few relative to the area under the MOAs/ATCAAs/restricted areas, and do not constitute a materials management impact. No significant environmental impacts to materials management would occur.

Air Quality: Implementation of Alternative A or B would result in a minimal increase in mobile source emissions from chaff and flares; however, they would not produce long-term air quality degradation. An air emissions conformity analysis determination is not required since this action would not exceed de minimis levels for National or New Mexico Ambient Air Quality Standards and would be implemented in an area that is classified as in attainment.

Physical Resources: Chaff constituents are comparable to, and would rapidly assimilate into, the soil. Chaff particles that fall into water could remain on the surface for up to 24 hours before sinking to the bottom. They would then become indistinguishable from bottom sediment. No anticipated impacts from chaff to soil, soil chemistry, surface water, or groundwater would occur. Flare components combust almost immediately on release from the aircraft; therefore, no anticipated discernable change in soil chemistry, surface water, or groundwater are expected from flare use.

Biological Resources: Under either Alternative A or B, the effects on biological resources from chaff are undetectable and not biologically significant. The benign nature of chaff materials (elemental aluminum and aluminosilicate fibers) and the rapid break down of chaff fibers in the

natural environment result in no impacts from chaff to wetland habitats, special status species, or habitats at the community or ecoregional level. Effects from chaff on people, livestock, or agricultural plants are undetectable and not biologically significant. No toxic effects are expected from chaff or flares; neither would there be irritation of the respiratory system or pathogenic inhalation risk. Flare usage could impact the environment if it were to result in a fire; however, the biological consequences would be similar to natural grass fires that occur in the region.

Cultural Resources: For both Alternatives A and B, no impacts to cultural resources are expected. Chaff and flares are widely dispersed within the airspace, reducing the potential for encountering residual components in association with cultural resources.

Land Use and Visual Resources: There would be no anticipated change in land use patterns, land ownership, land management plans, or special use areas underlying the airspace. Residual components of chaff are not likely to accumulate in sufficient quantities to impact land uses or visual resources.

No impacts to property values are expected due to the presence of chaff and flare residual components or the fire hazard of flares. Considering the large geographic area proposed for overflight, visual resources are not expected to be impacted by the residual components from chaff or flares.

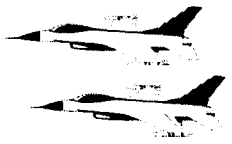
Environmental Justice: Neither minority ethnic groups, low-income populations, nor children are disproportionately represented in the area under the airspace. The proposed action would not create significantly adverse environmental or health effects. No disproportionately high or adverse human health or environmental effects on minority and low-income populations or children have been identified.

4.0 CONCLUSION

On the basis of the findings of this EA, which was prepared in accordance with the requirements of the National Environmental Policy Act, Council on Environmental Quality regulations, and Air Force Instruction 32-7061, and after careful review of the potential impacts of the proposed action, I conclude that implementation of the proposed action will not result in significant impacts to the quality of the human or natural environment. Therefore, a Finding of No Significant Impact is warranted for this action and an environmental impact statement is not required.

_____ _____

KENNETH P. SHELTON, Colonel, USAF Date
Chairperson, ACC Environmental Leadership Board



Draft Environmental Assessment

for the

Defensive Training Initiative
Cannon Air Force Base, New Mexico

Prepared For:

Air Combat Command
Langley Air Force Base, Virginia

July 2001

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EXECUTIVE SUMMARY

This Draft Environmental Assessment (EA) analyzes the Cannon Air Force Base (AFB) proposal to provide pilots with defensive training through the use of chaff and flares in currently established military airspace associated with Cannon AFB. The airspace includes the Pecos Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), Sumner ATCAA, Taiban MOA, Restricted Areas (R-5104/5105), and the northern part of Military Training Routes (MTRs) Visual Routes (VRs)-100/125. The Defensive Training Initiative will substantially improve the defensive responses of the 27th Fighter Wing (27 FW) pilots. Combat-condition training teaches defensive maneuvers combined with the near instantaneous dispensing of defensive countermeasures such as chaff, which confuses enemy search radars and radar-guided missiles, and flares, which decoy heat-seeking missiles and sensors.

This EA was prepared in accordance with the requirements of the National Environmental Policy Act of 1969, the Council on Environmental Quality regulations of 1978, and Air Force Instruction (AFI) 32-7061, titled The Environmental Impact Analysis Process. AFI 32-7061 provides implementing guidance for Air Force compliance with the National Environmental Policy Act. For the Defensive Training Initiative EA, the Air Force notified agencies and the public and conducted five public scoping meetings in New Mexico to assist in identifying pertinent environmental issues and public concerns. During the scoping process, input on the Defensive Training Initiative EA was obtained from federal, state, and local agencies; elected officials; Native American tribal governments; and the general public.

PURPOSE AND NEED

The 27 FW at Cannon AFB, New Mexico is an integral part of the United States Aerospace Expeditionary Force (AEF) with routine deployments to the world's "hot spots." Pilots of the 27 FW are subjected to increasingly sophisticated tactics and equipment of hostile forces. Pilots need combat-condition defensive training to survive these enemy tactics and equipment. For 50 years, aircraft stationed at Cannon AFB have been assigned a combined air-to-ground and air-to-air mission. The current F-16 aircraft continue that tradition with both an air-to-ground and an air-to-air role in the AEF. At present, 27 FW pilots spend 10 to 20 percent of their training time in airspace that permits combat-condition training. The Defensive Training Initiative would permit chaff and/or flare use in a greater area of existing Cannon AFB-managed airspace so that 40 to 50 percent of 27 FW training could be conducted under simulated combat conditions.

PROPOSED ACTION

The proposed Defensive Training Initiative would permit the use of chaff and flares in existing airspace contiguous to the Melrose Air Force Range (AFR) so that combat-condition training could occur in response to available simulated ground-based and aircraft threats. Currently, pilots can use defensive countermeasures to avoid these threats only in the restricted airspace over Melrose AFR. The 27 FW, as the proponent for this action, proposes to conduct defensive training using chaff and flares in the following existing military airspace: Pecos MOA/ATCAA; Sumner ATCAA; and Taiban MOA. Chaff use only is proposed for defensive training in the northern portion of VRs-100/125. F-16 pilots from the four squadrons at Cannon AFB, pilots from the New Mexico

Air National Guard, and occasional users of the airspace would benefit from this enhanced combat-condition defensive training.

Proposed Alternatives

Three alternatives are analyzed in this EA as shown on Figure ES-1.

ALTERNATIVE A (PREFERRED ALTERNATIVE): PECOS MOA/ATCAA, TAIBAN MOA, SUMNER ATCAA, R-5104/5105, AND VRS-100/125

Alternative A includes the use of Pecos MOA/ATCAA, Taiban MOA, R-5104/5105, and Sumner ATCAA for defensive training dispensing of flares from 2,000 feet above ground level to approximately 51,000 feet mean sea level and chaff from 500 feet above ground level to approximately 51,000 feet mean sea level. Dropping flares above 2,000 feet above ground level ensures complete burnout and reduces the potential of fire risk. The northern portion of the VRs-100/125, which has existing electronic threat emitters, is proposed for defensive training using chaff only. Use of the northern portion of VRs-100/125 would provide combat-condition training using existing emitters that simulate enemy air defenses. Threat emitters are also located under the MOAs, ATCAAs, and under the restricted airspace. Chaff and flare use would continue in the restricted airspace over the Melrose AFR. Alternative A directly meets the needs of Cannon AFB pilots through both high and low-altitude training scenarios that combine air-to-air and air-to-ground missions in contiguous airspaces.

ALTERNATIVE B: PECOS MOA/ATCAA, TAIBAN MOA, R-5104/5105, AND SUMNER ATCAA

Under this alternative, Pecos MOA/ATCAA, Taiban MOA, and Sumner ATCAA airspace would be used for defensive training. Although the same amount of chaff and flares would be used under this alternative, the area involved in dropping of chaff and flares would decrease. This would result in about a 9 percent increase in chaff use in this airspace over that proposed under Alternative A. Alternative B does not include defensive training using chaff in the northern portion of VRs-100/125. Chaff and flare use would continue to take place in restricted airspace over Melrose AFR. Alternative B would meet high-altitude training requirements although, without the MTR, several low-altitude training needs would not be met. Without this low altitude capability, the pilots would not experience defensive training in as many scenarios as could occur under Alternative A.

ALTERNATIVE C: NO ACTION

The No Action alternative continues limited defensive training using chaff and flares in the restricted airspace over Melrose AFR. Under the No Action Alternative, chaff and flare use would continue at existing rates in the restricted airspace (R-5104/5105) over Melrose AFR. No chaff or flare use would be permitted in the Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA and northern portions of VRs-100/125. Pilots would continue to be limited in their training against possible enemy threats and pilots would not experience combat-condition defensive training in most of the airspace associated with Cannon AFB.

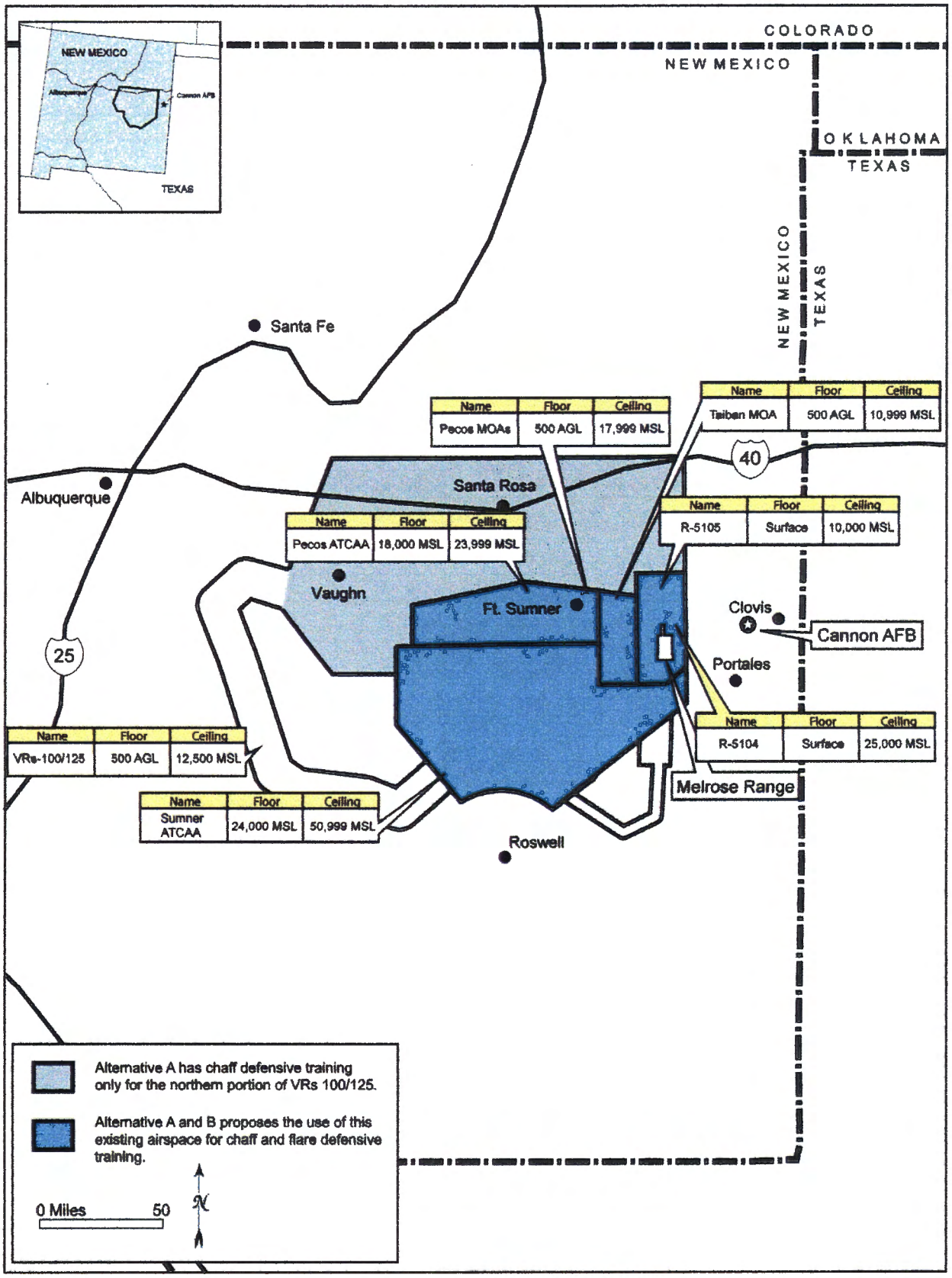


Figure ES-1. Cannon Airspace and Vicinity

ENVIRONMENTAL CONSEQUENCES

Environmental issues and concerns identified during scoping have been grouped into nine environmental resource areas for analysis in this EA. Table ES-1 summarizes the potential environmental consequences to each resource for each alternative.

Table ES-1. Defensive Training Alternative Environmental Summary

Environmental Resource	*Alternative A MOA, ATCAA, MTR (part)*	*Alternative B MOA, ATCAA*	*Alternative C (No Action)*
Airspace Management	No significant impact.	No significant impact.	No significant impact.
Safety	No chaff consequence, very slight dud flare risk.	Same as A.	Same as A at range only.
Materials Management	No significant impact.	No significant impact.	No significant impact.
Air Quality	No significant impact.	No significant impact.	No significant impact.
Earth and Water Resources	Constituents comparable to soil; no discernable impact.	Same as A except chaff in smaller area.	Same as A at range only.
Biological			
Natural	Constituents comparable to soil; no significant impacts; non-toxic.	Same as A except chaff in smaller area.	Same as A at range only.
Human-related	No significant impact to ranching except slight potential for fire from flare misuse.	Same as A except chaff in smaller area.	Same as A at range only.
Cultural Resources	No significant impact; slight potential for fire from flare misuse.	Same as A except chaff residual components in smaller area.	Same as A at range only.
Land Use/Visual	No land use impacts and insignificant infrequent visual impact from chaff or flare residual components (end caps).	Same as A except chaff residual components in smaller area.	Same as A at range only.
Environmental Justice	No minority, low-income, or children impacts; slight potential for encountering dud flares; handled through information program.	Same as A.	Same as A at range only.

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The 27th Fighter Wing (27 FW) at Cannon Air Force Base (AFB) is an integral part of the United States Aerospace Expeditionary Force (AEF). The AEF concept integrates fighters, bombers, support aircraft, and tactical airlift into one functional unit that responds rapidly and decisively to potential crises anywhere in the world. Cannon AFB's F-16 pilots are routinely deployed to the world's "hot spots" and subjected to hostile radar and anti-aircraft defenses. The increasing sophistication of enemy equipment and tactics requires that the 27 FW pilots be trained to instantly respond to these threats. Continued survival depends on this training.

Defensive training involves the rapid response of pilots to threats from opposing radar, reflexive maneuvering, and dispensing of defensive countermeasures. Defensive countermeasures include chaff that confuses enemy search radars, and radar-guided missiles and flares that decoy heat-seeking missiles and sensors. See section 2.1.1 for a detailed description of chaff and flares.

The 27 FW, the proponent of this action, currently conducts training using chaff and flares, but is limited to the restricted airspace associated with the Melrose Air Force Range (AFR) (R-5104/5105). The 27 FW proposes to conduct defensive training using chaff and flares in the existing military airspace designated as Pecos Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), Sumner ATCAA, and Taiban MOA. Chaff use is also proposed for defensive training in the northern portion of Military Training Routes (MTRs) Visual Routes (VRs)-100/125 (see Figure 1-1). Implementation of this proposal would expand defensive training for F-16 pilots of the 27 FW stationed at Cannon AFB and other transient users.

This Defensive Training Initiative (DTI) Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969. It addresses the 27 FW's Proposed Action and reasonable alternatives to the Proposed Action. If the analyses presented in this EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, then a Finding of No Significant Impact would be issued.

1.2 BACKGROUND

1.2.1 Cannon AFB

Cannon AFB is located approximately 7 miles west of Clovis, New Mexico and 17 miles west of the Texas-New Mexico state line (Figure 1-1). The base comprises approximately 3,500 acres and administers the Melrose AFR, which is located about 30 miles west of Cannon AFB. Melrose AFR encompasses approximately 66,000 acres with an additional 20,896 acres of buffer area (personal communication, McCord 2001).

During the mid 1920s, Portair Field on the current site of Cannon AFB was established as a civilian passenger terminal for transcontinental commercial flights. The airport's name was changed in the 1930s to Clovis Municipal Airport. After the United States' entry into World War II, the Army Air Corps took control of the airfield, which became known as Clovis Army Air Base.

Since 1943, the base has trained aircrews with an air-to-ground mission. Initially, the 16th Bombardment Operational Wing trained crews of B-17, B-24, and B-29 heavy bombers. The

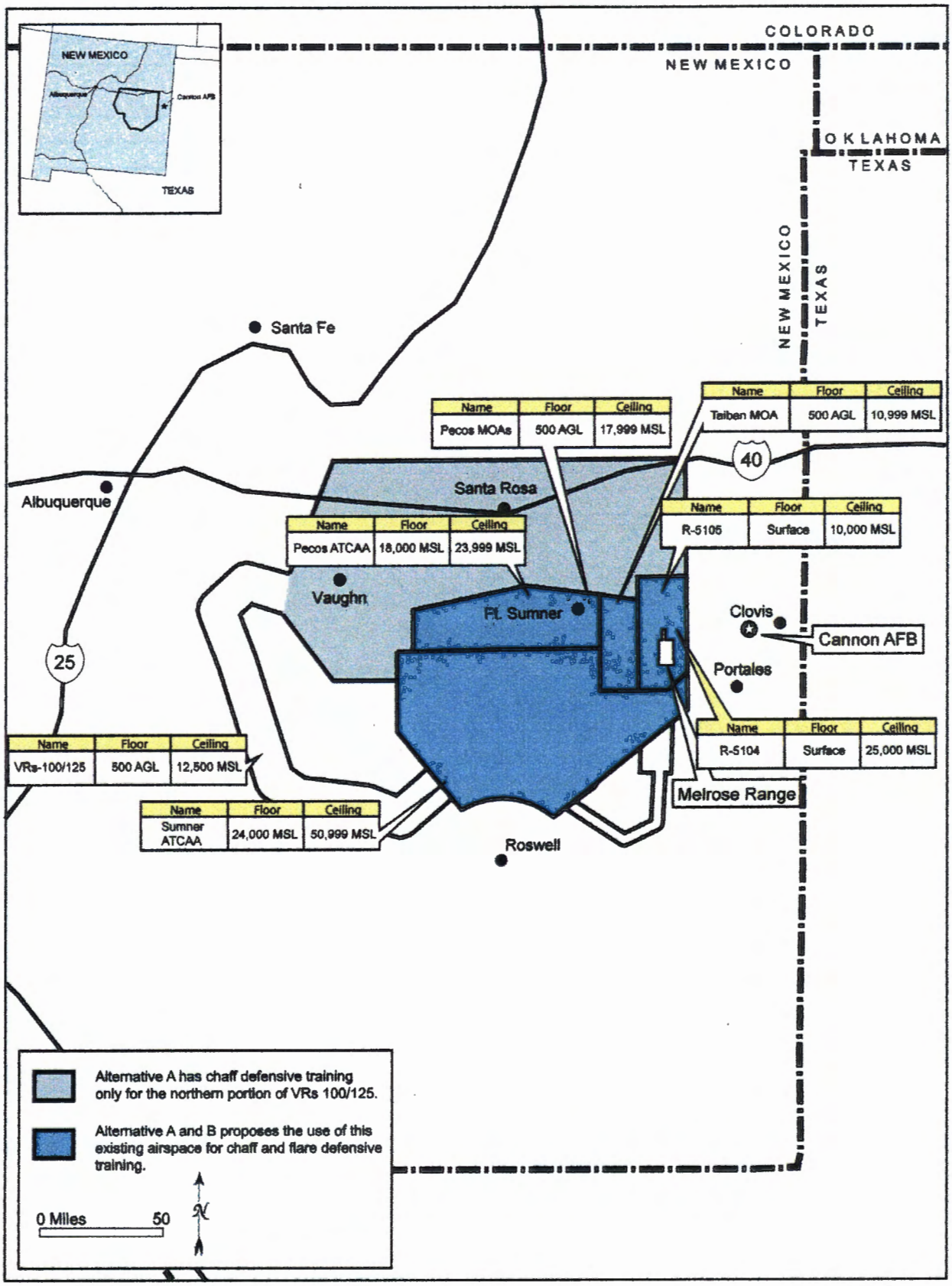


Figure 1-1. Cannon Airspace and Vicinity

base was inactivated in 1947 and reactivated in 1951 as a Tactical Air Command base with the 140th Fighter-Bomber Wing flying F-86 Sabre jet fighters. In 1954, the base became a major training site for F-86 aircrews with the transfer of the 474th Fighter-Bomber Group from Taegu, Korea.

Clovis AFB was renamed Cannon AFB on June 8, 1957, in honor of the late General John K. Cannon, a former commander of Tactical Air Command. The 474th and 312th Fighter-Bomber Groups were also redesignated as Tactical Fighter Wings (TFWs) during 1957, with the 832nd Air Division being activated to oversee their activities. Two years later the 312th was replaced by the 27 TFW, flying F-100 aircraft. In 1969, the 27 FW was re-equipped with the F-111E and, in 1971, with the F-111D. The 27 TFW became the principal United States Air Force (Air Force) unit at Cannon AFB in 1975. In 1995, the current F-16s, with a combined air-to-air and air-to-ground training requirement, replaced the aging F-111s. In 1998, the 428th Fighter Squadron F-16s were added as part of a cooperative training program among allied nations.

1.2.2 Current Military Mission

The current mission of Cannon AFB is to develop and maintain a fighter wing capable of day, night, and all-weather combat operations for war-fighting commanders worldwide. The 27 FW F-16 pilots have the same responsibility for combined air-to-air and air-to-ground missions that Cannon AFB aircrews have had for over 50 years. As part of the Air Force's AEF, the Cannon-based 27 FW pilots are routinely deployed for 90 days to overseas airfields, where they participate in United States directed peacekeeping missions. During these deployments, 27 FW pilots are subjected to increasingly sophisticated enemy action with upgraded equipment and enhanced tactics.

In addition to the 27 FW, Cannon AFB hosts cooperative programs designed to standardize flight training among allied nations. The 428 Fighter Squadron is 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.

1.2.3 Training for Military Missions

Pilots assigned to Cannon AFB must be capable of supporting both air-to-ground and air-to-air missions. These missions require training and proficiency in numerous aspects of aerial combat. While individual training requirements may be considered as discrete events, most, if not all training experience is integrated into a cohesive series of activities during an actual combat mission. At any time during a combat mission, a pilot could be exposed to numerous types of threats. These threats could be air-based (opposing aircraft with missiles and guns) or ground-based (varied surface-to-air missiles or anti-aircraft artillery). Cannon AFB manages existing emitters under training airspace to simulate enemy threats. These enemy threats usually incorporate fire control and guidance systems that are based on either radar tracking and guidance or infrared (heat) seekers. To counter these threats, a pilot must rapidly maneuver the aircraft while employing on-board defensive systems. Chaff is used to counter radar-controlled systems; flares are used to counter infrared systems.

In defensive training, chaff is used to counter radar-controlled systems; flares are used to counter infrared (heat-seeking) systems.

Defensive training develops the skills to incorporate and integrate maneuvering with the use of the appropriate countermeasure while engaged in other activity. Major training areas requiring proficiency by 27 FW pilots include the following:

- *Basic Weapons Delivery (BWD).* This requires air-to-ground delivery of ordnance, such as training ordnance, on a conventional bombing range.

Aerial combat requires the integration of varied air-to-air and air-to-ground tasks.

- *Tactical Weapons Delivery (TWD).* This training presents greater challenges to the pilot than BWD. Multiple attack headings and profiles are used so the pilot is exposed to varying visual cues, shadow patterns, and the overall configuration and appearance of the target. Target acquisition is added to the challenge of bomb release accuracy.
- *Surface Attack Tactics (SAT).* SAT is normally practiced in a block of airspace such as a MOA, Restricted Area, or range that provides room to maneuver. Precise timing during the ingress to the target is practiced, as is target acquisition. Ordnance is only used on approved ranges. Egress from the target area and reforming into a tactical formation are also practiced.
- *Close Air Support (CAS).* CAS training focuses on missions providing direct support to ground forces in close proximity to enemy forces. A Forward Air Controller (FAC) who is in direct radio contact with the flight directs CAS. After coordination with the FAC, and ensuring the precise location of friendly troops, the CAS flight simulates the delivery of ordnance on those enemy positions.
- *Basic Fighter Maneuvering (BFM).* This is the fundamental training of all air-to-air flight maneuvering. This training is conducted with two aircraft practicing individual offensive and defensive maneuvering against each other.

The challenges faced in aerial combat and the role chaff and flares play in survival are significant.

- *Air Combat Maneuvering (ACM).* This training emphasizes intra-flight coordination, survival tactics, and two-ship maneuvering against an adversary. The use of on-board radar is emphasized in this training.
- *Air Combat Tactics (ACT).* This training normally requires three or four aircraft and involves designating friendly and enemy forces that separate as far as possible in the maneuvering airspace to begin tactics training. Then, opposing forces approach each other at different designated altitudes to ensure vertical separation. If training is conducted using the same type of aircraft, it is termed similar air combat tactics; if different types of aircraft are involved, it is termed dissimilar air combat tactics.
- *Intercept Training (IT).* This training begins with the target aircraft and intercept aircraft separated beyond each aircraft's radar detection capability. The target aircraft attempts to penetrate the area protected by the interceptor. The interceptor must detect the target, maneuver to identify the aircraft, and then position itself to successfully intercept the target.
- *Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN).* During the day, pilots use the LANTIRN system to assist in navigation and weapons delivery at various altitudes. During the night, pilots must use the LANTIRN system above minimum safe altitudes for navigation and weapons delivery.
- *Suppression of Enemy Air Defenses (SEAD).* SEAD is a highly specialized mission requiring specific ordnance and avionics. The objective of this mission is to neutralize or destroy ground-based anti-aircraft systems.

1.2.4 Training Airspace

Several types of military training airspace are managed by Cannon AFB. These airspace elements provide training support for Cannon-based pilots. Each type of airspace is briefly defined below.

- *Restricted Areas* are blocks of airspace within which the flight of non-participating aircraft, while not wholly prohibited, is subject to restriction. Restricted Areas are designated when it is necessary to segregate activities that may be hazardous to non-participating aircraft. Use of the Melrose AFR is an example of an activity that would be encompassed by a restricted area. The only areas currently approved for 27 FW defensive training using chaff and flares are R-5104 and R-5105, the Restricted Areas associated with Melrose AFR.
- *Military Operations Areas* are blocks of airspace with defined vertical and lateral boundaries below 18,000 feet mean sea level (MSL) in which certain non-hazardous military flight activities are conducted. Because of the varied types of flight activities conducted in a MOA, altitudes and flight paths are random and may vary considerably. The Pecos MOA and Taiban MOAs are used by the 27 FW for training.
- *Air Traffic Control Assigned Airspace* is military training airspace from 18,000 feet MSL upward to an assigned altitude to accommodate higher altitude training requirements, often overlying a MOA. The description and use of ATCAAs are agreed upon by the military and the controlling Federal Aviation Administration (FAA) facility in a Letter of Agreement. The Pecos and Sumner ATCAAs are airspace used by the 27 FW for training.
- *Military Training Routes* are flight corridors of varying widths, lengths, and vertical altitudes that are used for low-altitude navigation and training in excess of 250 knots airspeed. An MTR can be visualized as a "highway in the sky." There are two types of MTRs: routes flown under Instrument Flight Rules (IFR), and routes flown under Visual Flight Rules (VFR). While instrument routes (IRs) may be flown under either VFR or IFR conditions, VRs are flown strictly under VFR conditions. VRs-100/125 are MTRs flown under VFR conditions by the 27 FW.

1.2.5 Other Training Assets

In order to add further realism to training, the 27 FW has deployed ground-based electronic threat emitters in areas underlying the regional military training airspace. These units provide electronic signatures that simulate ground-based "enemy" radar systems, threaten pilots during training, and require pilots to take defensive actions for self-protection. The 27 FW has ten emitter sites deployed under the MOAs, the northern portion of VRs-100/125, and the Melrose AFR restricted airspace.

1.2.6 An Example of Combat Training

Specific training events are interrelated and require specific types of military training airspace for support. As an example, the following "combat training event" (Figure 1-2) illustrates the linkage between training events and training airspace that supports the events. These training elements are depicted in the following seven events:

(1) F-16 aircraft are loaded with chaff and flares at Cannon AFB for defensive training. An aircraft could potentially carry 120 chaff or 120 flares but on a typical training mission would carry a mix of 30 chaff and 30 flares.

(2) Aircraft take off from Cannon AFB and enter the MTR to perform low altitude, high-speed navigation training.

(3) Within the MTR, a ground-based threat emitter simulating a radar-guided missile requires rapid defensive action using chaff and maneuvers to avoid the threat.

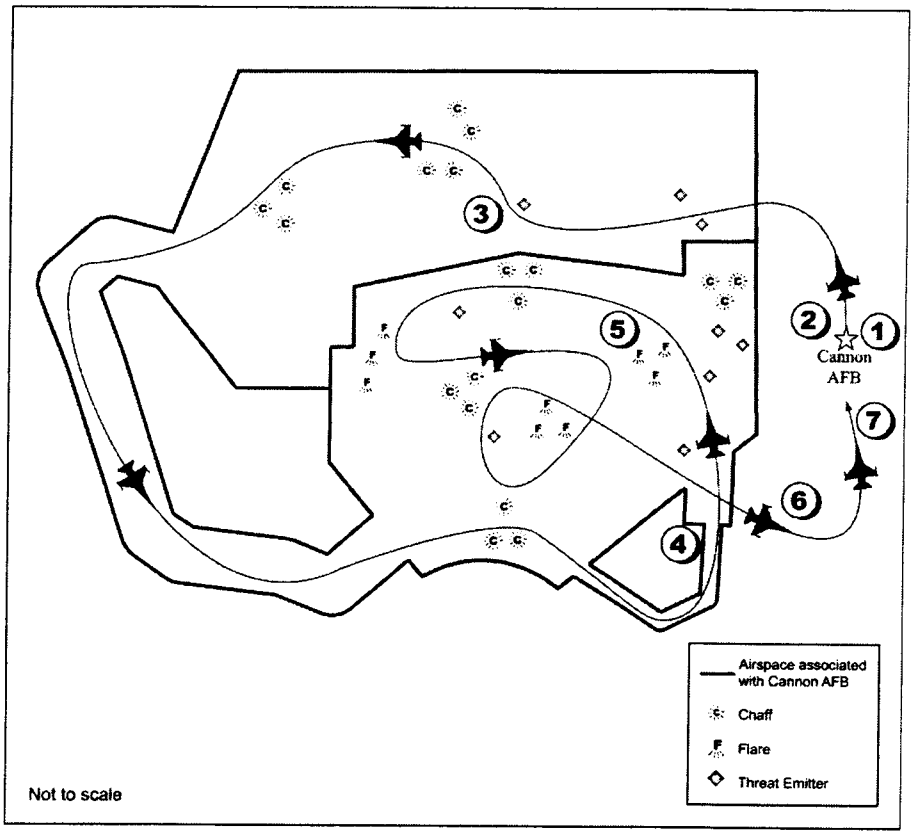


Figure 1-2. Example of a Combat Training Scenario

(4) Near the end of the MTR, the pilot makes a low-altitude, high-speed entry into a Restricted Area (which contains an air-to-ground range), and performs training in tactical weapons delivery and surface attack tactics. While performing these tactics, the pilot is threatened by surface threat emitters and must deploy defensive chaff and flares.

(5) Upon departing the target area, the aircraft enters a MOA with its associated ATCAA. There, opposing aircraft "attack" and participate in air combat tactics training, which incorporates chaff, flares, and all air-to-air combat skills.

(6) Upon completion of this combat training mission, the aircraft returns to base.

(7) Unused chaff and flares are off-loaded and stored at Cannon AFB.

The pilots in this example encountered threats similar to enemy threats encountered in actual combat. The pilots had to take defensive action against an air-based threat in the MOA and ground-based threats in the MTR, MOA, and Restricted Area. Defensive training to avoid the ground-based and air-based threats is essential for survival in real-world combat missions.

1.3 PURPOSE AND NEED FOR THE ACTION

The purpose of the proposed action is to enable the Air Force to implement initiatives that will improve, enhance, and provide simulated combat-condition defensive training for pilots using

Cannon AFB managed airspace. The pilots include those from the four F-16 squadrons at Cannon AFB, one F-16 squadron of the New Mexico Air National Guard, and other occasional users of the airspace. Allowing pilots to dispense training chaff and/or flares in applicable airspace in response to threats encountered in training will better prepare them to respond to actual threats encountered in combat. The example described in section 1.2.6 includes the use of defensive countermeasures. At present, the only airspace in which defensive countermeasures can be employed is over Melrose AFR.

Realistic training equals increased combat effectiveness.

Defensive training is needed to adequately prepare pilots for combat by enabling them to "train like they fight." With increasingly sophisticated equipment and tactics being deployed by adversaries and potential adversaries, the need for combat-condition training has increased. Survival in combat conditions demands instantaneous and intuitive defensive responses. These defensive responses integrate maneuvering, properly employing the correct countermeasure actions at the best time, and dispensing the amount of chaff or flares required to successfully counter the threat, all while performing the requirements of the mission. These responses are learned skills that must become instinctive to the pilot. These defensive skills must be developed and honed in the training environment to survive in actual combat. Currently, only approximately 10 to 20 percent of the 27 FW training in Cannon AFB airspace can be performed under simulated combat conditions using defensive countermeasures.

The need to enhance defensive training to combat sophisticated threats fits the 27 FW assignments as part of the AEF. In today's environment, a key tool used by the United States to project the military instrument of national power is the AEF. This integrated force of fighters, bombers, support aircraft, and tactical airlift is interdependent, and derives its synergy from its multifunctional components. To be effective, the 27 FW F-16s must be fully prepared to accomplish their assigned role in the AEF. In order to fully prepare 27 FW pilots for this integrated role, combat conditions must be replicated to the greatest extent possible in training. The proposed action would permit 27 FW pilots to perform 40 to 50 percent of their training under simulated combat conditions that require the use defensive countermeasures.

1.4 REGULATORY REQUIREMENTS AND OTHER DIRECTION

This EA has been prepared in accordance with the requirements of NEPA, Council on Environmental Quality (CEQ) regulations, Air Force Instruction (AFI) 32-7061 as promulgated in Title 32 of the Code of Federal Regulations Part 989, and the Department of Defense (DoD) Directive 6050.1.

In addition, other environmental laws and policies also apply to this EA. These laws deal with biological resources, cultural resources, Native Americans, environmental justice, land use, and materials management (see Appendix D).

1.5 PUBLIC INVOLVEMENT

In the case of the DTI EIAP, the Air Force informed agencies and the public of the proposed action and the intent to prepare an EA through newspapers and media beginning on March 16, 2001. During a 45-day public comment period, five public scoping meetings were held to solicit agency and public input for this EA. The purpose of the scoping process and meetings was to solicit public input regarding the proposal. This input helps public officials make informed

decisions based on public concerns and factual analyses of potential environmental consequences of the proposed action and alternatives.

During the scoping process, input received from federal, state, and local agencies; elected officials; Native American tribal governments; and the general public assisted in the identification of pertinent environmental issues addressed in this EA. The scoping process began with the preparation and mailing of the Interagency and Intergovernmental Coordination for Environmental Planning letters and continued through the end of the comment period on May 10, 2001.

2.0 *DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES*

2.1 PROPOSED ACTION

The United States Air Force (Air Force) proposes to conduct defensive training using chaff and flares in the following airspace: Pecos Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), Taiban MOA, Restricted Areas R-5104/5105, and Sumner ATCAA, with chaff use only in the northern portion of Visual Routes (VRs)-100/125. Pilots use chaff and flares as self-protection measures against radar-directed anti-aircraft artillery, radar-guided and heat-seeking missiles. When pilots detect threats from these systems, they must respond instantly and instinctively using appropriate countermeasures. The inability of pilots to actually use these countermeasures in training results in the loss of habit patterns. The instinctive nature of these habit patterns often determines a pilot's survivability in a hostile environment.

2.1.1 Description of Training Chaff and Flares

2.1.1.1 TRAINING CHAFF

Modern training chaff (RR-188) consists of bundles of extremely small strands of aluminum-coated silica fibers that reflect radio waves from a radar set. Chaff fibers are approximately the thickness of a very thin 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 filament. This chaff, also known as "angel hair" chaff, is made as small and light as possible so that it will remain in the air long enough to confuse enemy radar. Approximately 5 million chaff strands are dispensed in each bundle of chaff.

When released from an aircraft, chaff initially forms a "puff" that disperses widely in the air. Dispersed chaff forms an electronic cloud that 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 safely maneuver to 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. A 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 very rare occasions, the chaff may not wholly separate and may fall to earth as a clump.

Chaff used in combat has fibers cut to varying lengths in order to make it effective against the wide range of enemy radar systems that may be encountered. Training chaff proposed for use in the Cannon airspace would be limited to RR-188 training chaff that contains fibers cut to lengths that are designed to not interfere with radars operated by the Federal Aviation Administration (FAA) for Air Traffic Control throughout the National Airspace System. For more detailed information on chaff, please refer to Appendix A.

2.1.1.2 TRAINING FLARES

Defensive training flares are magnesium pellets that, when ignited, burn for a short period (3.5 to 5 seconds) at approximately 2,000 degrees Fahrenheit. 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 ¼-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. For more detailed information on flares, please refer to Appendix B. On extremely rare occasions a flare may not ignite and could fall to the earth as a dud flare.

The proposed use of training flares would incorporate management practices that include the following:

- The minimum altitude for flare release in special use airspace would be 2,000 feet above ground level (AGL) (flares burn out in approximately 325 feet).
- Flares would not be released over established communities beneath the airspace.
- Flares would not be used at all under high fire conditions or above as defined by the National Interagency Fire Center.
- Cooperation with local agencies for mutual aid response to fires would continue.
- The education program for fire departments beneath the airspace would be expanded to include flares.

2.2 IDENTIFICATION OF ALTERNATIVES

The Air Force identified operational considerations for alternative military training airspaces appropriate to support the 27th Fighter Wing (27 FW) defensive training initiative.

2.2.1 Basic Requirements for Training

The proposed action is designed to meet 27 FW F-16 pilots' air-to-air and air-to-ground defensive training needs. Although dispensing chaff and flares is an easily learned, mechanical skill, knowing when to dispense them and how to maneuver following release must be learned. To survive in combat, the pilot must instinctively react to cues and warning devices in the cockpit while under stress, and effectively use countermeasures for self-protection against radar and heat-seeking missiles. In order to train pilots to use chaff and flares instinctively and effectively, they must be able to use countermeasures during a training mission with multiple activities.

2.2.2 Airspace Configuration Requirements

At Cannon Air Force Base (AFB), combat training mission activities included Basic Weapons Delivery (BWD), Tactical Weapons Delivery (TWD), Surface Attack Tactics (SAT), Close Air Support (CAS),, Basic Fighter Maneuvering (BFM), Air Combat Maneuvering (ACM), Air Combat Tactics (ACT), Intercept Training (IT), Suppression of Enemy Air Defenses (SEAD), and Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN). Table 2-1 presents various airspace configuration requirements based on these training missions.

Table 2-1. Airspace Configuration Requirements for Cannon AFB Training

Training Mission	*Dimensions (NM[1])*	*Vertical Block (FT[2])*	*Floor (AGL[3])*	*Minimum Time in Area (Min[4])*
BWD/TWD/SAT[5]	10X10	20,000	0	30
CAS	30X30	25,000	300	30
BFM	20X30	25,000	5,000	40
ACM/ACT/IT	30X40	30,000	300	40
SEAD	40X40	25,000	300	30
LANTIRN	5X150	2,000	500	20

Notes: 1. NM = nautical miles
2 FT = feet
3. AGL = above ground level
4. Min = minutes
5. Restricted Airspace needed

To support combat readiness, pilots must conduct combat-condition training as frequently as possible. The frequency of training depends upon two interrelated factors: (1) the time required to depart from a base, conduct a sortie that includes all the training elements needed for a specific mission, and return to base; and (2) the distance and flight time to/in the training airspace. When the second factor is close to matching the first, pilots can conduct more frequent training. In contrast, the longer it takes to travel to the training area, the shorter the time that can be used for training.

2.2.3 Selection Criteria

Selection criteria described in this section were identified to evaluate potential training airspace. In general, the criteria served to identify those areas that met airspace configuration requirements such as training airspace size, distance from Cannon AFB, ease and relative flexibility in the use of the airspace, and efficiency in the use of the airspace. Collectively, these criteria served to further refine the proposed study area for the environmental analysis in this environmental assessment (EA).

AIRSPACE VERTICAL BLOCK

Defensive training requires rapid altitude changes to combine defensive countermeasures with avoidance maneuvers. In addition, threat aircraft and defensive training aircraft require altitude separation to simulate combat conditions. The vertical block is the vertical height in feet, from the airspace floor, within which defensive training would be performed.

AIRSPACE CONFIGURATION (DIMENSIONS)

To be most effective, defensive training must be fully integrated into the total training scenario and be accomplished during the same time that training for other missions is being accomplished. Since the airspace must be sized to accommodate these various training missions, this is also the size of the airspace necessary to integrate defensive training. Only existing airspace currently managed by Cannon AFB was considered. Other airspace would not accommodate the defensive training goals of local airspace that established instinctive behavior for combat conditions.

Airspace Proximity

In order to maximize the amount of productive training time in the airspace, the Air Force determined that transit time to and from the 27 FW training airspace should be limited to a total of 30 minutes. At cruise airspeeds, 30 minutes equates to 200 nautical miles (NM) or 100 NM each way. Therefore, the training airspace must effectively be within 100 NM of Cannon AFB.

Access to a Divert Airfield

Training for combat missions is intense, and makes maximum demands on the pilot, the aircraft, and the aircraft's associated systems such as avionics and propulsion. These stresses have the potential to induce mechanical system failures. Loss of an engine, especially in a single-engine aircraft like the F-16, can have catastrophic consequences. Therefore, the proximity of an alternate airfield (usually referred to as a "divert airfield") within less than 100 miles of the training area where the pilot can make an emergency landing is a critical concern in selecting training locations. Divert airfields are also an important consideration in the event that deteriorating weather conditions make it impossible for aircraft to land at their home base.

Existing Threats

To be effective, combat-condition training must be consistent with conditions faced in combat. This includes "enemy" threats from ground-based and aircraft-based forces. The availability of ground-based threats is an important element of combat training. For defensive training, ground-based threat emitters form a key element of the infrastructure required for training support. Where these assets are deployed under suitable airspace elements, the airspace permits integrated combat-condition training. Available threat emitter sites make the creation of new sites and associated infrastructure unnecessary.

Contiguous Airspace

The combat mission of the 27 FW is both air-to-air and air-to-ground. Contiguous airspace elements permit combat-condition training missions. This contiguous airspace best supports varied air-to-air and air-to-ground training elements that can be integrated into a single, cohesive scenario for each training mission. Additionally, for air-to-air training, airspace with a large vertical range of altitude is desirable. When searching for the adversary, if the altitude structure of the airspace is limited, the pilot needs only search within that narrow range of altitude. Without this constraint, the detection phase is made more complicated, and more closely resembles combat conditions where adversaries do not confine themselves to a narrow band of airspace.

Airspace Flexibility

Airspace flexibility is evaluated based on the ability of airspace elements, either individually or collectively to support a range of training missions. Airspace that, by its structure or configuration is limited in the types of training it can support is less desirable than airspace that can support a wide variety of training requirements.

Airspace Efficiency

Efficiency considers the availability of the airspace itself and the status of the infrastructure that supports training in the airspace. Airspace that is managed by Cannon AFB is much more likely to be available to support 27 FW needs than airspace managed by another facility.

2.2.4 Application of Selection Criteria

This section applies selection criteria to airspace units used regularly by the 27 FW for training. All criteria noted above were applied to each airspace unit in Table 2-2.

The result of this application demonstrates that the Pecos MOA/ATCAA and Sumner ATCAA meet all criteria for combat-condition training. The Bronco and Mount Dora MOAs lack specific elements for integrated defensive training. Melrose Air Force Range (AFR), although small and with limitations in altitude, is the only location where, in conjunction with the adjacent Taiban MOA, air-to-ground missions can be conducted with practice ordnance. The width of the northern segment of VRs-100/125 and its relationship to the Pecos MOA/ATCAA and operational ground threats give it most of the elements needed for combat-condition training. Compared to other Military Training Routes (MTRs) and the western and southern portions of VRs-100/125, only the northern portion meets the majority of the exclusionary and evaluative criteria for defensive training.

Table 2-2. Application of Criteria

	CANNON AFB AIRSPACE ELEMENTS							
Selection Criteria	*Pecos MOA/ ATCAA*	*Bronco MOA*	*Sumner ATCAA*	*Taiban MOA*	*Mt. Dora MOA*	*R-5104/ 5105*	*VRs-100/ 125*	*Other MTRs*
Airspace	Y	Y	Y	Y	N	Y	Y	Y
Dimensions	Y	Y	Y	N	Y	N	Y	N
Vertical Block	Y	L	Y	N	N	N	Y	Y
Divert Airfield	Y	Y	Y	Y	N	Y	N/A	N/A
Operational Ground Threats	Y	N	Y	Y	N	Y	Y	N
Contiguous	Y	N	Y	Y	N	Y	Y	N
Flexibility	Y	L	Y	Y	N	Y	Y	N
Efficiency (Use)	Y	Y	Y	Y	Y	Y	Y	Y

Key: Y = Yes
N = No
L = Limited
N/A = Not Applicable

2.2.5 Chaff and Flare Use

EXISTING USE

The portion of Restricted Areas R-5104/5105 over Melrose AFR is the only airspace within Cannon AFB's local flying area that is currently authorized for the use of chaff and flares. Melrose AFR does not permit a full complement of combat-condition defensive training primarily due to the limited amount of space and range configuration. To practice defensive training for combat conditions, more maneuvering airspace is required. Table 2-3 presents baseline chaff and flare usage.

Table 2-3. Annual Baseline Chaff and Flare Usage

Baseline	*Melrose AFR (Portions of R-5104/5105)*	*Pecos/Taiban MOAs/Sumner/ Pecos ATCAA*	*VRs-100/ 125*	*Total*
Chaff Usage	4,703	0	0	4,703
Flare Usage	2,538	0	N/A	2,538

Source: Personal communication, Schuler 2001

Military pilots are currently unable to use chaff and flare countermeasures while conducting combat-condition defensive training in Cannon airspace. This results in the loss of mission-essential habit patterns and significantly reduces training realism. In addition, there is a severe limit on integrated testing of the aircrew and verification of the aircraft systems, which have the potential to put mission success and pilot survival in jeopardy in combat with increasingly sophisticated enemy forces.

PROPOSED USE BASED ON SELECTION CRITERIA

Performing defensive training with the use of chaff and flares is one requirement that can be safely performed, with appropriate restrictions, outside of the confines of a range and restricted airspace environment. MOAs and ATCAAs provide the greater expanse of airspace in which aircraft training maneuvers can be conducted more effectively. The ability to improve upon this training with the actual use of chaff and flares would provide the realism needed to more properly and effectively train pilots for the combat environment. It is for this reason that the Air Force proposes chaff and flare use with current ongoing training activities conducted in the Taiban MOA, Pecos MOA/ATCAA, and Sumner ATCAA, with chaff use only in VRs-100/125.

The 27 FW currently conducts training in the Pecos MOA/ATCAA, the Sumner ATCAA, and the Taiban MOA. The Taiban MOA lies within the lateral boundaries of the Pecos MOA. For this action, Pecos MOA/ATCAA, Taiban MOA, and Sumner ATCAA are used together. Figure 2-1 shows the airspace used in this action. The Taiban MOA and Pecos MOAs are contiguous and west of the Melrose AFR.

2.2.6 Current and Projected Sortie-Operations

Defensive training would not change the use of Cannon AFB airspace. The 27 FW's sortie-operations would continue in the airspace units that meet the criteria described in section 2.2.3. About 75 percent of the aircraft using the Cannon Airspace are F-16 squadrons from Cannon AFB. One F-16 squadron from the New Mexico Air National Guard and transient aircraft also use the Cannon AFB airspace. Transient aircraft could include A-6, A-10, E-3, F-4, F-14, F-15, F-16, F-18, F-117, B-1, B-2, B-52, C-130, MH-53, UH-60, HH-64, and PAA-200 (GR-1). Transient aircraft are required to adhere to the procedures and policies for chaff and flare use on the range. Table 2-4 provides numbers of sortie-operations within the airspace.

A sortie-operation is the use of one airspace unit by one aircraft.

As shown on Table 2-4, approximately 4,954 annual sortie operations are flown on R-5104/5105. The Taiban MOA has the same annual sortie operations flown as R-5104/5105, 4,954. Approximately 70 percent of the sortie-operations are below 2,000 feet AGL. On the Pecos MOA, 45 percent of the 4,735 sortie-operations are conducted from 500 feet AGL to 2,000 feet MSL. On VRs-100/125, 95 percent of the 564 sortie operations are flown between 500 to 2,000 feet AGL.

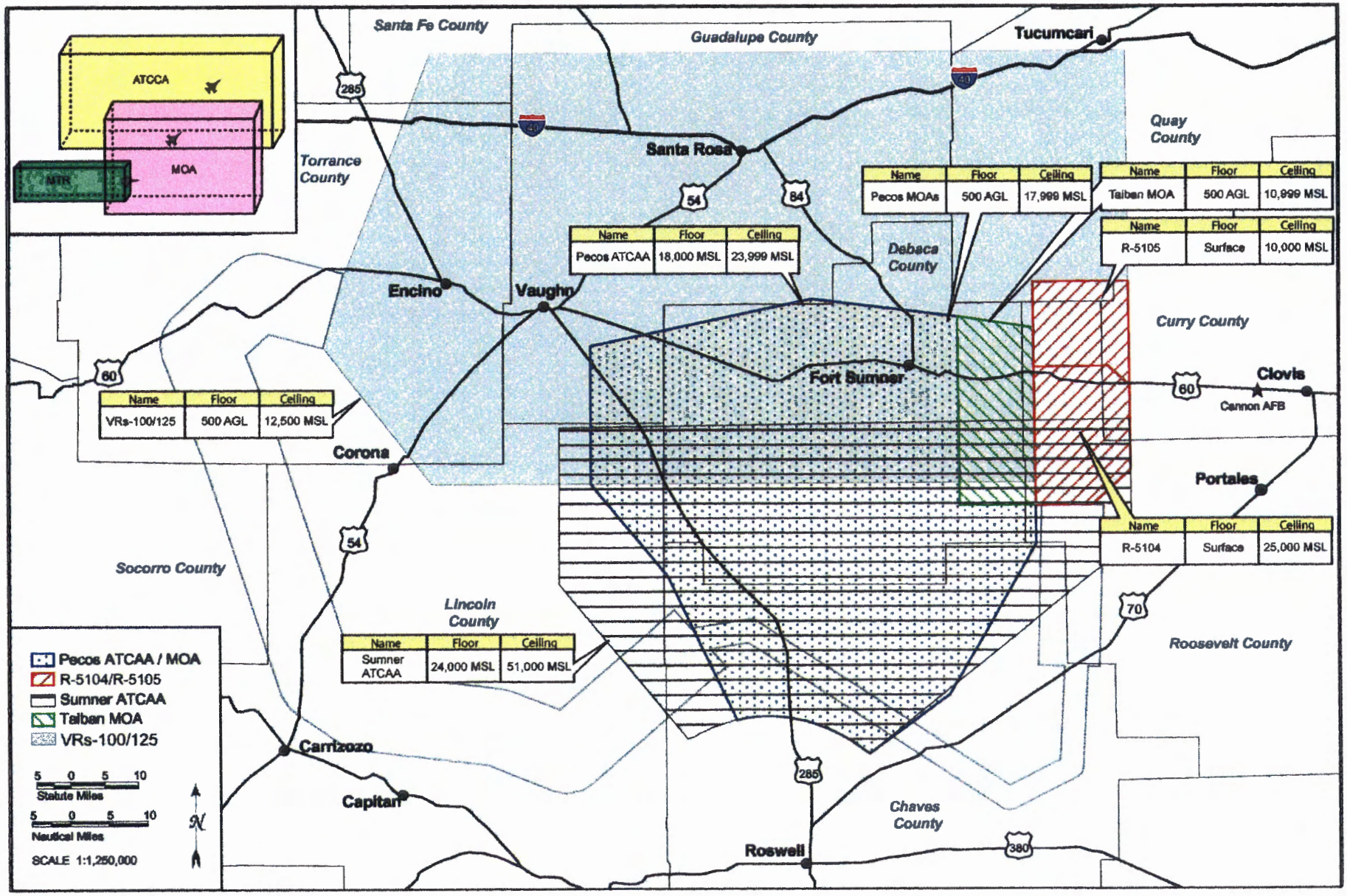


Figure 2-1. Airspace Associated with Cannon AFB

Table 2-4. Annual Baseline Sortie-Operations

Airspace	*Melrose AFR (R-5104/5105)*	*Pecos MOA*	*Taiban MOA*	*VRs-100/125*
Number of Day Sortie-Operations	4,910	4,698	4,910	564
Number of Night Sortie-Operations (10:00 pm–7:00 am)	44	37	44	0
Total Number of Sortie-Operations per Year	4,954	4,735	4,954	564

Source: Cannon AFB 2000.

2.3 ALTERNATIVE A (PREFERRED ALTERNATIVE): PECOS MOA/ATCAA, TAIBAN MOA, SUMNER ATCAA, R-5104/5105, AND VRS-100/125

Alternative A is presented in Figure 2-2. This preferred alternative for defensive training includes the Taiban MOA, Pecos MOA/ATCAA, R-5104/5105, and Sumner ATCAA for the defensive training use of chaff and flares. Flares would be used from 2,000 feet AGL to approximately 51,000 feet MSL (Flight Level [FL] 510). Chaff would be used from 500 feet AGL to approximately 51,000 feet MSL. The 27 FW and any transient aircraft using Cannon airspace would be subject to altitude restrictions for flare release. The Taiban MOA lies within the lateral boundaries of the Pecos MOA. For this proposed training, Pecos MOA/ATCAA, Taiban MOA, R-5104/5105, and Sumner ATCAA are used together. The northern portion of VRs-100/125 is proposed for chaff use only, to permit training against the existing electronic threat emitter sites in the area. The simulated enemy air defenses at these sites within the MTRs complete the training challenges. Chaff and flares would continue to be used in Melrose AFR airspace in conjunction with air-to-ground training conducted there. Table 2-5 summarizes the numbers of chaff and flares that would be expended under this alternative. These numbers include chaff and flares that would be expended by Cannon AFB aircraft, the New Mexico Air National Guard, and transient aircraft, all of which would be required to adhere to Cannon AFB policies and dispense F-16 compatible chaff and flares.

Table 2-5. Alternative A: Annual Chaff and Flare Usage

Alternative A	*Melrose AFR R-5104/5105*	*Pecos/Taiban MOAs/Sumner/Pecos ATCAA*	*Northern Portion of VRs-100/125*	*Total*
Chaff Usage	4,703	51,207	4,860	60,770
Flare Usage	2,538	37,748	N/A	40,286

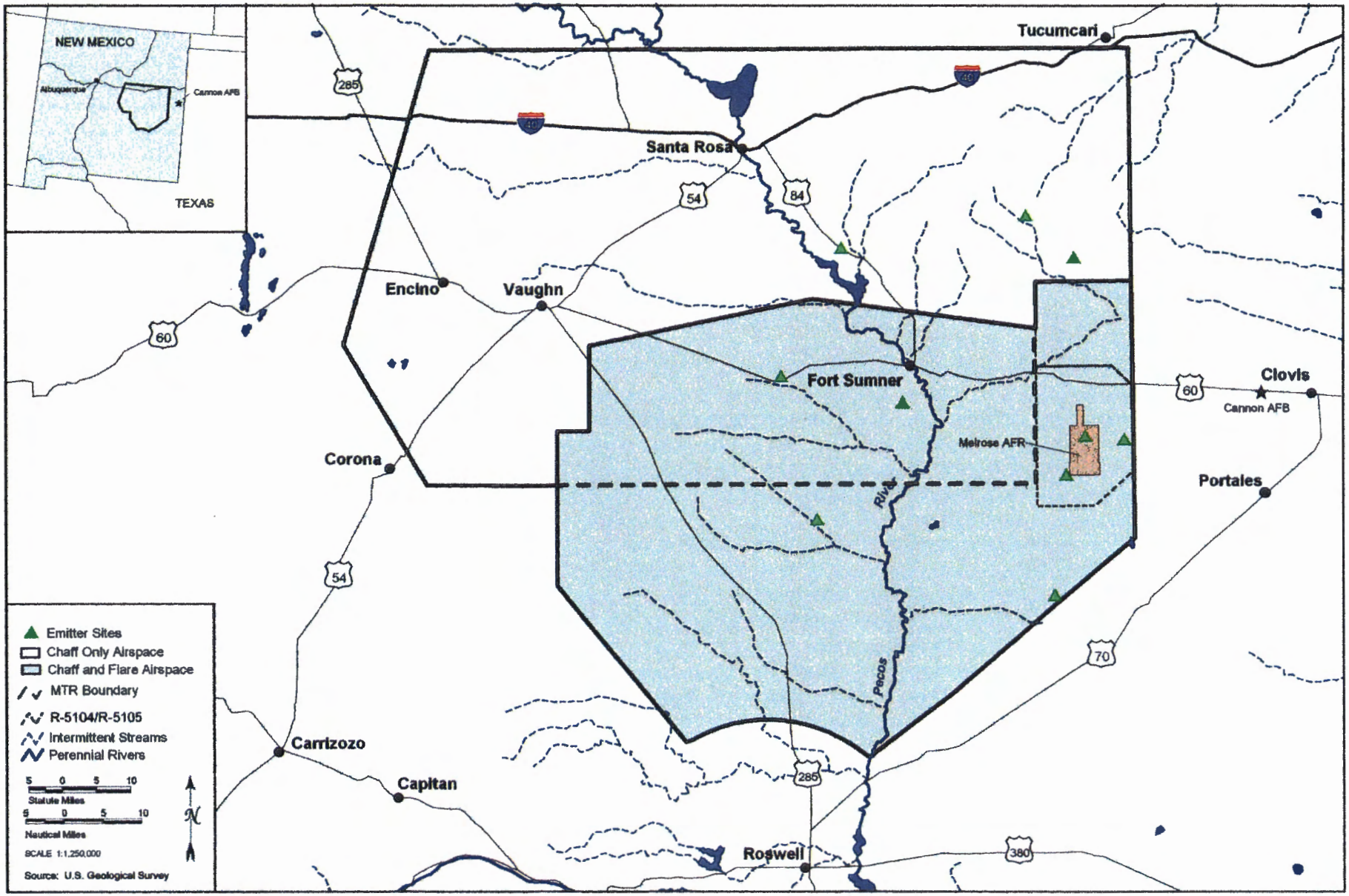


Figure 2-2. Chaff and Flare Use Associated with Alternative A

Alternative A directly meets the needs of Cannon AFB combat pilots through both high- and low-altitude training scenarios. With the high- and low-altitude airspace options available, Alternative A offers the full range of defensive training challenges necessary to replicate combat conditions. This alternative benefits from contiguous special use airspace (MOAs, ATCAAs, and Restricted Areas) and would meet mission requirements. Use of the MTRs (VRs-100/125) would permit pilots to use existing threat emitters and provide the realism of defensive training against simulated enemy air defenses at these sites.

2.4 ALTERNATIVE B: PECOS MOA/ATCAA, TAIBAN MOA, R-5104/5105, AND SUMNER ATCAA

Under this alternative, Pecos MOA/ATCAA, Sumner ATCAA, and Taiban MOA airspace use would be similar to Alternative A. Figure 2-3 depicts the airspace associated with Alternative B. The northern area of VRs-100/125 would not be included as a part of this alternative. This alternative would meet high-altitude training requirements. However, since no MTRs are included under this alternative, several low-altitude training needs would not be met. Without this low-altitude capability, the combat pilots would be limited in their combat-condition defensive training. Chaff and flare use would take place as presented in Table 2-6.

Table 2-6. Alternative B: Annual Chaff and Flare Usage

Alternative B	*Melrose AFR R-5104/5105*	*Pecos/Taiban MOAs/Sumner/ Pecos ATCAA*	*VRs-100/125*	*Total*
Chaff Usage	4,703	56,067	0	60,770
Flare Usage	2,538	37,748	N/A	40,286

2.5 ALTERNATIVE C: NO ACTION

Under the No Action Alternative, Air Force combat aircraft would continue to train in Cannon AFB airspace as they do today, and would not receive combat-condition defensive training. Chaff and flare use would continue to occur over Melrose AFR at the same baseline rates presented in section 2.2.5. Table 2-7 repeats Table 2-3 as the No Action Alternative reflects baseline conditions.

Table 2-7. Alternative C: Annual No Action Chaff and Flare Usage

Alternative C	*Melrose AFR R-5104/5105*	*Pecos/Taiban MOAs/Sumner/Pecos ATCAA*	*VRs-100/125*	*Total*
Chaff Usage	4,703	0	0	4,703
Flare Usage	2,538	0	0	2,538

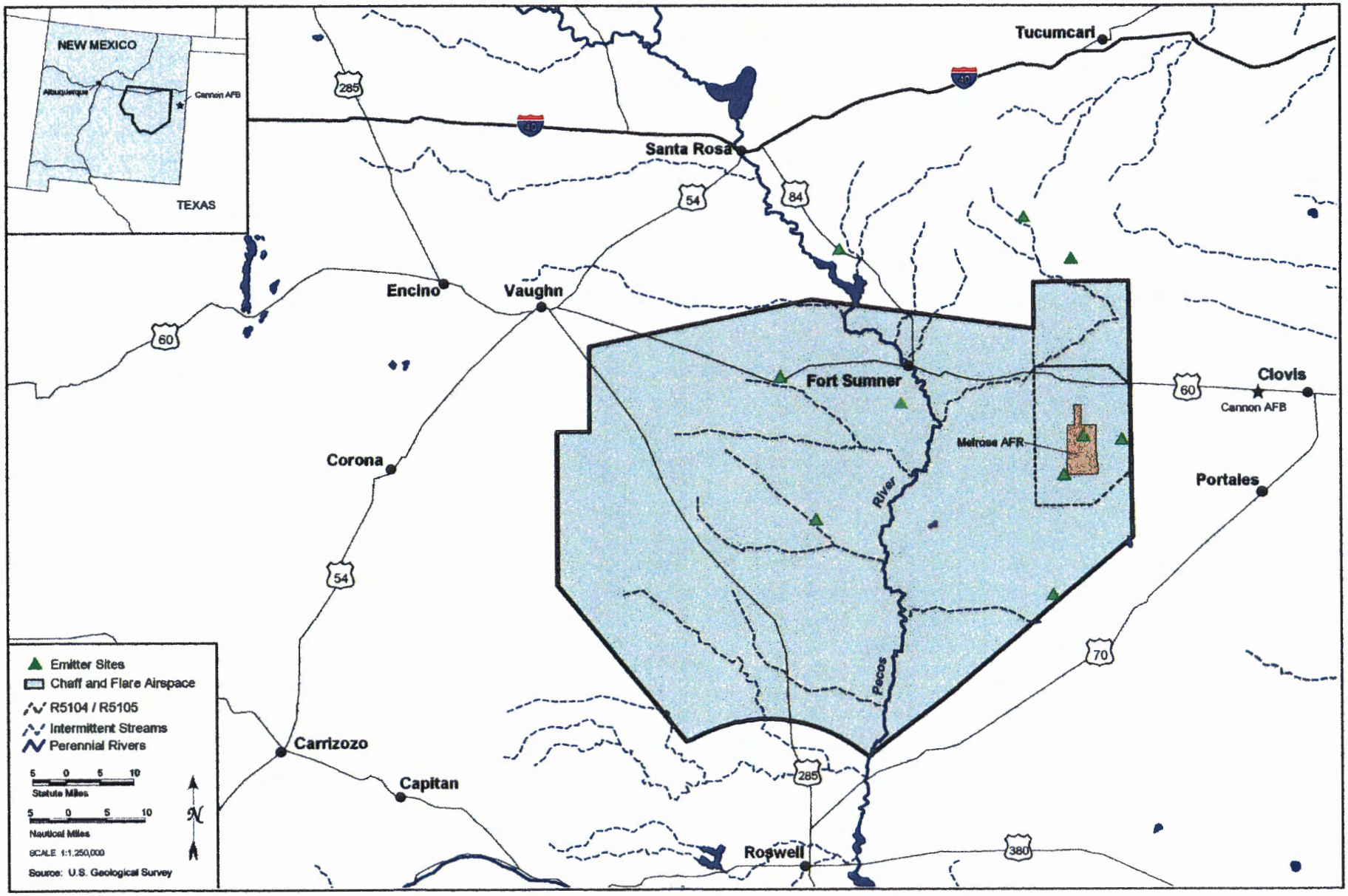


Figure 2-3. Chaff and Flare Use Associated with Alternative B

Under this alternative, defensive training needs would not be met. This alternative limits the available airspace to conduct defensive training and prevents the timely accomplishment of training requirements.

2.6 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

Other alternatives that were considered but not carried forward include the following:

- Training in other MOAs such as Mount Dora and Bronco MOAs. These MOAs did not meet the criteria discussed in section 2.2.3.
- Use of remote airspace for defensive training. Remote airspace that meets defensive training needs is currently used for limited defensive training and will continue to be used by 27 FW pilots. This training requires temporary assignment of 27 FW aircraft and pilots to other bases and does not provide the regular training under combat conditions that establishes pilot instinctive behavior essential for survival in an increasingly hostile environment.
- Sole use of flight simulators for training. Some, but not all pilot training can be conducted in flight simulators. Ultimately, pilots must be involved in actual flight and experience all of the external sensory inputs associated with actual flight to maximize training benefits.

2.7 ENVIRONMENTAL ISSUES IDENTIFIED DURING THE SCOPING PROCESS

Public scoping demonstrated a concern with the existing noise associated with military aircraft. Although there is no proposed increase in overflights, airspace use, or noise, Cannon AFB has previously implemented the following actions that address those concerns.

- Avoidance – Continued identification of sensitive areas, and the mapping and briefing of pilots about these areas and associated altitude restrictions. This is designed to minimize overflight consequences.
- Responsiveness – Continue established methods for public identification of aircraft overflight problems with a review of problems and a policy for dealing with offending pilots.
- Management – Use of operation altitude restriction on the release of flares; restrict the use of any flares during high to extreme fire conditions; provide provisions, or enter into agreements with local jurisdictions, to reduce the potential for fire consequences from flares.

The Air Force, in consultation with the U.S. Fish and Wildlife Service (USFWS), devised and implemented a set of special operating procedures designed to reduce the potential for effects on specific threatened and endangered bird species (USFWS 1998a). The special operating procedures were devised for airspace in New Mexico, including that scheduled and used by Cannon AFB (see section 3.6.2.3). These procedures would continue under the proposed action.

Neither the proposed action nor any alternatives involve any construction activities. Furthermore, there are no proposed changes in airspace use. Therefore, the focus of the analyses is on those areas related to chaff and flare use. In order to address questions about potential impacts of chaff and flares, Figure 2-4 depicts the life cycle and processes upon release of chaff and flares.

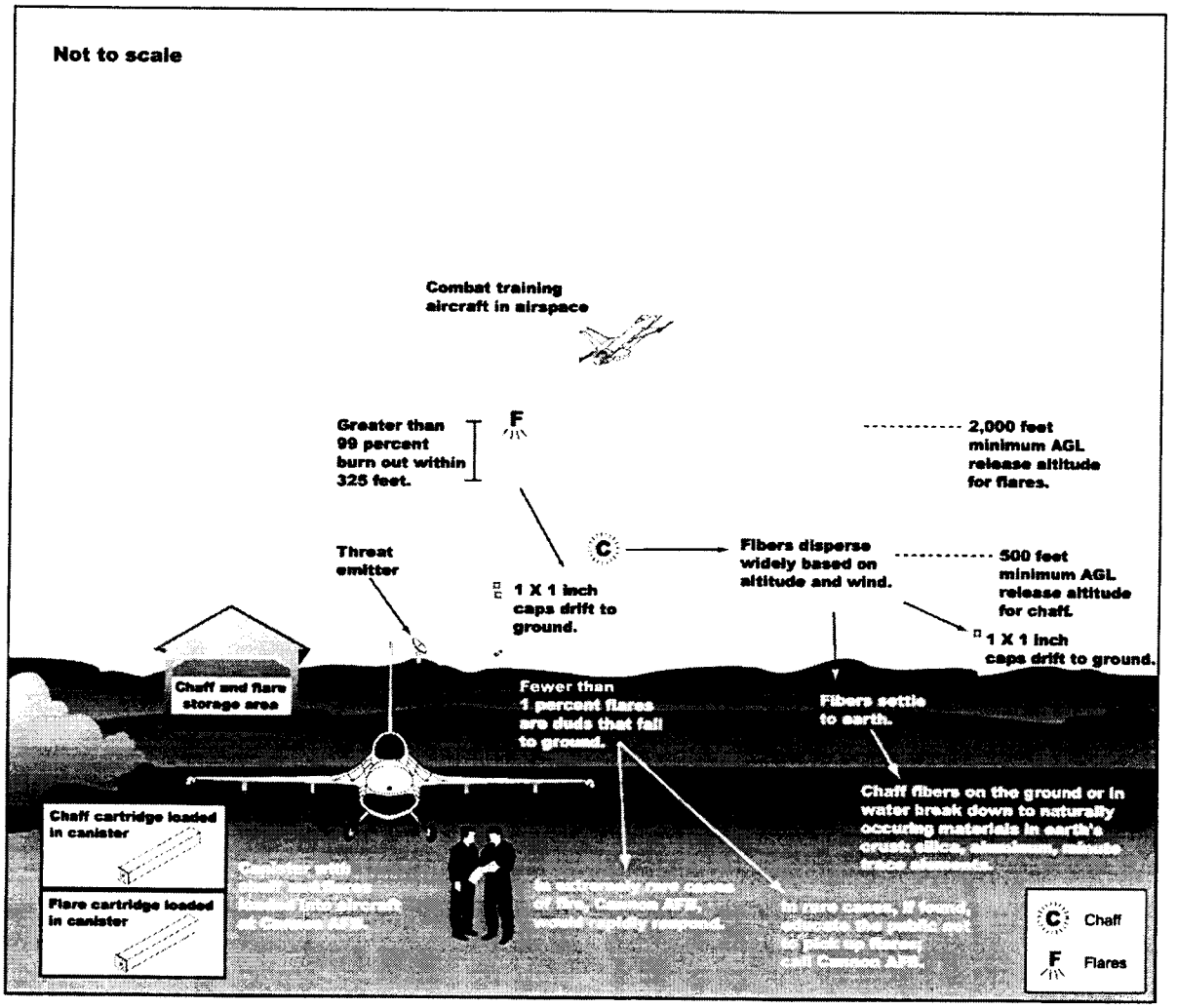


Figure 2-4. Life Cycle of Dispensing Chaff and a Flare

A Blue Ribbon Panel reviewed previous studies conducted, and presented a summary of the environmental effects of chaff and flares used within military-controlled airspace (Spargo 1999). This report developed guidelines to assist in the assessment of environmental impacts of proposals involving chaff and flare use. These guidelines were used to develop the methodology used in this EA and to address issues identified during public and agency scoping. The findings and recommendation of this report were also included in this document to support resource analysis. The following is a summary of the findings of this report.

- Chaff fiber concentrations in air of chaff-affected areas are $1/100^{th}$ of allowable limits set by USEPA.
- Deposition of chaff, even under areas of intensive use, is hundreds of times less than the annual deposition of dust in the southwestern United States. The chemical composition of chaff is very similar to the chemical composition of desert dust.
- Deposition of chaff does not result in the accumulation of toxic or otherwise undesirable substances in soils.

- The risk of exposure for humans through inhalation or ingestion is considered negligible because chaff fibers are too large to pass through the nose or mouth and do not exceed known toxic thresholds.
- Inhalation and ingestion exposure to domestic livestock and non-domestic grazers is considered minimal to nil. Nutritional values of chaff are low and comparable in composition to soil.
- Marine and freshwater organisms exposed to relevant levels of chaff are unlikely to exhibit effects in their growth or development.
- Previous studies on the environmental effects of chaff failed to consider realistic chaff exposure levels. Extremely high, non-relevant exposures were used to predict an effect.
- Degradable chaff is under development. However, the environmental effects of this material are unknown, and current Department of Defense (DoD) efforts fall short of demonstrating degradability, ultimate fate, and environmental effects.

2.7.1 Issues and Concerns

Several sources were used to identify issues and concerns. These sources including comments made during the scoping process with agencies and the general public, and reviewing technical reports such as the Blue Ribbon Panel. The resource section or sections where these issues are addressed in this EA are shown in parentheses following each issue listed below. Figure 2-5 depicts representative environmental issues raised during scoping.

- Possible chaff interference with radar at local airports (Airspace 4.1.2)
- Avoidance areas around communities and ranches (Airspace 4.1.3.1)
- Potential chaff interference with electronic systems, such as cell phones or satellite dishes (Safety 4.2.3.1)
- Chaff and flare system malfunctions (duds) (Safety 4.2.3.1)
- Potential impact from chaff and flares to aircraft and people (Safety 4.2.3.1; Land Use 4.8.3.1)
- Effect of weather on fire risk in an arid environment (Safety 4.2.3.1)
- Effect of flares on fire management capabilities (Safety 4.2.3.1.)
- Effectiveness of minimum flare release altitudes on fire risks (Safety 4.2.3.1)
- Fires on the ground resulting from flare use (Safety 4.2.3.1; Land Use 4.8.3.1; Biological Resources 4.6.2 and 4.6.3.1)
- Chaff and flares storage and handling concerns (Safety, 4.2.3.1, Materials Management 4.3.3.1)
- Effects of accumulation of chaff and flare residual components on agricultural areas and other land uses (Materials Management 4.3.3.1; Cultural Resources 4.7.2 and 4.7.3)
- Potential air quality impacts from air emissions into the atmosphere (Air Quality 4.4.3)
- Potential effects on soil and water (such as rivers or livestock tanks) from components or component by-products during decomposition (Physical Resources 4.5.3)

- Potential ecosystem impacts from fires on soil or water (Physical Resources 4.5.3.1; Biological Resources 4.6.3.1)
- Impact of chaff at Melrose AFR or other locations (Biological Resources 4.6.2)
- Potential fire risk/damage to ranching operations (Biological Resources 4.6.2 and 4.6.3)
- Potential physical effects from ingestion by livestock, wildlife or humans (Biological Resources 4.6.2 and 4.6.3; Land Use 4.8.3.1)
- Potential hazard of dud flares encountered by people or livestock (Land Use 4.8.3.1)
- Effects of chaff on land use or visual resources (Land Use 4.8.3.1)
- Effect on land use patterns from deploying chaff or flares (Land Use 4.8.3.1)
- Potential effect of proposed action on property values (Land Use 4.8.3.1)

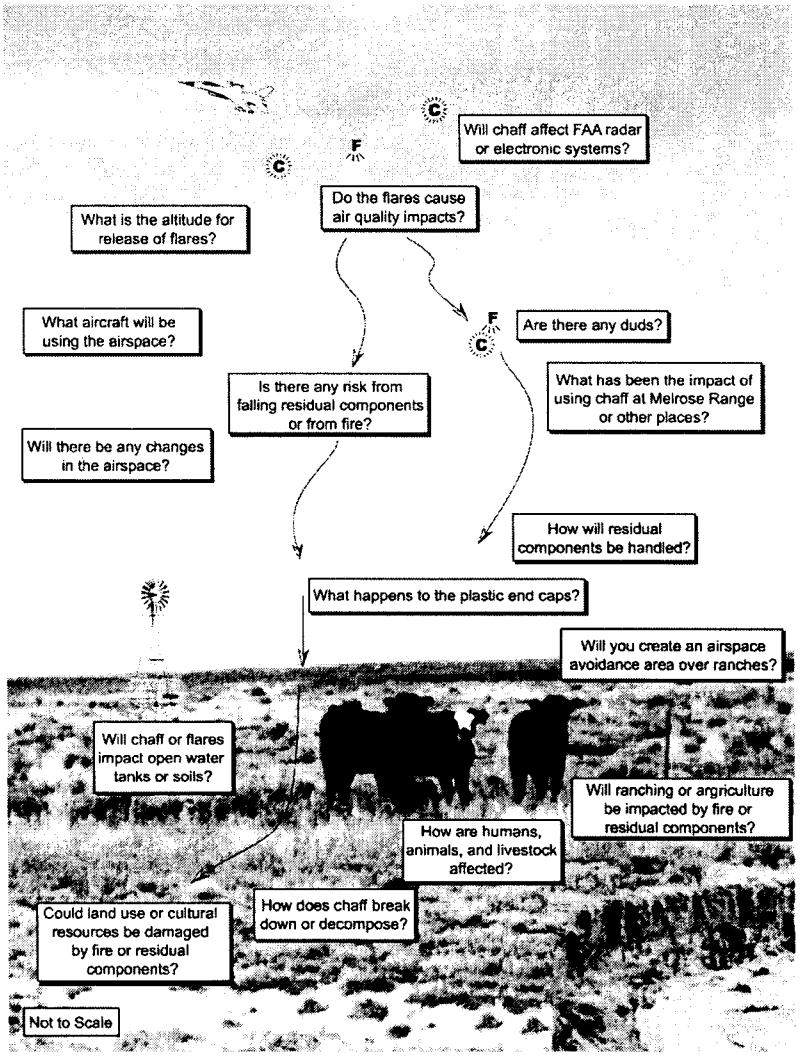


Figure 2-5. Representative Environmental Issues Raised During Scoping

- Effects of fire or residual components on cultural resources (Cultural Resources 4.7.2 and 4.7.3)

2.7.2 Summary of Environmental Consequences

The issues and concerns summarized in section 2.7 were grouped into nine environmental resources presented in Table 2-8. This section summarizes the results of the analysis presented in Chapter 4 for each alternative. The reader is encouraged to go to the existing conditions sections presented in Chapter 3 and the environmental consequences sections presented in Chapter 4 for a comprehensive discussion of each environmental resource.

Table 2-8. Summary of Potential Environmental Consequences

Environmental Resource	Alternative A Combat-condition training using 4,703 bundles of chaff and 2,538 flares at Melrose AFR, 51,207 bundles of chaff and 37,748 flares in the Pecos MOA/ATCAA, Sumner ATCAA, R-5104/5105, and the Taiban MOA and 4,860 bundles of chaff in northern portion of VRs-100/125.
Airspace Management	No change to airspace structure or configuration; no change in current training flights.
Safety	No consequences from handling increased volume of chaff and flares at Cannon AFB. No consequences anticipated from increased use of RR-188 training chaff (existing FAA coordination to continue). Flare use procedures and release altitudes minimize fire risk. Flare use would be modified or discontinued depending upon fire conditions. Experience shows that there would be a very small possibility of fire from pilot error or flare malfunction. Mutual aid fire support agreements would mobilize rapid Air Force response to help regional fire suppression. Slight possibility of dud flare safety risk if mishandled by an individual under MOA/ATCAA or restricted airspace. Education programs would increase awareness and reduce risk.
Materials Management	Munitions storage areas at Cannon AFB and incremental shipments can handle the 13-times increase in chaff and 16-times increase in flare use. In the MOAs/ATCAAs and portions of R-5104/5105, release of 1.71 grams (0.06 ounces) of chaff/acre/year and use of 1.0 flare over 73 acres/year is not expected to have any materials management environmental consequence. In the MTR, release of 0.14 grams (0.005 ounces) of chaff/acre/year is likewise not expected to result in any impact.
Air Quality	Good regional air quality is not expected to be impacted by small emissions from flare combustion or from particulate break-up of chaff.
Physical Resources	Chaff constituents comparable to soil under MOAs/ATCAAs, Restricted Areas, and MTRs. Chaff fibers rapidly assimilate into soil. Chaff on water surface could remain briefly then sink to become indistinguishable from bottom sediment. Based on experience at Melrose AFR, there are no anticipated chaff consequences to soil, soil chemistry, surface water, or groundwater. Flare components are combusted on release from aircraft. No discernable change in soil chemistry, surface water, or groundwater. No significant physical resource consequences from 1- inch-by-1-inch inert plastic end caps that drift to the ground following chaff or flare use.
Biological Resources	Effects on biological resources from chaff are undetectable and not biologically significant. The benign nature of chaff materials (elemental aluminum and aluminosilicate glass) and the rapid breakdown of chaff filaments in the natural environments result in no impacts of chaff to wetland habitats, special status species, or habitats at the community or ecoregional level. Effects on humans, livestock, or agricultural plants are undetectable and not biologically significant. No toxic effects are expected; neither would there be irritation of the respiratory system or pathogenic inhalation risk. Biological effects to the human environment or human health would be expected to be non-significant. Based on the area's fire history, flare usage will have little likelihood of impacting the environment as a result of flare-caused fires. In the highly unlikely event of a fire, the biological consequences would be similar to natural grass fires that occur in the region. Consequences to biological species from chaff or flare residual components are not expected. In over 15 years of chaff and flares deployment concurrent with ranching operations on and immediately adjacent to Melrose AFR, there are no known cases where ranchers have experienced a loss as a result of an inquisitive calf or any other animals ingesting an end cap or being injured by a dud chaff bundle or defensive flare.

Table 2-8. Summary of Potential Environmental Consequences

Alternative B Combat-condition training using 4,703 bundles of chaff and 2,538 flares at Melrose AFR, and 37,748 flares and 56,067 bundles of chaff in MOA/ATCAA/Restricted Areas.	Alternative C No Action constitutes continued limited defense training using 4,703 bundles of chaff and 2,538 flares in the restricted airspace directly over Melrose AFR.
Same as Alternative A.	Same as Alternative A.
Same as Alternative A.	No change in chaff or flare use at Cannon AFB. No consequences from continued use of R-188 training chaff in restricted airspace (existing FAA coordination to continue). Continued possibility of dud flare safety risk if found and mishandled by an individual.
Same as Alternative A except for slightly higher concentrations of chaff (1.87 grams [0.07 ounce]/acre/year) in the airspace.	Materials management conditions will continue as they currently exist at Cannon AFB and in the Cannon AFB managed airspace. Release of 1.14 grams (0.05 ounce) of chaff/acre/year and 1.0 flare over 117 acres/year in the airspace over Melrose Range has not resulted in an environmental or materials management consequence.
Same as Alternative A.	No change from continued use of chaff and flares.
Same as Alternative A except for slightly higher concentrations of chaff and plastic caps in the MOA/ATCAA/Restricted Areas. Based on experience at Melrose AFR, there are no anticipated chaff consequences to soil, soil chemistry, surface water, or groundwater.	No change in physical resources from existing conditions.
Same as Alternative A except for slightly higher concentrations of chaff in the MOA/ATCAA/Restricted Areas. Also no chaff use under MTRs. Based the on experience of ranching operations near Melrose Range, no chaff or flare consequences are anticipated to biological resources.	No change in biological resources from existing conditions.

Table 2-8. Summary of Potential Environmental Consequences

Environmental Resource	Alternative A Combat-condition training using 4,703 bundles of chaff and 2,538 flares at Melrose AFR, 51,207 bundles of chaff and 37,748 flares in the Pecos MOA/ATCAA, Sumner ATCAA, R-5104/5105, and the Taiban MOA and 4,860 bundles of chaff in northern portion of VRs-100/125.
Cultural	No impacts to cultural resources under airspace or at Melrose Range are expected. Chaff or flare use generally is not considered to have the potential to affect these resources, either chemically or aesthetically. Chaff and flares would be widely dispersed within airspace, reducing the potential for encountering residual components in association with cultural resources. The Mescalero Apache Tribe has indicated that chaff and flare use will not affect objects, sites, or locations important to their traditional culture or religion.
Land Use and Visual	No anticipated change in land use patterns, land ownership, land management plans, or special use areas underlying the airspace. Chaff residual components are not likely to accumulate in sufficient quantities to impact land uses or visual resources. Potential concerns regarding flare use include fire risk and aesthetic issues. Existing procedures require deployment of flares at or above altitudes that ensure a complete burnout of flares before they contact the ground. Because of its infrequent occurrence and small size, chaff residual components would not alter the landscape and would have little effect on overall scenic values.
Environmental Justice	Neither minority ethnic groups, low-income populations, nor children are disproportionately represented in the area under the airspace proposed for improved training. The preferred alternative would not create significantly adverse environmental or health effects. No disproportionately high and adverse human health or environmental effects on minority and low-income populations have been identified. There are no known environmental health or safety risks that may disproportionately affect children. The only potential risk would be from a child finding a dud flare and mishandling it (such as throwing it into a campfire). In the unlikely event of a child finding a dud flare, Cannon AFB would expand the local education program for fire departments.

Table 2-8. Summary of Potential Environmental Consequences

Alternative B Combat-condition training using 4,703 bundles of chaff and 2,538 flares at Melrose AFR, and 37,748 flares and 56,067 bundles of chaff in MOA/ATCAA/Restricted Areas.	Alternative C No Action constitutes continued limited defense training using 4,703 bundles of chaff and 2,538 flares in the restricted airspace directly over Melrose AFR.
Same as Alternative A, except with slightly higher concentrations of chaff in MOA/ATCAA/Restricted Area airspace. Also no chaff use under MTRs.	No change in cultural or traditional resources from existing conditions.
Same as Alternative A, except with slightly higher concentrations of chaff in MOA/ATCAA airspace. Also no chaff use under MTRs.	No change in land use or visual resources from existing conditions.
Same as Alternative A.	No change in environmental justice resources from existing conditions.

3.0 AFFECTED ENVIRONMENT

This section presents information on environmental conditions for resources potentially affected by the alternatives described in Chapter 2.0. Under the National Environmental Policy Act (NEPA), the analysis of environmental conditions only addresses those areas and environmental resources with the potential to be affected by the proposed action or alternatives; locations and resources with no potential to be affected need not be analyzed. The environment includes all areas and lands that might be affected, as well as the natural, cultural, and socioeconomic resources they contain or support. This analysis assumes chaff and flares are equally distributed throughout the airspace.

The resources to be analyzed are identified in the following section. The expected geographic scope of potential impacts, known as the region of influence (ROI), is defined as the airspace proposed for the Defensive Training Initiative and the land areas under the airspace.

3.1 AIRSPACE

3.1.1 Definition of the Resource

This section addresses each of these airspace elements relative to airspace use for the proposed action and alternatives.

Military Operations Areas (MOAs) are a special use airspace of defined vertical and lateral limits below 18,000 feet mean sea level (MSL) in which certain non-hazardous military flight activities (e.g., air-to-air combat maneuver training, intercept training, and navigation) are conducted. Because of the different types of flight maneuvers performed in a MOA, altitudes and flight paths are random and may vary considerably. When a MOA is active, the Air Traffic Control (ATC) system separates Instrument Flight Rules (IFR) traffic from MOA flight activities either through altitude restrictions or alternate routing that maintains the required safe distance from these activities. MOAs are charted on aeronautical maps to identify for Visual Flight Rules (VFR) general aviation aircraft, those areas where military flight training operations are conducted. VFR pilots can then elect to either avoid flying through a MOA airspace or exercise standard see-and-avoid procedures to remain clear of military aircraft while operating through this airspace. In any case, military aircrews are aware of other non-participating aircraft operating in a MOA and also use see-and-avoid and cockpit radar displays to maintain a safe distance from these aircraft.

An *Air Traffic Control Assigned Airspace (ATCAA)* is a special use airspace that extends MOA airspace from 18,000 feet MSL upward to an assigned altitude to accommodate higher altitude training requirements. The description and use of ATCAAs for each MOA are agreed upon by the military and controlling Federal Aviation Administration (FAA) facility in a Letter of Agreement. ATCAAs are not depicted on aeronautical publications, but generally have the same lateral boundaries as the underlying MOA and are activated for the same time periods of use.

Military Training Routes (MTRs) are flight corridors of varying widths, lengths, and vertical altitudes that are used for low-altitude navigation and training in excess of 250 knots airspeed. There are two types of MTRs: routes flown under IFR and routes flown under VFR. While instrument routes (IRs) may be flown under either VFR or IFR conditions, visual routes (VRs) are flown strictly under VFR conditions. VRs-100/125 are examples of MTRs flown under VFR conditions. Military planners try to align routes so that disturbances to people, property, and other potentially sensitive land areas are minimized. Department of Defense (DoD) flight publications describing the MTRs identify specific locations along route corridors that must be avoided by established horizontal and vertical distances to include airports, ground obstructions, biological resources, and locations

sensitive to high levels of noise. Military pilots are briefed on such avoidance areas prior to conducting any training on an MTR.

Restricted Areas are blocks of airspace within which the flight of non-participating aircraft are subject to restriction. This airspace is designated and identified on aeronautical charts when it is necessary to segregate activities that may be hazardous to non-participating aircraft such as weapons deliveries and air-to-ground gunnery training. Restricted areas typically surround air-to-ground ranges such as the Melrose AFR.

Federal Airways and Jet Routes provide the means for en route transit of air passenger carriers, military aircraft, and other IFR private/business aircraft operating under the ATC system. Federal airways extend from varying minimum altitudes depending on such factors as terrain elevation, obstructions, and navigational aid reception, up to but not including 18,000 feet MSL. Most IFR aircraft operate along Jet Routes that extend from 18,000 feet MSL up to 45,000 feet MSL (Flight Level [FL] 450). To the extent possible, airspace designated for military training is established in areas that are generally clear of Airways and Jet Routes. In those cases where these routes transit a MOA and/or ATCAA, formal procedures are established between the FAA and military controlling agencies to ensure military training activities are separated from the Airway/Jet Route traffic through either scheduling practices or lateral and/or vertical separation standards.

The airspace ROI includes the MOAs, ATCAAs, MTRs, and Restricted Areas identified as part of the proposed action and alternatives. It also includes Federal Airways, Jet Routes, public and private airfields, and other facilities supporting VFR general aviation activities within this region.

3.1.2 Existing Conditions

3.1.2.1 Military Operations Areas

Pecos MOA. The proposed action and alternatives include use of the Pecos and Taiban MOAs, as described in Chapter 2. The Pecos MOA extend from 500 feet above ground level (AGL) up to, but not including, 18,000 feet MSL. About 4,735 sortie-operations were conducted in the Pecos MOA under baseline conditions; 45 percent of these operations between 500 and 2,000 feet AGL. F-16s from Cannon Air Force Base (AFB) accounted for nearly 75 percent of these sortie-operations while Air National Guard units and other users account for the remaining utilization.

Taiban MOA. The Taiban MOA extends from 500 feet AGL up to, but not including, 11,000 feet MSL and serves primarily as additional maneuvering airspace for entering and exiting the Melrose Air Force Range (AFR) restricted airspace (R-5104/5105). The eastern portion of the Pecos MOA overlies the Taiban MOA to extend this training airspace from 11,000 feet MSL up to, but not including, 18,000 feet MSL (FL180). About 70 percent of the annual 4,954 sortie-operations conducted in the Taiban MOA occur between 500 and 2,000 feet AGL. Aircraft typically conduct sortie-operations within the Pecos and Taiban MOAs, and the Melrose AFR airspace during a single training mission.

3.1.2.2 Restricted Areas

R-5104 and R-5105 are the two restricted areas associated with Melrose AFR. These restricted areas allow low-altitude weapons deliveries on Melrose AFR. R-5104 extends from the surface to 23,000 feet MSL. R-5105 extends from the surface to 10,000 feet MSL.

3.1.2.3 Air Traffic Control Assigned Airspace

The Pecos ATCAA overlies the Pecos MOA, extending usable maneuvering airspace from 18,000 feet MSL (FL180) through 23,999 feet MSL (FL239) or as assigned by the Albuquerque Air Route Traffic Control Center (ARTCC). The Sumner ATCAA overlies a large portion of the Pecos ATCAA and is activated from 24,000 feet MSL (FL240) to 51,000 feet MSL (FL510), or as assigned by ATC, when this additional airspace is required to fulfill high-altitude training requirements. Use of these ATCAAs is outlined in a Letter of Agreement between Albuquerque ARTCC and Cannon AFB. The availability of the ATCAAs is generally dependent upon the ARTCC's need to route other IFR air traffic through this airspace.

3.1.2.4 Military Training Routes

Portions of the two MTRs considered for use in the proposed action, VR-100 and VR-125, are 58 miles wide. They are located along the same airspace corridor but are flown in opposite directions based on mission requirements and scheduling. These MTRs are often used in conjunction with Pecos MOA/ATCAA and Melrose AFR training missions. F-16 aircraft from Cannon AFB conduct about 90 percent of sortie-operations on these MTRs, with transient aircraft accounting for the remaining utilization. Under baseline conditions, annual use of these MTRs is about 564 sortie-operations. Although segments of these routes permit flights down to the surface, Cannon AFB aircraft are restricted to 500 feet AGL and above.

3.1.3 Other Airspace Uses

The Pecos and Taiban MOAs and overlying ATCAAs are surrounded by five different Federal Airways that are sufficiently distant from this training airspace to not be a potential conflict with any air traffic operating along these routes. Jet Route J74 crosses east-west above the Pecos MOA through the altitudes of the Pecos ATCAA. This route is controlled by the FAA Albuquerque ARTCC which coordinates with Cannon ATC in providing separation between the Jet Route traffic and military operations. Jet Route traffic is normally assigned altitudes at or above 24,000 feet MSL (FL240) along this route segment during times when military flight training is in progress.

Four different Federal Airways cross VRs-100/125. The published minimum en route altitudes for IFR traffic operating along these airways are above those lower altitudes military aircraft would normally fly along these MTRs. Any general aviation aircraft that may follow these airways are also generally at altitudes above the MTR traffic. "See and avoid" procedures also apply along the MTRs for military and general aviation aircraft.

The Fort Sumner Municipal Airport is the only public airport within close proximity to either the Pecos or Taiban MOAs. A charted MOA avoidance area requires military aircraft to remain above 1,500 feet AGL or to maintain at least 3 miles lateral separation when operating in the vicinity of this airport. Published airfield information indicates that this airport has an average of about 30 aircraft operations per month with most of those being general aviation. No commercial air service is conducted at this airport. Three private airfields (Double V Ranch, Bojax, and El Paso Natural Gas) are located beneath or adjacent to the Pecos MOA/ATCAA. A very limited number of aircraft operations are conducted at these airfields. MOA flight training activities have had little effect on aircraft operations at each of these public/private airfields.

VFR general aviation operations normally consist of small, single-engine fixed-wing or helicopter aircraft flown by recreational pilots or ranchers. These operations must remain below 18,000 feet MSL where pilots operate under "see and avoid" flight procedures and use visual references such as towns, highways, and railroads as a means of navigating between airfields. VFR aircraft may operate

through a MOA as discussed above. General aviation VFR aircraft operations within the ROI are light and such flights occur through the Pecos and Taiban MOAs on an infrequent basis. Cloud seeding is conducted within the MOA airspace only when military training is not in progress.

The current authorized use of chaff and flares within the Melrose AFR restricted airspace has not had any effect on Federal Airway and Jet Route air traffic, public/private airfield operations, or VFR general aviation flights. Chaff is dropped within Melrose AFR at altitudes that are generally below Albuquerque ARTCC's radar coverage, and the chaff used (RR-188) is the newer type that does not interfere with ATC radar systems. The potential for any interference has been minimized through agreements with the FAA that require military compliance with restrictions/clearances on chaff frequencies and the location, altitude, and times of chaff use. ATC can also direct pilots to cease dropping chaff in the unlikely event any radar interference is experienced.

3.2 SAFETY

3.2.1 Definition of Resource

Safety topics considered include fire safety and safety issues associated with chaff and flare use. Safety issues associated with chaff and flare use are discussed in terms of United States Air Force (Air Force)-established mishap categories. The Air Force defines five categories of mishaps: Class A, B, C, D, and High Accident Potential (HAP). Class A mishaps, the most serious, result in a loss of life, permanent total disability, a total cost in excess of $1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in a total cost of $200,000 or more, but less than $1 million in property damage; a permanent disability; or hospitalization of five or more personnel. Class C mishaps result in total damage of $10,000 or more, but less than $200,000; and injury or occupational illness that results in 8 hours or more of lost work; or a mishap that does not meet the requirements for a Class A or Class B mishap, but does require reporting under the guidance in Air Force Instructions. Class D mishaps result in total damage of $2,000 or more, but less than $10,000; a loss of worker productivity of more than 1 hour, but less than 8 hours; a nonfatal injury that does not result in a loss of worker productivity; or a mishap that does not meet the criteria for a Class A, B, or C mishap, but does require reporting. Class D mishaps are not applicable to aircraft-related mishaps. HAP events represent minor incidents not meeting any of the criteria for Class A, B, or C.

Two ROIs exist for the safety analysis. The first ROI encompasses Cannon AFB and the munitions storage area. The second ROI includes the area defined by the airspace proposed for chaff and flare use.

3.2.2 Existing Conditions

3.2.2.1 FIRE SAFETY

The Air Force enforces standards specifying the amount and type of fire and crash equipment and personnel required for a base. These standards are based on the number and type of aircraft as well as the nature and size of buildings on base. Cannon AFB fire and emergency services meet these standards. To meet any extraordinary requirements that might arise, the Cannon AFB Fire Department has established mutual aid support agreements with the nearby communities of Clovis, Portales, Texico, House, and Melrose (personal communication, Givney 2001).

The 27th Fighter Wing (27 FW) Fire Department provides an on-site fire response and suppression capability on Melrose AFR. 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. The Melrose AFR Control Officer evaluates regional fire risk daily. If risk is excessive, certain restrictions on range operations may be imposed. These restrictions could range from limiting the type of ordnance used, to the complete curtailment of all ordnance use. All aircrews must review and adhere to fire restrictions regarding the use of ordnance on the range.

The State of New Mexico Energy, Minerals and Natural Resources Department, Forestry Division and the United States Forest Service (USFS) participate in the Southwest Area (SWA) Wildland Fire Operations Center, an interagency wildland fire resource coordination center located in Albuquerque, New Mexico. The SWA is divided into nine zones that oversee fire management activities within the zone. Three zones, the Santa Fe, Albuquerque, and Lincoln zones, manage resources beneath the airspace addressed in this environmental assessment (EA). The SWA's Fire Intelligence website along with websites for the Santa Fe and Albuquerque zones provide information concerning fire potential, fire reports, and fire weather to the public and the fire protection community (USFS 2001). The USFS uses the National Fire Danger Rating System to identify daily fire danger indices to predict ignition potential for specific areas. These indices are generated by analyzing vegetation types, temperature, precipitation, fuel moisture, humidity, wind, lightning activity, and human factors. The fire rating is broken into five categories ranging from low to extreme fire hazard and is presented on a daily basis on the World Wide Web at www.fs.fed.us/land/wfas/fd-class.gif.

New Mexico normally experiences two fire seasons each year 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 and experiences strong dry winds. The threat of fire is heightened during this season, because live vegetation is starved for moisture. Fires during this season are most often caused by human activity or lightning from dry thunderstorms (thunderstorms with little or no rain). With no rain, fires caused by lightning strikes cannot be extinguished naturally. The second fire season usually begins with another dry period during the fall. During this time, many grasses and other small plants begin to die and dry out, providing ready fuel for fire activity. Moisture levels in the atmosphere are reduced and, once again, dry thunderstorms become a threat to ignite fires (New Mexico State University 2000). Based on the records kept by New Mexico's Forestry Division for the years 1996-2000, the state averaged 792 wildland fires that consumed approximately 153,700 acres in state and private lands annually.

Use of flares on Melrose AFR has been authorized since 1984. Melrose AFR has experienced a few small fires, primarily caused by ordnance spotting charges. Only one known fire has resulted from flare use. In this instance, an aircraft from another Air Force base inadvertently released a flare below the minimum release altitude for the range of 700 feet AGL. A 700 feet AGL altitude restriction is imposed on Melrose AFR to allow about a 375-foot buffer for flare burn-out. In general, fires that have occurred on Melrose AFR tend to be small and remain contained within the target impact areas, which are generally devoid of vegetation or are surrounded by fire breaks. In addition to on-site fire spotting and fire suppression capabilities, fire risk on the range is managed by controlled burning, development and maintenance of fire breaks, and suspending the use of heat- and spark-producing ordnance when fire risk is elevated (Air Force 1997a).

3.2.2.2 CHAFF USE

In 1997, the Air Force prepared an analysis of the *Environmental Effects of Self Protection Chaff and Flares* (Air Force 1997a) and addressed a broad range of potential safety issues associated with the use of chaff. The analysis considered potential interference with communications systems, disruption or

interference with FAA or other radar systems, potential damage to electrical power distribution systems and aircraft from engine ingestion of chaff, potential damage to aircraft and injury to personnel from chaff system malfunctions, and potential injury from falling chaff system components. The conclusions of the analysis indicated that there is little risk to aircrews, aircraft, maintenance personnel, or the public anticipated from the use of chaff.

During the 10-year period (1983 to 1993) evaluated for the 1997 analysis, the entire United States Air Force experienced 53 HAP events associated with chaff systems malfunctions during flight operations involving a variety of aircraft. Twenty-nine of the 53 events (approximately 55 percent) occurred in 1985-1986. During this time, the Air Force was experiencing a mechanical problem with a particular type of dispensing system resulting in a high incidence of inadvertent releases. The system was repaired in 1987 and HAP incidents for chaff systems during flight operations occurred at a rate of less than three per year (Air Force 1997a).

During this same 10-year period, there were no chaff system-related Class A, B, or C mishaps during ground operations (non-aircraft related). There were five Class D mishaps and 42 HAP occurrences (Air Force 1997a). In the past three years, there have been no Class A, B, C, or HAP events associated with chaff at Cannon AFB (personal communication, Travis 2001).

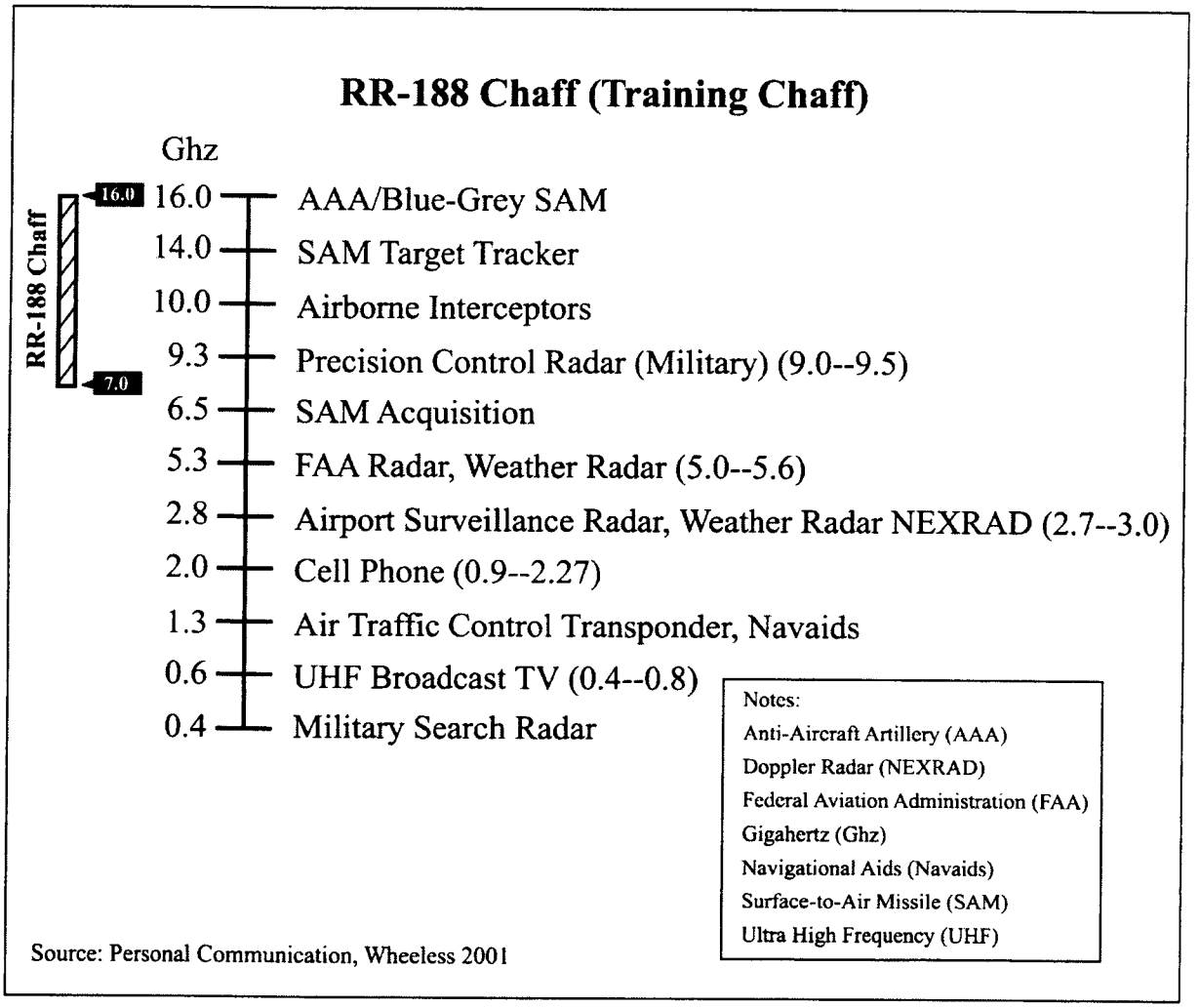
Prior to using chaff in any airspace, Cannon AFB must follow the requirements outlined in the *Chairman of the Joint Chiefs of Staff Manual 3212.02-Enclosure C Frequency Clearance and Notification Requirements*. Cannon AFB must submit a clearance request to the Air Force Frequency Management Office. After consultation with the area frequency coordinator, the request is forwarded to the FAA and the Federal Communications Commission national and regional offices for approval. The FAA's Spectrum Policy and Management Office (ASR-1) is the approving agency for DoD chaff use requests. As part of the approval process, this office considers all the information relative to the type of chaff, time, altitude, location of employment, and potential to interfere with any of the air traffic control frequency bands. Then, the annual request is either approved, approved with restrictions, or denied. Currently, Cannon AFB has approval to release chaff in the restricted airspace over Melrose AFR. Certain types of chaff, such as RR-170 combat chaff, have the potential to interfere with FAA radar. However, training chaff (RR-188) has been designed so that it does not interfere with the affected frequency bands (see Table 3.2-1).

3.2.2.3 FLARE USE

Potential safety issues previously analyzed by the Air Force (Air Force 1997a) included fire risk, flare system malfunction, and possible injury to people resulting from falling residual flare components. In addition to fire safety (refer to section 3.2.2.1), flare system malfunctions include conditions such as a malfunctioning impulse cartridge that is unable to eject the flare pellet from the cartridge or increased breakout resistance in the flare pellet that results from storage conditions or mishandling during the loading process.

Further evaluations of the officially reported rate of potential ejection failures and inadvertently dropped flares by Air Force depot personnel suggests an estimated failure rate of less than 1 percent (personal communication, Fullmer 2001). Examination of recent Explosive Ordnance Disposal Incident Reports-Form 3579 (2000 to 2001) of potential ejection failures at Cannon AFB identified only two incidents, with one incident actually involving M-206 flares, in which one flare had functioned improperly (personal communication, Foltz 2001).

Table 3.2-1. Chaff Radar Frequency Coverage for RR-188 Chaff



From 1983 to 1993, flares were involved in both non-aircraft- and aircraft-related mishaps. During this 10-year period, there were 156 non-aircraft related mishaps. There were no Class A mishaps; two Class B mishaps; 21 Class C mishaps, 26 Class D mishaps, and 107 HAP events. These incidents occurred primarily during maintenance activities such as movement, inspection, and system troubleshooting. During this same period, there were no Class A or Class B aircraft-related mishaps involving flares. There were three Class C mishaps and 101 HAP mishaps involving flares that were aircraft related. This constitutes a yearly average of 0.3 Class C and 10.1 HAP mishaps. None of those incidents resulted in serious injury (Air Force 1997a).

3.3 MATERIALS MANAGEMENT

3.3.1 Definition of the Resource

In this EA, materials management considers the transportation and storage of chaff and flares. The disposal of chaff and flares that cannot be used due to expired shelf life, physical damage, or other reasons will also be addressed.

Two ROIs exist for the materials management section. The first ROI is Cannon AFB, including the munitions storage areas. The second ROI is Melrose AFR and the land area underneath Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, R-5104/5105, and portions of VRs-100/125.

3.3.2 Existing Conditions

3.3.2.1 CANNON AFB

Chaff and flares and their associated systems are currently stored, maintained, and handled at Cannon AFB. Chaff and flare cartridges are classified as munitions as a result of the charge that ejects the chaff fibers or flare material from the aircraft. Chaff and flares are shipped to the base and stored in munitions storage facilities designed for such materials. Both the chaff and flares are transported to the flight line and loaded on the aircraft prior to training missions. After the mission, unused chaff and flares are removed from the aircraft and returned to the storage facility. Chaff and flares that cannot be used because of factors such as expired shelf life or damage are turned in and returned to the supply depot responsible for their disposal. Final disposal of unusable chaff and flares does not occur at Cannon AFB.

Chaff and flares are not dispensed from the aircraft on Cannon AFB or in the airspace in the immediate vicinity of Cannon AFB.

3.3.2.2 SPECIAL USE AIRSPACE (MOAS, ATCAAS, AND RESTRICTED AREAS)

Under current conditions, chaff and flares are dispensed from 27 FW aircraft only in the airspace above Melrose AFR. Currently, 4,703 bundles of chaff and 2,538 flares are used annually. Residual components from properly dispensed chaff consist of two small plastic pieces approximately one inch square by 1/8 inch thick, and a small felt spacer. Residual components from flares consist of mylar or filament tape bonded to aluminum tape, a 1 inch square by ¼ inch thick plastic (nylon) end cap, and felt spacers (Air Force 1997a). These items are non-hazardous.

Melrose AFR is operated by a contractor who monitors and maintains the televised ordnance scoring system, bombing and gunnery targets, and access roads. Range debris typically consists of metal fragments from inert ordnance, targets, and training ammunition. In accordance with Air Force requirements, areas of the range with the greatest concentrations of ordnance are cleared annually, and a complete boundary-to-boundary clearance is accomplished every 5 years. Trained explosive ordnance disposal personnel inspect all ordnance debris. Flares that do not ignite and/or burn completely (duds) and chaff bundles that do not disperse properly may also be disposed of

during range cleanup. The explosive ordnance disposal team has primary responsibility for ensuring that all inert ordnance and ordnance residue have been rendered "safe" (i.e., no longer capable of igniting, burning, or exploding) prior to removal and disposal (Air Force 1998). Under current operations, there are no specific issues associated with the use and disposition of chaff and flares on Melrose AFR.

Currently, the use of chaff and flares in the Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, and VRs-100/125 is not authorized. Only the portion of R-5104/5105 located over Melrose AFR is authorized for chaff and flare use.

3.4 AIR QUALITY

3.4.1 Definition of the Resource

Federal Air Quality Standards. Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. 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 United States 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 six "criteria" pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), respirable particulate matter less than 10 micrometers in diameter (PM_{10}), sulfur dioxide (SO_2), and lead (Pb). Based on measured ambient criteria pollutant data, the USEPA designates areas of the United States as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment).

State Air Quality Standards. Under the CAA, state and local agencies may establish ambient air quality standards (AAQS) and regulations of their own, provided these are at least as stringent as the federal requirements. For selected criteria pollutants, the State of New Mexico has established its state AAQS, which are somewhat more stringent than the federal standards (New Mexico Department of Environmental Improvement 1996). New Mexico AAQS are more restrictive than federal standards for CO, NO_2, and SO_2. New Mexico does not have state standards for PM_{10}, O_3, and Pb. In addition, New Mexico regulates emissions of total suspended particulates, hydrogen sulfide (H_2S), and total reduced sulfur, three pollutants for which there are no federal standards. A summary of the federal and New Mexico AAQS that apply to the proposed project area is presented in Table 3.4-1.

State Implementation Plan. States are required to develop a State Implementation Plan that sets forth how the CAA provision will be implemented within the state. The State Implementation Plan 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 a national goal of preventing degradation or impairment in federally designated Class I areas. Class I areas are defined as those areas where any appreciable degradation in air quality or associated visibility impairment is considered significant. As part of the PSD program, Congress assigned mandatory Class I status to all national parks, national wilderness areas (excluding wilderness study areas or wild and scenic rivers), and memorial parks greater than 5,000 acres. 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

Table 3.4-1. New Mexico and Federal Ambient Air Quality Standards

Air Pollutant	*Averaging Time*	*New Mexico AAQS*	*FEDERAL (NAAQS)*	
			Primary	*Secondary*
Carbon Monoxide (CO)	8-hour 1-hour	8.7 ppm 13.1 ppm	9 ppm 35 ppm	--- ---
Nitrogen Dioxide (NO_2)	AAM 24-hour	0.05 ppm 0.10 ppm	0.053 ppm ---	0.053 ppm ---
Sulfur Dioxide (SO_2)	AAM 24-hour 3-hour	0.02 ppm 0.10 ppm ---	0.03 ppm 0.14 ppm ---	--- --- 0.5 ppm
Particulate Matter (PM_{10})	AAM 24-hr	--- ---	50 µg/m³ 150 µg/m³	50 µg/m³ 150 µg/m³
Particulate Matter ($PM_{2.5}$) [a]	AAM 24-hour	--- ---	15 µg/m³ 65 µg/m³	15 µg/m³ 65 µg/m³
Total Suspended Particulates (TSP)	AGM 30-day 7-day 24-hr	60 µg/m³ 90 µg/m³ 110 µg/m³ 150 µg/m³	--- --- --- ---	--- --- --- ---
Hydrogen sulfide (H_2S)	1-hr[d] ½-hr[e] ½-hr[f]	0.010 ppm 0.100 ppm 0.030 ppm	--- --- ---	--- --- ---
Total Reduced Sulfur[b]	½-hr[d] ½-hr[e] ½-hr[f]	0.003 ppm 0.010 ppm 0.003 ppm	--- --- ---	--- --- ---
Ozone (O_3) [c]	1-hour 8-hour	--- ---	0.12 ppm 0.08 ppm	0.12 ppm ---
Lead (Pb) and Lead Compounds	Calendar Quarter	---	1.5 µg/m³	1.5 µg/m³

Notes: AAM = Annual Arithmetic Mean; AGM = Annual Geometric Mean.

ppm = parts per million; µg/m³ = micrograms per cubic meter.

(a) The $PM_{2.5}$ standard (particulate matter with a 2.5 µm diameter) was promulgated in 1997, and will be implemented over an extended time frame. Areas will not be designated as in attainment or nonattainment of the $PM_{2.5}$ standard until the 2002-2005 timeframe.

(b) Total reduced sulfur does not include H_2S.

(c) The 8-hour O_3 standard was promulgated in 1997 and may eventually replace the 1-hour standard. The United States Supreme Court has instructed the USEPA to develop a reasonable implementation of the 8-hour nonattainment provisions. During the interim, the 1-hour O_3 standard will continue to apply to areas not attaining it.

(d) Entire state except for the Pecos-Permian Air Basin (AQCR 155), which includes De Baca, Chaves, Curry, Quay, and Roosevelt counties.

(e) Within the Pecos-Permian Air Basin.

(f) 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.

Sources: 40 Code of Federal Regulations 50; New Mexico Department of Environmental Improvement 1996.

been so designated. The PSD requirements affect construction of new major stationary sources in the PSD Class I, II, and III areas and are a pre-construction permitting system. The nearest PSD Class I area is the Salt Creek Wilderness Area, located just south of the Pecos MOA. Because the Proposed Action does not involve the addition or modification of any new stationary sources, PSD and Title V permitting requirements do not apply.

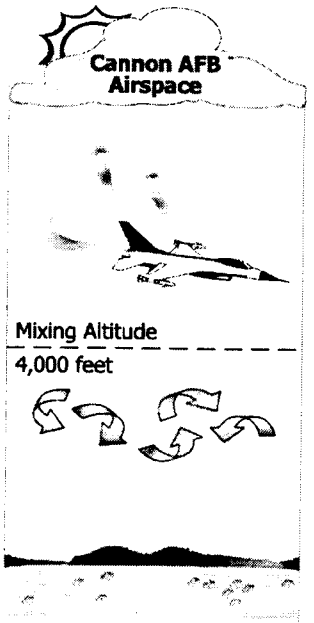
Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in the PSD Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a PSD Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for PSD Class I areas that will also 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 PM_{10} and SO_2 in the lower atmosphere.

The ROI for air quality is the airspace affected by the proposed action. This includes the Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, and R-5104/5105 and portions of VRs-100/125.

3.4.2 Existing Conditions

3.4.2.1 Special Use Airspace (MOAs, ATCAAs, and Restricted Areas)

Climate. The general climate for this area is semi-arid. The area undergoes the basic climatic trend of four seasons. The down slope warming of air from the mountains tends to modify and temper the air masses, which pass over this area from the west and northwest. Winds with a northwesterly component blow down slope and enhance atmospheric ventilation. Winds with a component from the south and east blow upslope and lead to increased cloud formation and precipitation.



Emissions of pollutants above the atmosphere mixing height do not impact air quality on the ground.

Winds in southeastern New Mexico are often gusty and can average 10 miles per hour (mph) or greater. Wind speeds are typically highest during March and April. Based on a 10-year period, the prevailing surface wind direction is from the west. These west winds occur primarily from October to May. In the warmer months, the winds tend to be from the south. The annual mean wind speed is approximately 8 mph. Monthly averages range from 6 mph to 10 mph. The maximum-recorded wind gust is 84 mph.

The atmosphere in the region is generally well mixed. The seasonal and annual average mixing heights can vary from 400 feet in the morning to 4,000 feet in the afternoon. The morning mixing heights are usually low, due to nighttime heat loss from the ground, which produces surface-based temperature inversions. After sunrise, these inversions quickly break up, and solar heating of the earth's surface results in good vertical mixing in the lower layers of the atmosphere (National Oceanic and Atmospheric Administration 1998a, 1998b).

Dust is frequently entrained into the atmosphere in this region of the country because of gusty winds and the semi-arid climate. The Texas Panhandle-eastern New Mexico area is considered one of the worst areas in the United States for windblown dust. Occasionally this windblown dust is of sufficient quantity to restrict visibility. Most of the seasonal dust storms occur in March and April, when the wind speeds are typically high.

Attainment Status. The proposed action would involve the use of chaff and flares within a ROI that spans portions of Lincoln, Guadalupe, San Miguel, Torrance, Chaves, Curry, DeBaca, Quay, Roosevelt, and Santa Miguel Counties. According to federally published attainment status for New Mexico in 40 Code of Federal Regulations 81.332, all of these regions are designated as in attainment, better than the national standards, or unclassified for CO, NO_2, SO_2, PM_{10}, O_3, and Pb.

PSD Class I Areas. Mandatory PSD Class I areas for the state of New Mexico are listed under 40 Code of Federal Regulations 81.421. The nearest PSD Class I areas to the region is the Salt Creek Wilderness Area, located in east-central Chaves County approximately 5 miles outside the southern boundary of the Pecos MOA.

Current Emissions. The baseline emission sources section focuses on chaff and flares because the number and type of aircraft operations would not change as result of the proposed action. Therefore, emissions associated with aircraft activities would be the same as the baseline emissions and are not quantified here.

Air emissions from the deployment of chaff and flares were estimated using emission factors from recent studies. The emission factors for M-206 flare combustion, provided in the *Air Force Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Air Force 1999a), were applied to the baseline flare usage data in Table 2-1. For M-206 flares, each cartridge contains 143 grams of flare material, which is primarily elemental magnesium and an end cap, composed of a plastic resin material. Baseline emissions of criteria pollutants from the usage of M-206 flares over the Melrose AFR are presented in Table 3.4-2.

Table 3.4-2. Baseline RR-188 Chaff and M-206 Flare Emissions over the Melrose AFR

	ANNUAL EMISSIONS (TONS/YR)				
	CO	*NO_2*	*SO_2*	*PM_{10}*	*VOC*
R-188 Chaff	-	-	-	<0.01	-
M-206 Flare	<0.01	<0.01	<0.01	0.22	<0.01
TOTAL	<0.01	<0.01	<0.01	0.22	<0.01

Intact chaff dipoles are 25 micrometers in diameter and up to 2.5 centimeters in length (about 1 inch). A recent study by a panel of university-based research scientists (Spargo 1999) concluded that air pollution emissions from the use of chaff are insignificant. The chaff itself does not break down to PM_{10}-sized particles or smaller, so none of it would be classified as PM_{10}. The explosive charge in the BBU-35/B impulse cartridge used to eject the chaff does, however, produce a measurable amount of PM_{10}. The impulse cartridge contains approximately 4.85 milligrams of explosive charge. Chaff testing results have indicated that approximately 5 percent of the mass of the impulse charge is converted to PM_{10} (Air Force 1994a). Baseline emissions of PM_{10} from the usage of RR-188 chaff over the Melrose AFR airspace are presented in Table 3.4-2.

Section 112 of the CAA relates to the release of hazardous air pollutants. Section 112 (d-j) of the CAA specifies that a National Emission Standards for Hazardous Air Pollutants be promulgated for numerous source categories. There is no source category listed for chaff and flares. Therefore, a risk assessment of any hazardous air pollutants from the chaff and flares was needed. There are no hazardous air pollutants emitted from chaff. However, some flares emit chromium, which is considered hazardous. A risk assessment for emission of toxic air pollutants from flares has been performed (Air Force 1997a).

The results of the risk assessment indicated that, using the USEPA cancer risk potency values and the quantity of chromium in the first fire mix and impulse cartridges, emission thresholds for causing significant increased cancer risk are unlikely to be exceeded under typical military flight exercises during a given year. On a yearly basis, up to 220,000 flares could be deployed in a 10,000-acre target area without significantly increasing the chromium-related risk of cancer. For larger areas, such as a 490,000-acre MOA, the number of flares that could be deployed annually before a significant increased cancer risk is created increases to 4.5 million flares.

3.5 PHYSICAL RESOURCES

3.5.1 Definition of the Resource

Physical resources consist of both earth and water resources of an area. This includes the analysis of soil materials, surface water features, aquifers, and watersheds potentially affected by the proposed action.

The ROI for physical resources is Melrose AFR where chaff and flares will continue to be used; special use airspaces (Taiban MOA, Pecos MOA/ATCAA, R-5104/5105, and Sumner ATCAA) where deployment of chaff and flares is proposed; and portions of VRs-100/125 (where only chaff use is proposed).

3.5.2 Existing Conditions

3.5.2.1 MELROSE AFR

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 northeast through it. 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 evidence of surface water flow north of Sundale Valley Road is difficult to identify (Air Force 1996).

The Sheep Canyon drainage area contains one major drainage that flows northeast from the Mesa and several small seasonal tributaries. Other surface water features on Melrose AFR include four periodically flooded wetlands primarily located in shallow playa basins in the eastern portion of the range, two playa ponds, and numerous on-channel impoundments in natural and man-made drainages (Air Force 1996).

The drainage patterns expand in long shallow draws and arroyos that extend nearly from the western edge of the High Plains to the eastern boundary of the plateau. Eventually, the draws drain into one of three river valleys: the Red, the Brazos, or the Colorado. Although the draws extend to the river valleys as drainage systems, they rarely contribute actual flow to the rivers because the bulk of precipitation is lost to evaporation and infiltration into the ground (Air Force 1997b).

Stormwater runoff from the southeastern half of Melrose AFR is generally carried by the Canada del Tule draw. The Mesa, which is the high point on Melrose AFR rising over 4,600 feet MSL, is

drained from the northeast by the Sheep Canyon drainage area and from the northwest, southwest, and east by intermittent surface drainages. Much of the runoff on Melrose AFR is captured in numerous impoundments that are used as sources of water for livestock (Air Force 1996).

Wetlands located within the watershed are described in section 3.6.2.1.

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 1997c). Surficial soils underlying the airspace can be generally characterized as sandy to silty loams, with considerable localized variation.

The 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 (Soil Conservation Service 1958, 1960, 1967, 1970, 1981, 1986, 1988).

The airspace 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 1997c).

3.5.2.2 Special Use Airspace (MOAs, ATCAAs, and Restricted Areas)

Under the airspace, precipitation ranges from approximately 12 inches per year at the western perimeter to approximately 18 inches per year at the eastern perimeter, most of which occurs during summer thunderstorms. As a result of the semi-arid climate and the high evaporation rate, regional drainage occurs primarily through poorly developed seasonal streams or closed basins.

The Pecos River, comprising the primary surface water feature in the Upper Pecos watershed, flows southerly under the airspace, and is the only 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 (USEPA 2001) (see Figure 3.5-1). 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.

Given the relative lack of permanent surface water resources underneath 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 1997c). 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). Most groundwater in the Ogallala aquifer is a calcium magnesium bicarbonate type, though some areas of southeastern New

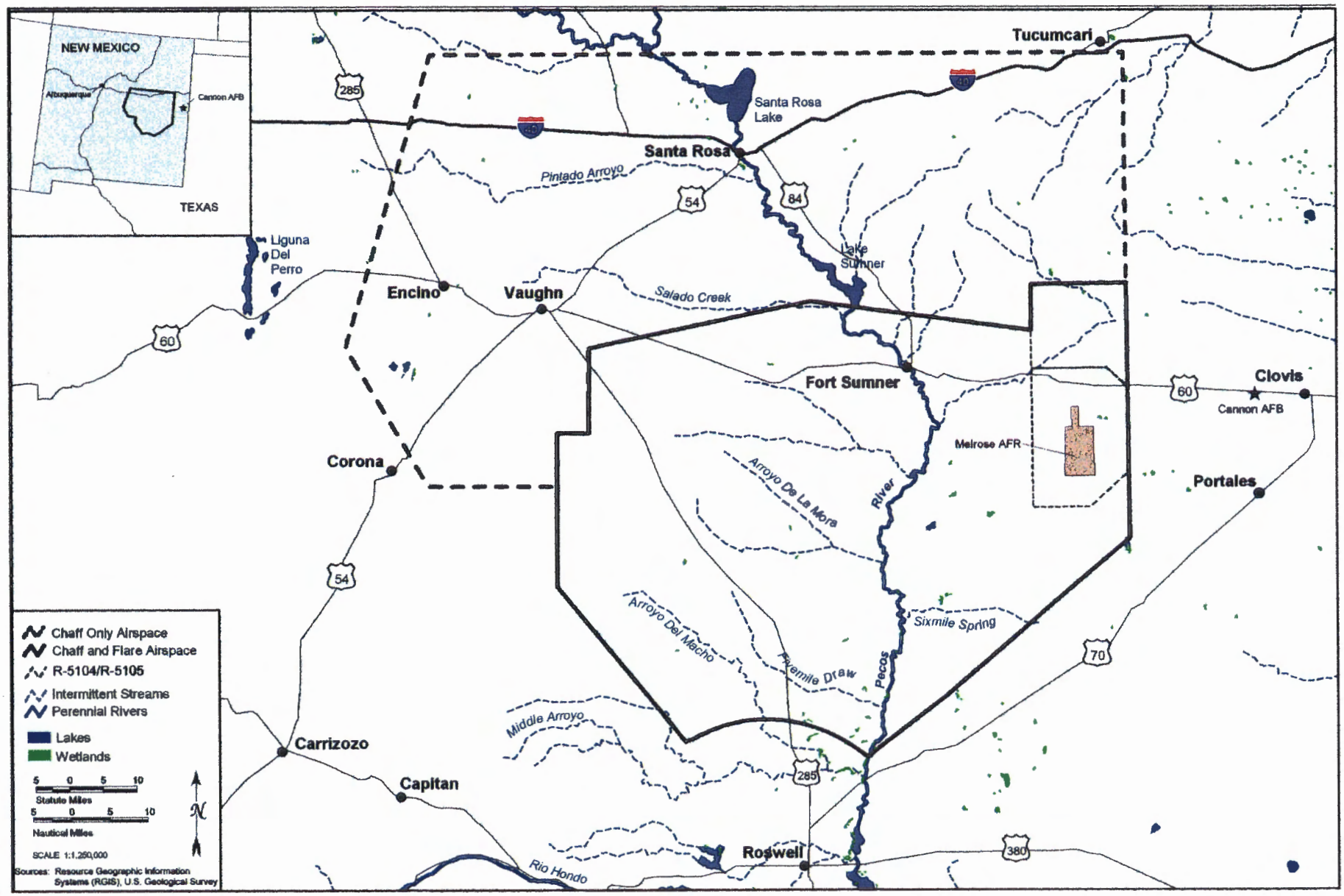


Figure 3.5-1. Surface Water Features Within the Region of Influence

Mexico exhibit a bicarbonate sulfate quality due to high concentrations of dissolved sulfate (U.S. Geological Survey [USGS] 2001).

Soils on the Melrose AFR are the same as those described in section 3.5.2.1.

3.5.2.3 MILITARY TRAINING ROUTES (NORTHERN PORTION OF VRS-100/125)

The portion of VRs-100/125 involved in the deployment of chaff-only overlies 3.3 million acres. Like the airspace described above, this area encompasses a portion of the Great Plains Physiographic Province in the Pecos Valley and Southern High Plains subprovinces. The eastern portion of the MTR is underlain by the Pecos Valley and High Plains subprovinces. Predominant landforms include the Pedernal Hills and the Estancia Valley (Williams and McAllister 1979).

Primary surface water features include the Pecos River, bisecting the airspace from north to south, and Santa Rosa and Sumner Lakes in the north. Santa Rosa and Sumner Lakes are both man-made impoundments, owned and operated by the United States Army Corps of Engineers (USACE) (USACE 2001). Additionally, numerous ephemeral streams drain toward the Pecos River during storm runoff events.

Under the MTR, two aquifers are present: the primary Ogallala aquifer and the secondary Roswell Basin aquifer. The Roswell Basin aquifer can be characterized as a carbonate-rock aquifer. The Roswell Basin aquifer is considered highly permeable and is recharged through direct infiltration of precipitation from surface water in streams and ponds, and from water applied to irrigated fields. This aquifer has a very gentle gradient of often less than one foot per mile. Groundwater in the western portion of the aquifer is typically characterized as a calcium sulfate or a calcium magnesium sulfate type water. In the eastern margin of the aquifer, dissolved sodium and chloride concentrations in the water can be large; consequently, the water is classified as a sodium chloride type. Water with a high sodium chloride content is problematic for irrigation, as many crops can be damaged by excessive salt in the water and soil (USGS 2001).

Soils under the MTR are the same as those described in section 3.5.2.1.

3.6 BIOLOGICAL RESOURCES

3.6.1 Definition of the Resource

The term biological resources is used in this discussion to refer to both natural and human related living resources. Natural living resources include native and exotic organisms, and the habitats, including wetlands, within which they occur. Human-related living resources is a category developed specifically for this document and includes people and domesticated species associated with human activities (agricultural plants and livestock).

The ROI for biological resources for the proposed action and alternatives consists of all lands directly under the affected airspace (i.e., MOAs, MTRs, and Restricted Areas) including Melrose AFR.

3.6.1.1 NATURAL LIVING RESOURCES

Natural plant and animal life are typically referred to as vegetation and wildlife, respectively. Assemblages of plant and animal species within a defined area and linked by ecological processes are referred to as natural communities. The existence and preservation of these resources are intrinsically valuable; they also provide aesthetic, recreational, and socioeconomic values to society. This section focuses on plant and animal species or vegetation types that typify or are important to the function of the ecosystem, are of special societal importance, or are protected under federal or

state law or statute. For purposes of the analysis, natural biological resources will be organized into three major categories: (1) vegetation and habitat, including wetlands; (2) wildlife; and (3) species with special protection status defined below. Because of the broad area under consideration, a habitat-level perspective will govern both descriptions of existing conditions and analyses.

Vegetation and habitat includes all existing terrestrial plant communities but excludes discussion of species with special protection status. The composition of plant species within a given area often defines ecological communities and determines the types of wildlife that may be present.

Wetlands are considered special category sensitive habitats and are subject to regulatory authority under Section 404 of the Clean Water Act and Executive Order (EO) 11990, *Protection of Wetlands*. They include jurisdictional and non-jurisdictional wetlands. Jurisdictional wetlands are those defined by the USACE and USEPA as those areas that meet all the criteria defined in the USACE's *Wetlands Delineation Manual* (USACE 1987) and are under the jurisdiction of the USACE. Non-jurisdictional wetlands include wetlands that fail to meet this requirement. For proposed actions not involving direct ground disturbance, wetlands are typically not considered. However, because of the unique set of possible impacts associated with the proposed action, general consideration of wetlands is given.

Wildlife includes all vertebrate animals with the exception of those with special protection status. Typical animals include terrestrial vertebrate species groups such as snakes, lizards, songbirds, waterfowl, raptorial birds, hoofed animals, carnivores, rodents and other small mammals, and bats. Under particular circumstances, significant invertebrate species or species groups such as mollusks (e.g., snails) or insects may be included in discussions. The attributes and quality of available habitats determine the composition, diversity, and abundance patterns of wildlife species assemblages, or communities. Each species has its own set of habitat requirements and inter-specific interactions driving its observed distribution and abundance. Community structure is derived from the net effect of the diverse resource and habitat requirements of each species within a geographic setting. For this reason, an assessment of habitat types and area affected by the proposed action can serve as an overriding determinant in the assessment of impacts for wildlife populations.

Species with special protection status are defined as those plant and animal species listed as threatened, endangered, candidates, or species of concern by the United States Fish and Wildlife Service (USFWS), as well as species with special state protection status. The Endangered Species Act (ESA) protects federally listed, threatened, and endangered plant and animal species. Candidate species are species that the USFWS is considering for listing as federal threatened or endangered but for which a proposed rule has not yet been developed. In this sense, candidates do not benefit from legal protection under the ESA. In some instances, candidate species may be emergency listed if the USFWS determines that the species population is at risk due to a potential or imminent impact. The USFWS encourages federal agencies to consider candidate species in their planning process as they may be listed in the future. Species of concern are species for which available information supports tracking of trends or threats. Similar definitions of threatened and endangered apply at the state level. Often state and federal lists have considerable overlap. State categories do not provide federal protection under the ESA but do provide a context for evaluating the sensitivity of habitats or communities.

3.6.1.2 HUMAN RESOURCES

During the scoping meetings held within communities in the area, several attendees expressed an interest in the biological resource section including an analysis of the human-related activities such as

agricultural and ranching. To support this interest, human resources are defined as a special category of living things that are components of the uniquely human environment. People and their associated domestic plants and animals will be discussed and evaluated as biological entities in this section, independent of their social or cultural contexts. In addition to the agricultural and ranching uses of the region, it is also important to note that many Native Americans ascribe value to a variety of plant and animal resources. Cultural and social contexts of human land use are discussed in sections 3.7 and 3.8.

3.6.2 Existing Conditions

3.6.2.1 MELROSE AFR

Vegetation and habitat. The physiographic setting of Melrose AFR is discussed in section 3.5. Melrose AFR provides a general framework for describing vegetation and communities typical of the general environmental setting of the eastern portion of the affected area. It 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. Vegetation on Melrose AFR can be generally described as short grass prairie, dominated by herbaceous plants and grasses. 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 (*Opuntia* spp.) occur throughout Melrose AFR.

Wetlands. In a 1996 wetland delineation report for Melrose AFR, two ponds/impoundments, four wetlands, and intermittent streams and drainages were delineated as jurisdictional waters. Scattered earthen stock tanks occur in areas supporting grazing. No permanently flooded areas are located on the range. In general, wetlands have been impacted to varying degrees by road construction, farming, and cattle grazing (Air Force 1996).

Wildlife. For the purposes of describing vertebrate species found on Melrose AFR, Parmenter et al. (1994) classified the plant community types they identified into five major habitat types: mixed-species grasslands, mesquite-grasslands, sand-hill shrublands, old agricultural fields, and areas under current cultivation (i.e., 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 (*Zenaida 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, silky pocket mouse (*Perognathus flavus*), northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), coyote, and pronghorn (*Antilocapra americana*) (Parmenter et al. 1994).

The most widespread habitat on Melrose AFR is mixed-species grassland which, in addition to the generalists listed above, supports a number of grassland specialists. The lowest species diversities are found in the sand hills, 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 (*Pooecetes gramineus*) (Parmenter et al. 1994).

Species with special protection status. The black-tailed prairie dog (*Cynomys ludovicianus*), a candidate for federal listing, occurs in large colonies on many areas of Melrose AFR. Extensive

surveys of Melrose AFR in 1993 and 1994 found no other species of plant, amphibian, reptile, or mammal that was, or is, currently listed as threatened, endangered, or sensitive (Parmenter et al. 1994, DeBruin et al. 1995). Three bird species that are considered species of concern by the USFWS were observed: ferruginous hawk (*Buteo regalis*), white-faced ibis (*Plegadis chihi*), and loggerhead shrike (*Lanius ludovicianus*) (Parmenter et al. 1994).

3.6.2.2 Special Use Airspace (MOAs, ATCAAs, and Restricted Areas)

Wildlife and vegetation communities commonly found underlying much of the special use airspace associated with the proposed action are typical of the Southwest Plateau and Plains Dry Steppe and Shrub Province, and are similar to those already discussed for Melrose AFR (Brown 1994, Degenhardt et al. 1996). Figure 3.6-1 and Table 3.6-1 summarize general vegetation cover types found under special use airspace. The northern portion of VRs-100/125 are assessed for chaff use only. Total area of chaff use would consist of airspace above 6,247,500 acres. Of that area, 2,931,896 acres would also include flare use. The Pecos River, which runs through the center of the Pecos MOA/ATCAA, contains a diverse range of habitats, including riparian, wetland, short grass prairie, and desert uplands.

Wildlife. The Pecos River valley, in the ROI, occurs within a karst landscape, providing some contrasting topographic relief. Located along the Pecos River, just south of Pecos MOA/ATCAA, is the Bitter Lake National Wildlife Refuge (NWR). This refuge protects native grasslands and rare springs and streams along the Pecos River corridor. The refuge supports reptiles, amphibians, and a variety of nesting shorebirds and wintering waterfowl, in addition to resident bird species. Common mammals include desert cottontail, black-tailed jackrabbit, thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), plains pocket gopher (*Geomys bursarius*), beaver (*Castor canadensis*), southern plains woodrat (*Neotoma micropus*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), and mule deer (*Odocoileus hemionus*) (USFWS 1997).

Wetlands. The majority of areas supporting wetlands occur under the special use airspace areas. Wetland acreages and percentages are summarized in Table 3.6-2.

Species with special protection status. USFWS identified a total of 68 federal endangered, threatened, or candidate species or species of concern potentially occurring under MOA airspace based on occurrence records for all counties intersected by affected airspace (see USFWS IICEP response letter in Appendix C). From this list, seven species are listed as endangered, five as threatened, one as proposed threatened, and two are candidates for listing as proposed endangered or threatened. The remainder are federal species of concern. The State of New Mexico lists a total of 38 species as endangered or threatened: 15 endangered and 23 threatened.

No federally listed mammal species are known to occur under the airspace. Federal Candidate mammals that occur under MOA airspace include the swift fox (*Vulpes velox)* and the black-tailed prairie dog (*Cynomys ludovicianus*). In New Mexico, swift fox historically occurred in the short grass prairie or plains-mesa grassland east of the Pecos River. New Mexico Department of Game and Fish (NMGF) surveys have found swift fox under all affected special use airspace (Harrison and Schmitt 1997). The black-footed ferret (*Mustela nigripes*) has not been documented in the state since 1934; in 1991 it was considered extirpated from the state (NMGF 2001). The federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*) is a rare visitor to the riparian areas of the Pecos River under Pecos and Taiban MOAs. It is known primarily from the Rio Grande and Chama rivers, and after extensive surveys, breeding remains unconfirmed along the Pecos River and its drainages (NMGF 2001, Williams 1997).

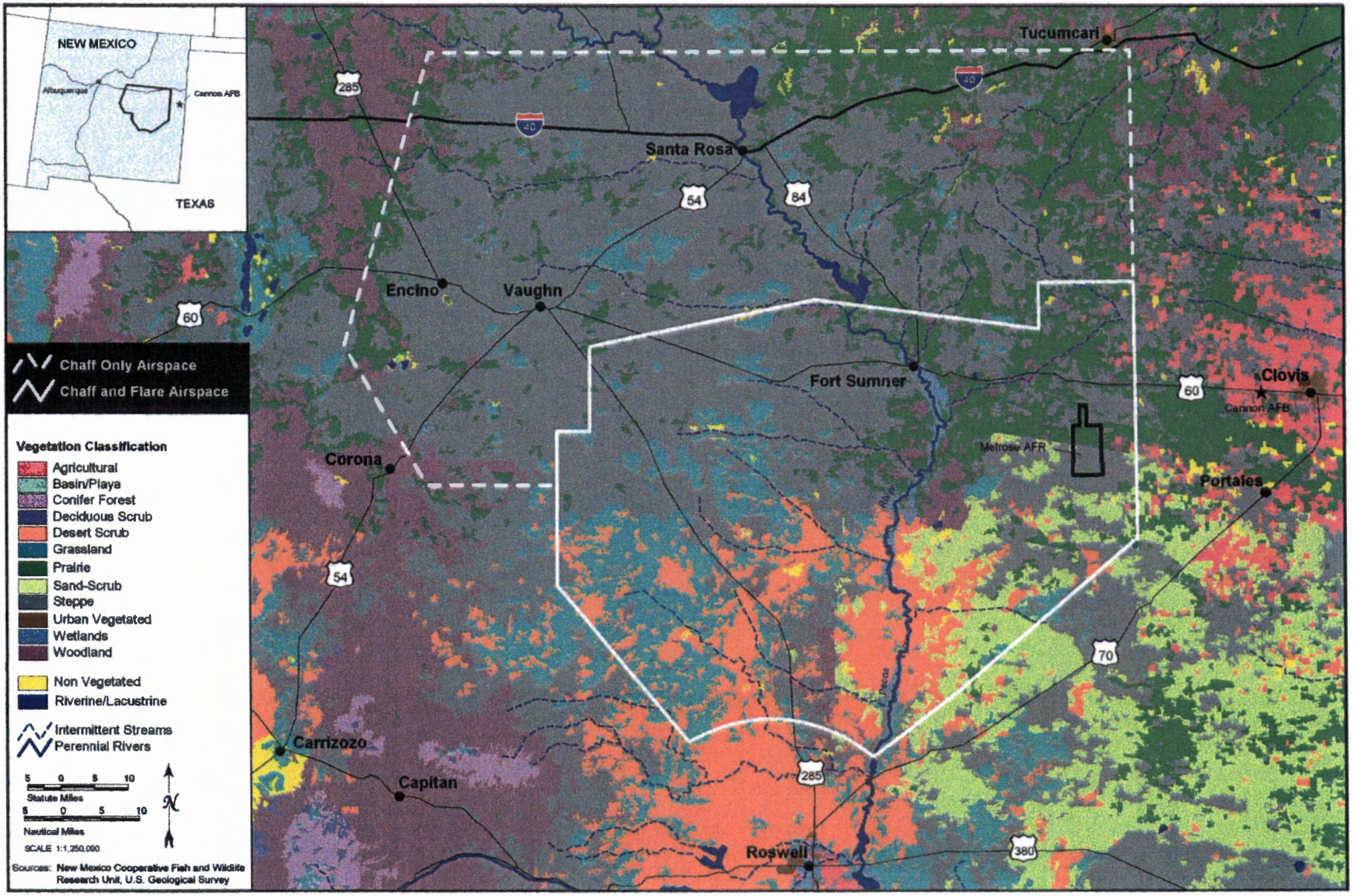


Figure 3.6-1. Vegetation Types Within the Region of Influence

Table 3.6-1. General Vegetation Cover Types (Page 1 of 2)

Airspace	*Vegetation Classification*	*Vegetation Area Within Airspace (acres)*	*Vegetation Area by Percentage of Airspace*
Chaff Use Only (Northern Portion of VRs-100/125)	**Agricultural**		
	Dryland Agricultural	2,266	0.07
	Basin/Playa	953	0.03
	Desert Scrub		
	Chihuahuan Broadleaf Evergreen Desert Scrub	326	0.01
	Grassland		
	Chihuahuan Foothill-Piedmont Desert Grassland	88,588	2.67
	Prairie		
	Mid-Grass Prairie	765,099	23.08
	Tall Grass Prairie	7,656	0.23
	Steppe		
	Short Grass Steppe	2,229,636	67.25
	Urban Vegetated	195	0.01
	Wetlands		
	Graminoid Wetlands	3,588	0.11
	Southwest & Plains Forested/Shrub Wetlands	932	0.03
		Total	**0.14**
	Woodland		
	Rocky Mnt/Great Basin Closed Conifer Woodland	2,460	0.07
	Rocky Mnt/Great Basin Open Conifer Woodland	193,426	5.83
		Total	**5.91**
	Non Vegetated		
	Barren	5,941	0.18
	Rock Outcrop	7,039	0.21
		Total	**0.39**
	Riverine/Lacustrine	7,500	0.23
	Total	**3,315,604**	**100**
Chaff and Flare (Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, R-5104/5105)	**Agricultural**		
	Dryland Agriculture	3,205	0.11
	Irrigated Agriculture	1,801	0.06
		Total	**0.17**
	Basin/Playa	425	0.01
	Desert Scrub		
	Chihuahuan Broadleaf Deciduous Desert Scrub	337,698	11.52
	Chihuahuan Broadleaf Evergreen Desert Scrub	154,772	5.28
		Total	**16.80**
	Grassland		
	Chihuahuan Desert Grassland	21,943	0.75
	Chihuahuan Foothill-Piedmont Desert Grassland	404,773	13.81
		Total	**14.55**
	Prairie		
	Mid-Grass Prairie	365,363	12.46
	Tall Grass Prairie	14,700	0.50
		Total	**12.96**
	Sand-Scrub		
	Plains-Mesa Broadleaf Sand-Scrub	215,654	7.36
	Steppe		
	Short Grass Steppe	1,247,706	42.56

Table 3.6-1. General Vegetation Cover Types (Page 2 of 2)

Airspace	*Vegetation Classification*	*Vegetation Area Within Airspace (acres)*	*Vegetation Area by Percentage of Airspace*
Chaff and Flare (Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, R-5104/5105) (continued)	**Wetlands**		
	Graminoid Wetlands	8,103	0.28
	Southwest & Plains Forested/Shrub Wetlands	40,500	1.38
		Total	**1.66**
	Woodland		
	Rocky Mnt/Great Basin Closed Conifer Woodland	4,485	0.15
	Rocky Mnt/Great Basin Open Conifer Woodland	89,027	3.04
		Total	**3.19**
	Non Vegetated		
	Barren	6,026	0.21
	Rock Outcrop	10,162	0.35
		Total	**0.55**
	Riverine/Lacustrine	5,555	0.19
	Total	**2,931,896**	**100**
All Project Airspaces	**Agricultural**		
	Dryland Agriculture	5,471	0.09
	Irrigated Agriculture	1,801	0.03
		Total	**0.12**
	Basin/Playa	1,378	0.02
	Desert Scrub		
	Chihuahuan Broadleaf Deciduous Desert Scrub	337,698	5.41
	Chihuahuan Broadleaf Evergreen Desert Scrub	155,098	2.48
		Total	**7.89**
	Grassland		
	Chihuahuan Desert Grassland	21,943	0.35
	Chihuahuan Foothill-Piedmont Desert Grassland	493,362	7.90
		Total	**8.25**
	Prairie		
	Mid-Grass Prairie	1,130,461	18.09
	Tall Grass Prairie	22,356	0.36
		Total	**18.45**
	Sand-Scrub		
	Plains-Mesa Broadleaf Sand-Scrub	215,654	3.45
	Steppe		
	Short Grass Steppe	3,477,341	55.66
	Wetlands		
	Graminoid Wetlands	11,691	0.19
	Southwest & Plains Forested/Shrub Wetlands	41,432	0.66
		Total	**0.85**
	Woodland		
	Rocky Mnt/Great Basin Closed Conifer Woodland	6,944	0.11
	Rocky Mnt/Great Basin Open Conifer Woodland	282,452	4.52
		Total	**4.63**
	Non Vegetated		
	Barren	11,966	0.19
	Rock Outcrop	17,200	0.28
		Total	**0.47**
	Riverine/Lacustrine	13,055	0.21
	Total	**6,247,500**	**100**

Table 3.6-2. Wetland Acreages under the Airspace

Airspace	*Wetland Type*	*Wetland Area Within Airspace (acres)*	*Percentage Wetlands*
Chaff Use Only Area[1] (3,315,604 acres)	Nonforested Wetland	3,588	0.001
	Forested Wetland	932	0.0003
	TOTAL Wetland	4,520	0.001
Chaff and Flare Use Area[2] (2,931,896 acres)	Nonforested Wetland	8,103	0.003
	Forested Wetland	40,500	0.014
	TOTAL Wetland	48,603	0.017

Notes: 1. Northern portion of VRs-100/125.
2. Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, R-5104/5105.

The northern aplomado falcon (*Falco femoralis septentrionalis*) has been considered extirpated from the United States since the late 1950s, with the last documented nesting occurring in 1952 in southern New Mexico. Recent confirmed observations of adult aplomados in Otero and Socorro counties and the discovery of two breeding populations 25 miles south of New Mexico in Chihuahua, Mexico have increased the potential for natural colonization of the species' former breeding range in southern New Mexico (Richardson 1996, Montoya et al. 1997). In the eastern portion of its historical range (east of the Pecos River), the aplomado was found in mesquite and yucca desert grasslands. Combinations of heavy grazing, the encroachment of mesquite, and proliferation of weedy species such as snakeweed may have substantially reduced the amount of suitable habitat in eastern and southeastern New Mexico for aplomado falcons (Leal et al. 1996). Due to the lack of historic records of aplomados in the area of Pecos or Taiban MOAs, and the significant change in habitat from what existed historically, it is unlikely that aplomados would occur under MOA airspace except as rare vagrants.

The federally endangered interior least tern (*Sterna antillarum athalassos*) is known to breed just south of Pecos MOA at Bitter Lake 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, BLM 1997, NMGF 2001).

The federally threatened bald eagle (*Haliaeetus leucocephalus*) is a transient and winter habitat user along portions of the Pecos River. No Mexican spotted owl (*Strix occidentalis lucida)* habitat or occurrences are known from airspace associated with the proposed action.

A total of three species of fish are federally listed as threatened or endangered, or proposed as endangered, and seven additional species are listed as threatened or endangered by the state of New Mexico. The majority of these species are found along the Pecos River and various lakes, sinkholes, springs, and tributaries associated with the river. The major factors that threaten fish species along the Pecos River are competition and depredation by non-native fish species and habitat loss caused by water diversion, groundwater depletion, channelization, and watershed disturbance (USFWS 1998b).

Human resources. Crop production accounts for 2.4 percent of the land area under special use airspace. The remainder is almost entirely rangeland supporting livestock (cattle) development activities. Human population density across most of the area is fewer than 1 individual per square mile.

3.6.2.3 MILITARY TRAINING ROUTES (NORTHERN PORTION OF VRS-100/125)

Vegetation and habitat. Vegetation and habitat under the northern portion of VRs-100/125 affected by the proposed action are the same as those described previously in section 3.6.2.2. Acres and percentages of vegetation habitat and wetlands under airspace are summarized in Table 3.6-1.

Wildlife. The portions of VRs-100/125 within the ROI overlie predominantly Dry Plains Grassland habitat; therefore, most wildlife found under MTR airspace would be similar to that found under the special use airspace and at Melrose AFR. Due to the arid nature of the region, the abundance and diversity of resident and migratory wildlife is greatest around riparian areas, lakes, or reservoirs (e.g., Ute, Conchas, Sumner, and Santa Rosa lakes), and ephemeral playas. These areas provide important resident and migratory waterfowl habitat, in addition to habitat for endemic amphibians, reptiles, and mammals.

Wetlands. Considerably less wetlands are located under the northern portion of VRs-100/125 than under the special use area. Wetland acreages and percentages are summarized in Table 3.6-2.

Species with special protection status. The majority of the same federal and state protected species that are potentially found under MOA airspace are also found under MTR airspace (refer to Appendix E).

The federally listed threatened bald eagle occurs primarily as a wintering visitor to New Mexico and is associated with major rivers, lakes, or reservoirs. Only two bald eagle nests are known to exist in New Mexico, and neither occurs under MTR airspace associated with the proposed action. An estimated 545 bald eagles wintered in New Mexico in 1996 and 1997. Major winter roost sites under MTR airspace include Sumner, and Santa Rosa lakes, and the Pecos river valley.

The Air Force, in consultation with the USFWS, devised and implemented a set of special operating procedures designed to reduce the potential for effects on specific threatened and endangered bird species (USFWS 1998a). All other threatened and endangered species that may occur under the airspace have been evaluated, and no special operating procedures were deemed necessary. The special operating procedures were devised for airspace in New Mexico, including that scheduled and used by Cannon AFB. These procedures would not change under the proposed action.

Human resources. Human land use patterns are similar to those under special use airspace described previously under section 3.6.2.2. The percentage of land area in crop production is slightly higher. Average human population density is less than 1 individual (0.951) per square mile under the total project airspace.

3.7 CULTURAL RESOURCES

3.7.1 Definition of the Resource

Cultural resources are prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources are typically divided into three major categories: archaeological resources, 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). Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for inclusion in the National Register of Historic Places (NRHP). 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. They may include archaeological resources, locations of historic events, sacred areas, sources of raw materials, topographic features, traditional hunting or gathering areas, and native plants or animals.

Only significant cultural resources are evaluated for adverse impacts from a federal undertaking. Significant cultural resources are generally those that are eligible or potentially eligible for inclusion in the NRHP. Traditional resources also may be identified as significant by Native American or other ethnic groups.

The ROI for cultural resources consists of Melrose AFR and the land underlying the affected MOAs, ATCAAs, Restricted Areas, and MTRs.

3.7.2 Existing Conditions

3.7.2.1 HISTORICAL SETTING

The earliest remains of human activity in the region date to the 12,000 years before present (BP) and are associated with the hunting of large game animals. Gradually the activity shifted from reliance on hunting larger game to a broader based hunting and foraging strategy as the climate changed from a grassland environment to a drier, desert shrub environment. Ceramics came into use; the practice of agriculture developed; and more permanent, substantial residential structures (e.g., pueblos) were built (Geo-Marine 1996).

Spanish explorers entered the region beginning in the mid 16th century, following exploration routes along the Pecos River and other areas. They encountered Native American groups, probably Apachean people, who had ranged onto the southern Plains in search of buffalo. 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 (Geo-Marine 1996).

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. In the following decades, Mescalero encounters with the American military led to short-term treaty and reservation arrangements. From 1863 to 1868, between 8,000 and 9,000 Navajo people (Dineh) and about 400 Mescalero Apache were incarcerated at the Bosque Redondo Reservation within the study area near Fort Sumner (Geo-Marine 1996). 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 2001). 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.

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 (Geo-Marine 1996). After 1865, American

cattle ranchers entered the region, establishing extensive ranches during the 1880s, including in the Melrose AFR area. The Goodnight-Loving trail followed the Pecos River valley 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 (Geo-Marine 1996). Small towns grew up along the rail lines, including Taiban and others in the Melrose AFR area.

A modern military presence was established in the region during World War II with the founding of Clovis Army Air Field in 1942 as a tactical training facility for bomber aircrews. In 1957, Clovis Air Base was renamed Cannon AFB. Melrose Air Force Range was used continuously beginning in 1952, although some earlier uses were reported during World War II. The range was expanded several times over the decades to accommodate Air Force training needs (Geo-Marine 1996).

3.7.2.2 SPECIAL USE AIRSPACE (MOAS, ATCAAS, AND RESTRICTED AREAS)

Melrose AFR and R-5104/5105. Archaeological survey projects have been conducted within Melrose AFR since 1981, covering more than 45,000 acres (Geo-Marine 2000). More than 200 archaeological sites, ranging in age from the Paleoindian period (before 7500 BP) through the Historic era (after 400 BP), have been recorded on the range (Geo-Marine 2000). More than 50 of these are considered eligible or potentially eligible for the NRHP, although none are listed. An evaluation of Cold War architectural structures indicated no eligible or potentially eligible buildings on Melrose AFR (Geo-Marine 1996). Contact with the New Mexico Historic Preservation Division (HPD) has been initiated to identify potential cultural resource issues (refer to Appendix C).

Native American groups with historic ties to the area include the Mescalero Apache, Jicarilla Apache, 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 Tribe is 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, and Comanche people to identify potential concerns associated with the proposed action.

Taiban MOA, Pecos MOA/ATCAA, and Sumner ATCAA. Three NRHP-listed properties underlie project MOAs/ATCAA. These are a courthouse, a bridge, and the Fort Sumner Ruins under Pecos MOA/ATCAA and Sumner ATCAA. Fort Sumner is also a New Mexico State Monument and has been identified as a Registered Cultural Property by the State of New Mexico. Also under MOA/ATCAA airspace is the Billy the Kid Gravesite. Table 3.7-1 identifies NRHP-listed properties under project MOAs. In addition to NRHP-listed cultural resources under special use airspace, there are also likely to be many archaeological, architectural, or traditional resources that are either eligible or potentially eligible for the NRHP. Contact with the New Mexico HPD has been initiated to identify potential cultural resource issues (refer to Appendix C).

Table 3.7-1. National Register-Listed Properties Under Airspace

Airspace	*County*	*Property*	*Location*
Pecos MOA / Sumner ATCAA	DeBaca	De Baca County Courthouse	Fort Sumner
		Fort Sumner Railroad Bridge	Fort Sumner
		Fort Sumner Ruins	Fort Sumner
VRs-100/125	Guadalupe	Abandoned Route 66 (Cuervo to NM 156)	Cuervo
		Jesus Casaus House	Santa Rosa
		Colonias de San Jose Historic District	Colonias
		Alexander Grzelachowski House	Puerto de Luna
		Guadalupe County Courthouse	Santa Rosa
		La Placitas de Abajo District	Colonias
		Julius J. Moise House	Santa Rosa
		Park Lake Historic District	Santa Rosa
	Quay	Richardson Store	Montoya
		Route 66 (Montoya to Cuervo)	Montoya
		Route 66 (Palomas to Montoya)	Montoya

No Indian reservations underlie the project MOAs (Bureau of Indian Affairs 1998). Native American groups with historic ties to the area include the Mescalero Apache, Jicarilla Apache, Comanche, and Navajo. The nearest reservation is the Mescalero Apache Reservation, approximately 30 miles south of the MOAs near Ruidoso, New Mexico. The Jicarilla Apache Reservation is about 150 miles northwest of the MOAs; and the Comanche Reservation is in Lawton, Oklahoma.

In the 1960s, a marker was placed at Fort Summer State Monument to commemorate the signing of the peace treaty with the Navajo people there 100 years earlier (Banks 1998). A more extensive Bosque Redondo Memorial is planned and is awaiting construction (personal communication, O'Hara 2001). The Air Force has initiated contact with the Mescalero Apache, Jicarilla Apache, Comanche, and Navajo people to identify potential concerns associated with the proposed action.

3.7.2.3 MILITARY TRAINING ROUTES (NORTHERN PORTION OF VRS-100/125)

NRHP-listed properties under project MTRs include historic highway segments, residences, commercial buildings and a courthouse (refer to Table 3.7-1). In addition to NRHP-listed cultural resources, there are also likely to be cultural resources that are either eligible or potentially eligible for the NRHP under MTR airspace. Contact with the New Mexico HPD has been initiated to identify potential cultural resource issues (refer to Appendix C).

No Indian reservations underlie VRs-100/125 (Bureau of Indian Affairs 1998). Native American groups with historic ties to the area include the Mescalero Apache, Jicarilla Apache, and Comanche. The Mescalero Apache Reservation is located approximately 25 miles south of VRs-100/125 near Ruidoso, New Mexico. The Jicarilla Apache Reservation is about 40 miles northwest of the MTRs; and the Comanche Reservation is in Lawton, Oklahoma. The Air Force has initiated contact with

the Mescalero Apache, Jicarilla Apache, and Comanche people to identify potential concerns associated with the proposed action.

3.8 LAND USE AND VISUAL RESOURCES

3.8.1 Definition of the Resource

The attributes of land use addressed in this analysis include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize the types of uses within a particular area including agricultural, residential, military, and recreational. Land ownership is a categorization of land according to type of owner; the major land ownership categories include private, federal, Indian, and state. Federal lands are described by the managing agency, which may include the USFWS, USFS, BLM, or DoD. Land management plans include those documents prepared by agencies to establish appropriate goals for future use and development. As part of this process, sensitive land use areas are often identified by agencies as being worthy of more rigorous management.

Visual resources, defined as the natural and manufactured features that constitute the aesthetic qualities of an area, are also considered in this section. These features form the overall impression that an observer receives of an area or its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered characteristic of an area if they are inherent to the structure and function of the landscape.

The ROI for land use and visual resources consists of Melrose AFR and all the lands under the airspace proposed for chaff and flare training (Figure 3.8-1).

3.8.2 Existing Conditions

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, DeBaca, Chaves, Quay, and Curry counties. Major transportation routes in the study area include Interstate 40 (running east-west from Albuquerque to Tucumcari), and State Highways 54, 285, and 60. Towns within the study area range in population from less than 200 to about 2,250 (University of New Mexico 2000).

The visual landscape under the special use airspace is primarily flat terrain with broad expanses of treeless, short grass prairie. Located in the southernmost portion of the High Plains, the area is notable for its large expanse of "near featureless terrain" (USGS 2000). 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, manmade impoundments of the Pecos River, interrupt the vast semi-arid plains. Some forested areas occur along the western edges of the study area.

3.8.2.1 SPECIAL USE AIRSPACE (MOAS, ATCAAS, AND RESTRICTED AREAS)

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. Melrose AFR comprises 66,000 acres with an additional 20,896 acres of buffer area (personal communication, McCord 2001). The Air Force leases approximately 54,000 acres to ranchers for cattle grazing (Air Force 1997d). The agricultural areas act as a buffer zone around the training range. The buffer zone also contains range support facilities including a fire station, maintenance areas, and a camera station for monitoring ordnance practice.

Outside the range boundary, lands are generally used for cattle grazing and crop production. Crops produced in this area are wheat, grain sorghum, corn, barley, cotton, hay, peanuts, and potatoes. Although urban land uses comprise less than one percent of the total area, they include the towns of House, Krider, and Cantara (New Mexico Resource Geographic Information System Program 2001).

Table 3.8-1 shows the acreages and percentages of land uses under R-5104/5105. Rangeland and agriculture are the dominant land uses.

Table 3.8-1. Existing Land Use under R-5104/5105

Land Use Category	*Acreage*	*Percentage of Restricted Area*
Rangeland	245,325	83
Agriculture	48,249	16
Water/Wetland	767	<1
Urban	577	<1
Total	294,918	100

Source: USEPA 2000.

Approximately 71 percent of all land under the restricted airspace is held in private ownership, 21 percent is state-owned, and 8 percent is owned by the Air Force (USEPA 2000). Hart Youth Ranch, a division of New Mexico Boys Ranch, Inc., is a 6,000-acre ranch located between Cannon AFB and Melrose AFR. It is devoted to troubled teenagers ages 16 and up. Despite past success, as of July 1, 2001, all of the teens will leave in preparation of the Hart Youth Ranch's closing. The ranch's remote location made it difficult to keep a full staff, necessarily limiting the number of teens the ranch could accept. The Hart Youth Ranch is considering offers from various church groups and local ranchers to purchase the land (personal communication, Kull 2001).

Taiban MOA, Pecos MOA/ATCAA, and Sumner ATCAA. As shown in Table 3.8-2, approximately 93 percent of the land under this airspace is used for grazing and agriculture. Approximately 6.5 percent of the remaining land is forest, water, or wetland, and approximately 0.5 percent is 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 less than approximately 1 person (0.951) per square mile.

Table 3.8-2. Existing Land Use under MOAs, ATCAAs, and MTRs

MOAs, ATCAAs, MTRs	*Agriculture (acres)*	*Forest (acres)*	*Rangeland (acres)*	*Water/Wetland (acres)*	*Urban (acres)*	*Total Acreage*
Pecos MOA/ ATCAA	15,700	429	1,952,167	4,724	2,078	1,975,098
Sumner ATCAA	15,437	0	2,046,756	4,689	392	2,067,274
Taiban MOA	785	0	197,618	911	39	199,353
VRs-100/125	145,197	274,614	3,923,706	10,240	19,004	4,372,761

Note: Total acreage numbers are not cumulative due to overlap of airspaces.
Source: USEPA 2000

Land status is depicted on Figure 3.8-1. As shown in Table 3.8-3, private ownership accounts for approximately 78 percent of the land underlying the affected airspace with a variety of state, Native American, military, and other federal interests overseeing the remainder of the land below the airspace. Federal lands in the ROI are managed by the BLM and the DoD.

Table 3.8-3. Land Ownership under Airspace

Defensive Training Initiative	*Private (acres)*	*State (acres)*	*Indian Reservation (acres)*	*Military (acres)*	*Other Federal (acres)*
Chaff Only Northern Portion (VRs-100/125)	2,861,911	383,978	0	0	69,714
Chaff and Flare (Pecos MOA/ ATCAA, Taiban MOA, Sumner ATCAA, R-5104/5105)	2,051,937	493,543	0	22,179	364,239

Source: USEPA 2000.

The BLM's Roswell Approved Resource Management Plan (RMP) and Record of Decision (ROD) presents a plan for managing all public land administered by the BLM in the Roswell Resource Area. The Roswell Resource Area includes about 1,490,000 acres encompassing all counties under the MOA and ATCAA airspace except for a portion of Chaves County (BLM 1997a). This portion of Chaves County is included in the Carlsbad Approved RMP Amendment and ROD (BLM 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. Land in DeBaca and Chaves counties is also managed by their own county land use plans.

The BLM has established Areas of Critical Environmental Concern (ACEC) based on the presence of resources and opportunities for efficient management. These areas are managed for specific resources and do not necessarily restrict or exclude other uses. The study area contains four ACECs: Coachwhip Cave, Crystal Caverns-Devil's Well Caves, Martin-Antelope Gyp Cave, and North Pecos River. Management goals for these ACECs allow for limited recreational use (BLM 1997a).

While many recreational activities exist under airspace, the BLM has formally designated some areas to manage those activities. Special Recreation Management Areas (SRMAs) are areas needing special management attention and are established to protect sensitive recreation and natural resource values, prevent natural resource degradation, and resolve conflicts between recreational user groups (BLM 1997a). The land beneath the MOAs contains five SRMAs (Martin-Antelope Gyp Cave, Crystal Caverns-Devil's Well, Coachwhip Cave, Billy the Kid Recreation Area and Caprock Wildlife Habitat Area). Off-Highway Vehicle designations are established to provide safe, quality recreational opportunities while minimizing adverse impacts on sensitive resource values (BLM 1997a). With the exception of Caprock Wildlife Habitat Area, the SRMAs listed above are also Off-Highway Vehicle designations.

State lands underlying the MOA and ATCAA airspace include the Fort Sumner State Monument, approximately 10 miles southeast of Fort Sumner (refer to Figure 3.8-1). This monument is an improved destination with restroom and visitor facilities, historic exhibits, and guided tours.

For more than five decades, land under the affected airspace has been subject to military jet overflights involving a broad array of aircraft types. As military jet overflights have continued, the Air Force has established special operating procedures to avoid overflight of specific locations considered to be sensitive to aircraft noise. The types of locations addressed by these special operating procedures include residences, ranches, resorts, and communities. Other sensitive receptors or land uses that may be avoided include churches and schools.

Military aircraft are transitory in a landscape. The nature of the impact depends on the sensitivity of the resource affected, the distance from which they are viewed, and the length of time they are visible. Altitude relative to the viewer also plays a key role in determining impacts from aircraft overflights. People's eyes are typically drawn to the horizon more than overhead and they are, therefore, less likely to notice aircraft at higher altitudes.

The most prevalent aircraft using the MOAs is the F-16. An F-16 traveling at an average speed of 480 knots true airspeed would travel 1.5 miles in 10 seconds, 4.6 miles in 30 seconds, and 9.2 miles in one minute. At these high speeds, the visual impact of an aircraft would be temporary. Military aircraft are also painted a muted gray to make them difficult to pick out against a blue or gray sky.

3.8.2.2 MILITARY TRAINING ROUTES (NORTHERN PORTION OF VRS-100/125)

Approximately 91 percent of the land under MTR airspace is used for grazing and agriculture. Approximately 8.5 percent of the remaining land is forest, water, or wetland, and approximately 0.5 percent is developed or urbanized land. Residences exist within the communities of Encino, Vaughn, and Santa Rosa, as well as on large acreages. An average density under the airspace used for chaff only is about 1 person (1.084) per square mile.

Land status is depicted on Figure 3.8-1. 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 BLM and the DoD. Santa Rosa and Sumner lakes are owned and operated by the USACE (USACE 2001). The BLM's Roswell RMP applies to all land underlying MTR airspace except for land in Torrance County. Land in Torrance County is managed under the BLM's Rio Puerco RMP (BLM 1986).

As depicted in Figure 3.8-1, Sumner Lake State Park is located 16 miles northwest of Fort Sumner. Sumner Lake State Park is an improved destination for picnicking, fishing, and water skiing. The area offers recreational vehicle facilities and 48 developed campsites (New Mexico State Parks 2001).

3.9 ENVIRONMENTAL JUSTICE

3.9.1 Definition of Resource

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to address environmental and human health conditions in minority and low-income communities. The general purposes of this EO are as follows:

- To focus attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice

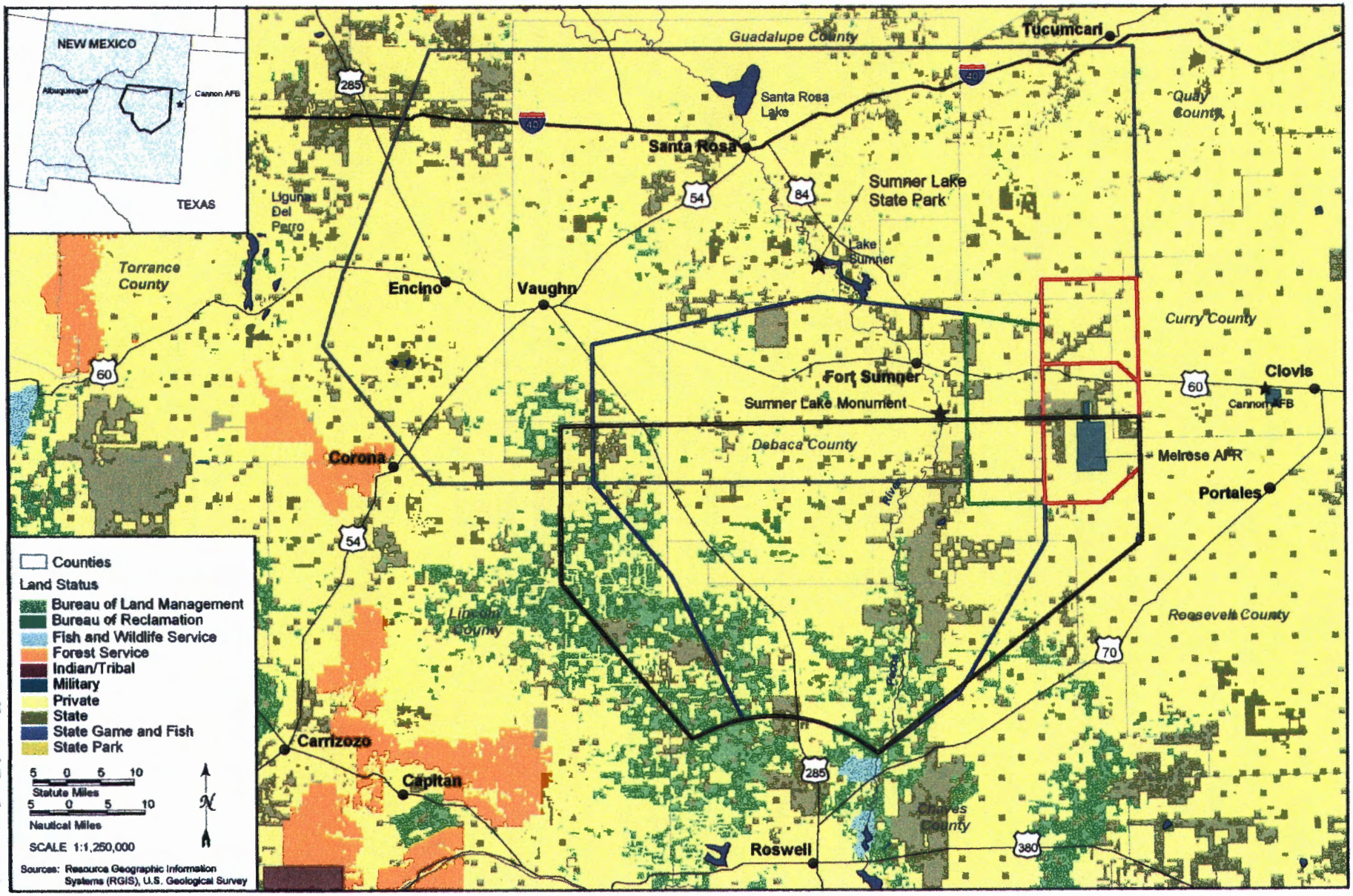


Figure 3.8-1. Land Status Within the Region of Influence

- To foster non-discrimination in federal programs that substantially affect human health or the environment
- To give minority communities and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment.

EO 12898 applies to federal agencies that conduct activities that substantially affect human health or the environment. The concept of environmental justice therefore ensures that studies such as EAs address the issue of determining if actions of federal agencies disproportionately impact the human health and environmental conditions in minority communities and low-income communities. The approach applied in this section is in accordance with the *Interim Guide for Environmental Justice with the Environmental Impact Analysis Process* (Air Force 1997e).

Also included with environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

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

- *Minority Population*: Persons of Hispanic origin of any race, Blacks, American Indians, Native Alaskans, Asians, or Pacific Islanders.
- *Low-Income Population*: Persons living below the poverty level, estimated based on a 1990-equivalent annual income of $12,674 for a family of four persons.
- *Youth Population*. Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the United States Bureau of the Census. Total and minority population figures are based on recent demographic data released from Census 2000 (U.S. Bureau of the Census 2001). 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 action. Low-income population figures were drawn from *U.S.A. Counties 1998* (U.S. Bureau of the Census 1998a). Youth population data are from the Census report *Estimates of the Population by Age, Sex, and Race/Hispanic Origin* (U.S. Bureau of the Census 1998b).

The ROI comprises the following counties in New Mexico: Chaves, Curry, DeBaca, Guadalupe, Lincoln, Quay, Roosevelt, San Miguel, and Torrance.

3.9.2 Existing Conditions

The majority of the airspace associated with the proposal addressed in this EA has been in existence for many years and the training changes being proposed would not alter the current configuration. The Cannon AFB MOAs, ATCAAs, Restricted Areas, and MTRs are configured to avoid densely populated and metropolitan or urban areas. Populated areas that occur under the boundaries of the airspace proposed for training changes are typically scattered, relatively low in density compared to urbanized areas, and are avoided to the maximum extent possible. During scoping, noise was noted as a concern by residents under the airspace. However, the proposed defensive training initiative does not include changes in aircraft overflight rates or flight profile that would increase noise.

The military airspace shown in Figure 2-2 was overlaid on maps of county boundaries in order to identify areas that would be potentially affected by the proposed action. Portions of nine counties in

New Mexico are located under the designated military airspace. Table 3.9-1 identifies total population, number and percent minority population, number and percent low-income population and number and percent of children under 18 for each of these counties and for the multi-county ROI that combines data for the nine counties.

Table 3.9-1. Population and Environmental Justice Data

Area	Population (2000)	Minority Persons (2000)		Persons Below Poverty (1993)		Children under 18 (1998)	
		Number	Percent	Number	Percent	Number	Percent
State of New Mexico	1,819,046	1,005,551	55.3	359,490	21.6	504,210	29.0
Chaves County	61,382	29,412	47.9	15,083	24.9	19,590	30.9
Curry County	45,044	18,583	41.3	9,617	20.1	14,347	30.7
DeBaca County	2,240	833	37.2	485	21.3	573	23.9
Guadalupe County	4,680	3,956	84.5	1,319	31.0	1,182	28.9
Lincoln County	19,411	5,648	29.1	2,842	20.3	4,027	24.4
Quay County	10,155	4,202	41.4	2,953	27.7	2,678	25.9
Roosevelt County	18,018	6,719	37.3	4,930	27.4	5,660	30.7
San Miguel County	30,126	24,436	81.1	8,120	30.5	9,218	31.3
Torrance County	16,911	7,234	42.8	2,828	23.7	4,870	31.4
Total ROI	207,967	101,023	48.6	48,177	24.6	62,145	30.1

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. Total populations and minority persons are for year 2000 data. Persons below poverty are 1993 data, and youth population are 1998 data.

Source: U.S. Bureau of the Census 1998a, 1998b, 2001.

The total 2000 population for the ROI was 207,967 persons, representing 11.4 percent of the 1,819,046 New Mexico population. Average population density in the total project area is less than 1 person (0.951) per square mile.

Minority persons account for 48.6 percent of the ROI population and 55.3 percent of the state population. Of the nine counties in the ROI, only two (Guadalupe and San Miguel), have minority populations proportionately greater than the state. The smallest percentage of minority residents in a single county is 29.1 percent (Lincoln County) and the largest percentage is 84.5 percent (Guadalupe County).

The population of the nine-county ROI is 24.6 percent low-income. The low-income population in the individual counties ranges from 20.1 percent (Curry County) to 31 percent (Guadalupe County). By comparison, the population of New Mexico is 21.6 percent low-income.

Children under the age of 18 years constitute 30.1 percent of the 10-county ROI, compared to 29.0 percent for New Mexico overall. There is relatively little variation in the youth population among the ROI counties, ranging from a low of 23.9 percent (DeBaca County) to a high of 31.4 percent (Torrance County). Six counties have youth populations slightly exceeding the ROI and state average.

Hart Youth Ranch, located between Cannon AFB and Melrose AFR, occupies approximately 6,000 acres. The ranch houses up to 14 children ages 16 years and older (personal communication, Kull 2001). Hart Youth Ranch will be closing at an unspecified time; however, current resident children will vacate by July 2001 (also refer to section 3.8.2.1).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents an assessment of the potential environmental consequences of implementing the proposed action or no-action alternatives within the designated airspace. The analysis presented in this chapter is based on overlaying the potential impacts of the proposed action or alternatives from Chapter 2.0 on the baseline conditions from Chapter 3.0. Cumulative effects of the proposed action or alternatives with other past, present, and reasonably foreseeable future actions within the region of influence are presented in Chapter 5.0.

4.1 AIRSPACE

4.1.1 Methodology

The potential for defensive use of chaff and flares on airspace activities was assessed by identifying known issues and concerns from previously published reports and from current agency and public comments. Impacts would be considered to exist only if there were a likelihood that the proposed action or alternatives would cause any interference with Air Traffic Control (ATC) operations, Visual Flight Rules (VFR) flight activities, or ATC or weather radar systems.

4.1.2 Issues and Concerns

Few issues have been identified in regard to any specific impacts of chaff and flare use on airspace or aviation activities. The flare's short burn time (3.5 to 5 seconds) and limited distance traveled during this time is not an issue for any aviation activities. On occasions, combat chaff has been noted to cause some interference with ATC or weather radar systems. The training chaff proposed for defensive training does not disrupt ATC systems (refer to Table 3.2-1). A United States Air Force (Air Force) summary report (Air Force 1997a) determined that little or no documented evidence exists that chaff had caused aircraft radar systems to falsely identify nearby air traffic, caused aircraft engines to malfunction after ingesting chaff, or distracted other aircraft pilots. The current practice of Cannon Air Force Base's (AFB's) close coordination with regional ATC and the cessation of chaff use if it interferes with specific weather system radar has successfully avoided airspace consequences. Since chaff use can be avoided or carefully managed through prior planning and coordination with the Federal Aviation Administration (FAA), safety risks are extremely low and no impacts on aircrews, aircraft, or the public are anticipated. The following sections address chaff and flare use in local airspaces identified in section 3.1.

4.1.3 Impacts

4.1.3.1 ALTERNATIVE A: (PREFERRED)

Chaff and flare use under the proposed action would not result in any changes to the airspace structure or any change in sortie-operation rates for the Pecos Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), Taiban MOA, the Sumner ATCAA, Restricted Areas R-5104/5105, and Visual Routes (VRs)-100/125.

As discussed in section 3.1, non-military aviation within this region is limited and would be relatively unaffected by any changes in military training activities conducted within the MOAs and ATCAAs and MTRs. Federal Airways in the region of influence (ROI) do not transit the Pecos or Taiban MOAs and use of the Jet Route that crosses the Pecos ATCAA is coordinated between the Cannon ATC and the FAA Albuquerque Air Route Traffic Control Center (ARTCC) so as to accommodate both military training and commercial air traffic needs.

The location of the Fort Sumner Municipal Airport and the three private airfields in the area and their overall limited number of aircraft operations minimize any effects military training activities

have on these airfields. The limited number of VFR general aviation aircraft that operate within this region would also be unaffected by the training activities associated with this proposal. General aviation pilots in this area are familiar with the local airspace environment and the presence of military training operations. Both they and military pilots are aware and remain well clear of each other's operations so as not to be an interference. Therefore, it is not likely that general aviation pilots would be distracted or otherwise affected by any distant flares that may be observed on occasion.

As previously discussed, training chaff has the potential to affect certain bands of weather radar systems (see Table 3.2-1). However, any such interference that could occur for either the Cannon AFB or Albuquerque ARTCC radar systems would be avoided through coordination procedures outlined in a Letter of Agreement between Cannon AFB and the ARTCC and, if necessary, real-time direction to pilots to cease dropping chaff. These existing procedures are in effect to support existing 27th Fighter Wing (27 FW) chaff use in R-5104/5105 airspace over Melrose Air Force Range (AFR).

4.1.3.2 ALTERNATIVE B

The effects of this alternative on airspace would be as discussed for the preferred alternative except that chaff use would not be used on any portion of VRs-100/125.

4.1.3.3 ALTERNATIVE C: (NO ACTION)

Under this alternative, aircraft operations described for baseline conditions would remain unchanged with chaff and flare training confined to the Melrose AFR restricted airspace. No other aviation activities within the ROI would be affected by this chaff and flare use.

4.2 SAFETY

4.2.1 Methodology

The assessment of impacts focuses on how and to what degree the alternatives could affect safety issues, and on fire safety associated with the increased and expanded use of chaff and flares. Existing programs, processes, and procedures will be considered to determine their adequacy to manage potential risks. These risks could result from both the proposed increase in the volume of chaff and flares expended, and the expanded geographic area that would support that increased use. The results of previous investigations of potential safety risks associated with the use of chaff and flares will also be considered.

4.2.2 Issues and Concerns

Primary concerns identified by the public pertaining to the use of chaff involve the potential for chaff to interfere with other equipment operating in the frequencies spectrum and impact certain land uses if it accumulates. Expressed public issues and concerns pertaining to flare use center around fire risk and the potential hazards to humans and animals that could result from dud flares on the ground. For both chaff and flare use, concerns also exist pertaining to possible effects to people and aircraft resulting from chaff or flare system malfunctions, and possible injury to people on the ground from expended materials. Human health and safety issues are addressed in section 4.6, Biological Resources.

4.2.3 Impacts

4.2.3.1 ALTERNATIVE A: (PREFERRED)

Fire Safety. Under this alternative, the volume of chaff and flares expended by 27 FW aircrews would increase 13 times with chaff and 16 times in flare use. As a result, storage requirements for

flares, and the pyrotechnic devices associated with chaff and flare ejection systems at Cannon AFB would also increase. Adequate storage facilities, incorporating all required explosive safety standards, exist on Cannon AFB to support this increased storage requirement. Additionally, as described in section 3.2, the 27 FW fire department is staffed and equipped to meet all current response requirements. There are no specific fire or explosive safety concerns associated with this increased storage requirement on Cannon AFB.

Management of day-to-day flying operations would be similar to actions already in practice by the Range Control Officer at Melrose AFR where flare release altitudes are 700 feet above ground level (AGL). In addition to a minimum release altitude of 2,000 feet AGL (exclusive of Melrose AFR), Cannon AFB personnel would continue to monitor weather and fire conditions from resources available on the Southwest Area Fire Intelligence website and provide recommendations to operations personnel. As currently in practice on Melrose AFR, these recommendations would address the need to alter flight operations, and modify or cease countermeasure use in potentially affected airspace. As an added fire safety measure, Cannon AFB would suspend deployment of flares when the fire danger rating is high or above for the areas beneath the airspace associated with this alternative.

Currently, the 27 FW 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. This minimizes the risk from wildland fires. The base commander would continue to be able to direct the base fire department to assist in any local or regional fire emergency.

The expenditure of flares in the MOAs and ATCAA airspace during military training operations would follow existing Air Combat Command and Cannon AFB regulations, which prohibit release below 2,000 feet AGL. Once released, flares burn no longer than 3.5 to 5 seconds. The minimum release altitude of 2,000 feet AGL provides an adequate margin of safety (1,675 feet) that no burning material will reach the ground. The flare item manager at Hill AFB, Utah, has indicated that in all the testing, and based on years of observation, when the flare deploys from the aircraft properly with the initial fire source, the construction of the flare is such that it burns as designed. There were no recorded instances of a slow burning flare or one that caught fire later. The flare requires the high temperature associated with the pyrotechnic ejection from the dispenser to catch fire. If the flare pellet leaves the aircraft without that high temperature heat source, it would not ignite (unless subjected to another high heat source). The ignition point for magnesium is about 1,200 degrees Fahrenheit. If a flare comes into contact with a high heat source, then the flare will ignite and burn immediately (Air Force 1999b). Based on the estimated failure rate of less than 1 percent, up to four flares annually would have the potential to fall to the ground without igniting under this alternative. With 2,931,896 acres under the airspace proposed for use with flares, that equals one dud flare for every 732,974 acres annually. As discussed in section 3.2.2.3, any or all of these four flares might malfunction and remain in the flare dispenser, may partially eject and remain in the flare dispenser, or may fall to the ground.

Given the buffer distance and the low failure rate, the risk of fire associated with flare use is extremely low and would not measurably increase the frequency of fire over that which is currently experienced in New Mexico.

Chaff Use. The proposed increased use of chaff would represent little safety risk to maintenance personnel, aircrews, aircraft, or the public. All maintenance and operations on chaff and chaff systems are performed by trained and qualified personnel who follow detailed procedures specified in Air Force Technical Orders and Air Force Occupational and Environmental Safety, Fire

Protection, and Health directives. As described in section 3.2.2.2, the frequency and relative severity of incidents involving chaff and chaff systems are low. Specifically, in the Chaff and Flare Study, the incidents identified during the 10-year data period were assigned a hazard risk level of "acceptable," and required either no, or only low-priority corrective action (Air Force 1997a).

Training chaff (RR-188), which includes no dipoles cut to radio frequency bands used by FAA weather radar, would be the only chaff used within the airspace. As shown in Table 3.2-1, training chaff also would have no effect on other electronic equipment operating in the frequency spectrum such as cellular telephones, radio, or television.

The probability of chaff residual components hitting a person is difficult to quantify since it depends on a number of variables such as the frequency of chaff use, the density of people beneath the airspace, and atmospheric conditions. However, the two small plastic caps weigh so little (0.45 and 0.15 ounces), or create so much drag in comparison to their weight, that no injury would be expected even if a person were to be struck. No incidences of injuries from falling chaff components have ever been recorded. Accident pathology indicated that there is less than a 1 percent probability of a brain concussion from impulse impacts less than 0.10 pound-seconds. Impact momentum for the plastic caps has been calculated at 0.045 and 0.009 pound-seconds respectively, this is well below the amount calculated to cause any injury (Air Force 1997a).

Flare Use. The primary safety concern regarding flare use is the risk of fire. This risk was addressed above, under fire safety. Incidents and mishaps involving flares and flare systems also constitute safety concerns, as do risks of injury from falling system components, or components being found on the ground.

Maintenance and operations activities on flares and flare systems are conducted to the same standards as those involving chaff and chaff systems. However, in the case of flares, since more pyrotechnic material and components are involved than in chaff, some additional risk is associated with flares.

As noted in section 3.2 there have been no Class A, B, C, or High Accident Potential (HAP) events associated with chaff and flares at Cannon AFB in the last three years. Historical information for the entire Air Force collected between 1983 and 1993 identified no Class A and B aircraft related mishaps and a yearly average of 0.3 Class C and 10.1 HAP mishaps in the entire Air Force (Air Force 1997a). As with the handling of any ordnance, the increased level of exposure that would result from this alternative warrants increased vigilance.

Falling flare residual components could create safety concerns due to the possibility of striking a person. The M-206 flare falling to the ground would develop an impact momentum of 2.79 pounds per second. This value represents the most extreme condition since it is assumed the object falls in the most streamlined position. In reality, and especially for lighter objects, they would probably twist, turn, and tumble as they fell, increasing air resistance, causing the terminal velocity to decrease, and as a result, the momentum to be less. If a person were to be struck by a falling flare, it could result in serious injury or death. The population density in the year 2000 beneath the total project airspace is less than 1 person (0.951) per square mile. When the probability of a flare falling to the ground is coupled with the operational limitations of not using flares over established communities and the probability of a person being in the area and being struck, the actual risk is reduced even further. Based on the population density under the airspace, the possibility of a person being struck by a dud flare would be one in 850 million. For comparison purposes, the probability of being struck by lightning in New Mexico between 1959 and 1993 was approximately one in 15,200 (Los

Alamos National Laboratory 2001). This suggests that the probability of being struck by lightning would be approximately 50,000 times greater than the probability of being struck by a dud flare.

A dud flare on the ground has a hazard potential and should only be handled by trained explosive ordnance disposal personnel. While the component could be ignited, it is improbable that it would spontaneously ignite, or ignite under subtle stimulus such as stepping on it. Normally, the material would only respond to an external heat source of sufficient temperature to cause combustion. Considering the flare's high reliability and the extensive geographic area proposed for overflight, the probability of a person or animal encountering a dud flare is remote. Furthermore, even if encountered, the probability of the flare igniting without some deliberate act involving a heat source is also minimal. A program of education of the public and, especially, children was noted as desirable by the public during scoping. Considering these two factors, risk associated with dud flares on the ground is extremely low.

4.2.3.2 ALTERNATIVE B

Chaff Use. Under this alternative, the use of chaff would be limited to the Pecos MOA/ATCAA, Taiban MOA, and Sumner ATCAA. No chaff use would occur along VRs-100/125. Chaff would continue to be dropped on Melrose AFR. The environmental consequences of this alternative would basically be the same as under Alternative A. The exception is that the airspace and land underlying VRs-100/125 would not be exposed to chaff use and the area under the MOAs would receive the chaff proposed for use in the Military Training Route (MTR). This would result in no effective change in consequences.

Flare Use. Under this alternative, flare use would be the same as Alternative A in the Pecos MOA/ATCAA, Taiban MOA, portion of R-5104/5105, and Sumner ATCAA. Flares would continue to be dropped on Melrose AFR. The environmental consequences of this alternative regarding flare use would be the same as under Alternative A.

Fire Safety. Overall, fire safety issues would be the same as under Alternative A. Since flare use would be the same as Alternative A, fire risks would be managed as described in section 4.2.3.1. Ongoing coordination between the base fire department and 27 FW operations and training staff would minimize fire risk.

4.2.3.3 ALTERNATIVE C: (NO ACTION)

Under this alternative there would be no new or changes to chaff or flare use. The 27 FW would continue to store and handle chaff and flares on Cannon AFB and use them on Melrose AFR at current levels.

4.3 MATERIALS MANAGEMENT

4.3.1 Methodology

The assessment of potential consequences focuses on how and to what degree the proposed action or alternatives would affect materials usage and management, waste generation and management, and possible waste disposal. Materials management programs will be reviewed to determine the significance of anticipated increases in any materials usage and transport. The results of previous investigations and on-going research on the environmental effects of chaff and flares will also be considered to determine potential impacts resulting from implementation of the proposed action or alternatives.

4.3.2 Issues and Concerns

Management issues associated with the proposed increased use of chaff and flares involve considerations about the capability of storage facilities, transportation systems, and disposal processes to handle the added demand. Environmental concerns about the expansion of chaff and flare use into new geographic areas include the potential toxicity of chaff and flares to humans and livestock and the potential for harm to the natural environment. These are addressed in section 4.6, Biological Resources. Concerns including the potential for fires and the possibility of a dud igniting after being handled or disturbed on the ground are addressed in section 4.2, Safety.

4.3.3 Impacts

4.3.3.1 ALTERNATIVE A: (PREFERRED)

Under this alternative, the use of chaff and flares by 27 FW aircrews would increase by 13 times and 16 times, respectively. The munitions storage area at Cannon AFB is adequate to handle the increased use of chaff and flares. While additional transportation and other logistic support would also be required, these, too, would also be incremental throughout the year. Existing processing and disposition procedures are adequate to manage these increased demands, and no adverse impacts would be anticipated.

If during the course of a year it is assumed that the defensive systems are employed relatively homogeneously throughout the airspace and all residual components would fall beneath the airspace, some conservative assessments can be made about relative concentrations on the ground. This homogenous distribution can be modified by the distribution approach applied to noise models. Noise modeling in MOAs are uniformly distributed. Near the MOA edges, examination of radar track data has shown that the operations decrease at a linear rate (Lucas and Calamia 1994). This means that as pilots come within one to two miles of the edge of an airspace boundary, they turn back into the airspace to avoid accidentally going outside the agreed-to airspace boundaries. Applied to the distribution of chaff and flares, this means that under a homogenous distribution assumption, and based on the expected levels of chaff and flare use and the extent of the airspace supporting that use, expected concentration levels would be as follows:

- In the airspace supporting both chaff and flare use, chaff concentration throughout most of the airspace would be approximately 1.71 grams (0.06 ounce) per acre per year. An estimated one flare would be dispensed over every 73 acres per year. Within one to two miles of the edge of the airspace, these concentrations would be approximately one-half these amounts.
- In the northern portion of VRs-100/125, concentrations of chaff would be estimated at 0.14 grams (0.005 ounces) per acre per year over most of the airspace with concentrations approximately one-half these amounts within one to two miles of the edge of the airspace.

Chaff consists of small aluminum-coated silica fibers covered with a slip coating of stearic acid (fat). The major components of chaff are generally prevalent in the environment. Silica is inert in the environment and aluminum is the third most abundant element in the earth's crust. The silica is primarily composed of silicon dioxide and also contains trace elements of aluminum, calcium oxide and magnesium oxide, boron oxide, sodium and potassium oxide, and iron oxide. The aluminum coating comprises aluminum with trace quantities of silicon, iron, copper, manganese, magnesium, zinc, vanadium, and titanium. Some of these individual components, in sufficient quantity, have identified toxic risks. However, in chaff, these elements are in minute quantities and are fused together in a stable state, and it is unlikely that they would break down to their independent forms or

portion of the fibers that it is unlikely they would contribute to environmental toxicity (Spargo 1999). Table 4.3-1 shows the composition and percent weight of components in a typical training chaff bundle.

Table 4.3-1. Composition and Percent Weight of Components in Chaff

Element	*Chemical Symbol*	*% (by weight)*
Glass Fiber (Silica)		
Silicon Dioxide	SiO_2	52-56
Alumina	AI_2O_3	12-16
Calcium Oxide & Magnesium Oxide	CaO & MgO	16-25
Boron Oxide	B_2O_3	8-13
Sodium & Potassium Oxide	Na_2O & K_2O	1-4
Iron Oxide	Fe_2O_3	1 or less
Aluminum Coating		
Aluminum	Al	99.45 minimum
Silicon + Iron	Si + 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

Source: Spargo 1999.

Residual components from the operation of the chaff system were identified and discussed in section 3.3.2.

These factors, when coupled with the low likelihood of any significant accumulation of chaff, indicate minimal potential impacts associated with chaff use.

Dud flares and the risk of fire are the main public concerns associated with flare use. When flares function properly, and are released no lower than the minimum release altitude of 2,000 feet AGL, no burning material reaches the ground. While the possibility of a dud flare cannot be discounted, such failures are rare (less than 1 percent). These extremely high reliability rates, and the vast geographic area proposed for use indicate that the probability of encountering a dud flare on the ground is highly remote. Additional information of flares and fire safety is contained in section 4.2, Safety.

4.3.3.2 ALTERNATIVE B

Under this alternative, chaff and flare use would increase to the same total levels as in Alternative A. As under that alternative, no impacts to materials management areas would occur.

No chaff or flares would be authorized for use on VRs-100/125 under this alternative. Under this alternative, estimated chaff accumulations for the airspace approved for chaff use could be about 1.87 grams (0.07 ounces) per acre per year. Since flare use under this alternative would be the same as under Alternative A, an expected one flare per year would continue to be released over every 73 acres.

All other potential impacts remain as assessed under Alternative A.

4.3.3.3 ALTERNATIVE C: (NO ACTION)

Under this alternative, there would be no impacts to materials management. The 27 FW would continue to store and handle chaff and flares on Cannon AFB and use them on Melrose AFR at current levels.

4.4 AIR QUALITY

4.4.1 Methodology

Significance Criteria. Air emissions resulting from the proposed action were evaluated in accordance with federal, state, and local air pollution standards and regulations. The analysis included assessing potential impacts from the increased usage of chaff and flares in the ROI. Baseline aircraft sorties would not be changed due to the proposed action.

Air quality impacts from a proposed activity or action would be significant if they:

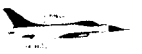
- increase ambient air pollution concentrations above any National Ambient Air Quality Standards (NAAQS);
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally mandated Prevention of Significant Deterioration (PSD) Class I area.

The approach to the air quality analysis was to estimate the increase in emission levels due to the proposed action.

Conformity. According to United States Environmental Protection Agency's (USEPA's) General Conformity Rule in 40 Code of Federal Regulations Part 51, Subpart W, any proposed federal action that has the potential to cause violations, as described above, in a nonattainment or maintenance area must undergo a conformity analysis. A conformity analysis is not required if the proposed project occurs within an attainment area. Since the 9 counties within the ROI are all designated as attainment for all criteria pollutants, a conformity determination is not required and was not performed.

4.4.2 Issues and Concerns

The proposed action includes no changes in aircraft emissions from baseline emissions. The analysis of air quality impacts was limited to changes in emissions due to increased use of chaff and flares. It is assumed that all chaff and flare residual components falls onto the ground within the ROI and are not carried into other areas.



4.4.3 Impacts

4.4.3.1 ALTERNATIVE A: (PREFERRED)

Emissions from chaff and flare usage under Alternative A were calculated using the same emission factors and assumptions as were used to calculate chaff and flare emissions under baseline conditions. Chaff and flare usage at Melrose AFR is unchanged in Alternative A compared to the baseline. Chaff usage (only) would be added to current aircraft activities in the northern portion of VRs-100/125, while both chaff and flare usage would be added to the Pecos MOA/ATCAA, Taiban MOA, and Sumner ATCAA.

The aircraft currently use RR-188 chaff (training chaff) and M-206 flares (training flares). To allow for a comparison, Table 4.4-1 is repeated from section 3.4. Table 4.4-2 shows the estimated emissions, in tons per year, from chaff and flare use under Alternative A. Under the proposed action, pilots would use the same training chaff and flare as under baseline conditions. The table also indicates the differences, in tons per year, for each criteria pollutant between the emissions under Alternative A and those under baseline conditions.

Table 4.4-1. Baseline RR-188 Chaff and M-206 Flare Emissions over the Melrose AFR

	ANNUAL EMISSIONS (TONS/YR)				
	CO	*NO_2*	*SO_2*	*PM_{10}*	*VOC*
R-188 Chaff	-	-	-	<0.01	-
M-206 Flare	<0.01	<0.01	<0.01	0.22	<0.01
TOTAL	<0.01	<0.01	<0.01	0.22	<0.01

Table 4.4-2. Proposed RR-188 Chaff and M-206 Flare Emissions – Alternative A

Airspace	*ANNUAL EMISSIONS (TONS/YR)*				
	CO	*NO_2*	*SO_2*	*PM_{10}*	*VOC*
Pecos/Taiban MOA & Sumner ATCAA					
RR-188 Chaff	-	-	-	<0.01	-
M-206 Flare	0.05	0.02	0.01	3.27	<0.01
VRs-100/125					
RR-188 Chaff	-	-	-	<0.01	-
Melrose AFR (R-5104/5105)					
RR-188 Chaff	-	-	-	<0.01	-
M-206 Flare	<0.01	<0.01	<0.01	0.22	<0.01
TOTAL	0.05	0.02	0.01	3.49	<0.01
Change from Baseline	*0.05*	*0.02*	*0.01*	*3.27*	*< 0.01*

CO = carbon monoxide
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter less than 10 microns in diameter
VOC = volatile organic compounds

The emissions shown in Table 4.4-2 represent the total emissions over a 1-year period from 60,770 bundles of chaff and 40,286 flares over an area spanning 6,247,680 acres (9,762 square miles). The estimated increase in PM_{10} emissions of 3.3 tons per year is comparable to the total emissions of PM_{10} from stationary sources at Cannon AFB, which was reported to be 3.7 tons per year (Air Force 1998), and approximately 22 percent of the total PM_{10} emissions from the F-16 aircraft that are flying the sorties. The PM_{10} emissions from chaff and flare usage shown in Table 4.4-2 are less than 0.02 percent of the total PM_{10} emissions from stationary sources in New Mexico, which USEPA reported as 16,895 tons per year for calendar year 1997 (USEPA 1997).

Because flares released at a minimum of 2,000 feet AGL are the primary source of PM_{10} increases, it is likely that, due to the frequent high winds in eastern New Mexico, these emissions would be distributed rapidly over a wide area and result in insignificant changes in the ambient air quality. Potential impacts to visibility are expected to be short term and limited in area prior to the rapid dispersion of the material, and are not expected to adversely impact any of the PSD Class I areas in the region.

4.4.3.2 ALTERNATIVE B

Emissions from chaff and flare usage under Alternative B were calculated using the same emission factors and assumptions as were used to calculate chaff and flare emissions under baseline conditions. Chaff and flare usage in the Melrose AFR is unchanged in Alternative B compared to the baseline. No chaff or flare usage would be added to current aircraft activities in VRs-100/125 under Alternative B. The chaff that, under Alternative A, would be released in VRs-100/125 would, under Alternative B, be released in the Pecos MOA/ATCAA, Taiban MOA, and the Sumner ATCAA instead.

Table 4.4-3 shows the estimated emissions, in tons per year, from chaff and flare use under Alternative B. Under Alternative B, pilots would use the same type of training chaff and flares as under baseline conditions. The table also indicates the differences for each criteria pollutant between the emissions under Alternative B and those under baseline conditions.

Table 4.4-3. Proposed RR-188 Chaff and M-206 Flare Emissions - Alternative B

Airspace	*ANNUAL EMISSIONS (TONS/YR)*				
	CO	*NO_2*	*SO_2*	*PM_{10}*	*VOC*
Pecos/Taiban MOA & Sumner ATCAA					
RR-188 Chaff	-	-	-	<0.01	-
M-206 Flare	0.05	0.02	0.01	3.27	<0.01
Melrose AFR (R-5104/5105)					
RR-188 Chaff	-	-	-	<0.01	-
M-206 Flare	<0.01	<0.01	<0.01	0.22	<0.01
TOTAL	0.05	0.02	0.01	3.49	<0.01
Change from Baseline	*0.05*	*0.02*	*0.01*	*3.27*	*< 0.01*

The emissions shown in Table 4.4-3 for chaff and flare usage under Alternative B are the same as those reported in Table 4.4-1 for Alternative A. These emissions represent the total emissions over a 1-year period from chaff and flare usage over the entire ROI, and are approximately 22 percent of

the PM_{10} emissions from the F-16 aircraft that are flying the sorties, and less than 0.02 percent of the total PM_{10} emissions in New Mexico during the same year (USEPA 2001). It is likely that, due to the frequent high winds in eastern New Mexico, these emissions would be distributed over a wide area and result in insignificant changes in the ambient air quality. Potential impacts to visibility are expected to be short term and limited in area prior to the rapid dispersion of the pollutants, and are not expected to adversely impact any of the PSD Class I areas in the region.

4.4.3.3 ALTERNATIVE C: (NO ACTION)

Under the No Action alternative, the current chaff and flare usage activities in the Melrose AFR would continue unchanged and no chaff and flare usage would occur in the Pecos MOA/ATCAA, Taiban MOA, Sumner ATCAA, portions of R-5104/5105, or VRs-100/125. Air emissions would be identical to those of the baseline conditions.

4.5 PHYSICAL RESOURCES

4.5.1 Methodology

Impacts to physical resources stem from the release and breakdown of residual components of chaff and flares. If the chemical breakdown of chaff and flares do not result in toxic concentrations within the environment, then the impact is considered insignificant.

The physical resources impacts associated with the deployment of chaff and flares on Melrose AFR, R-5104/5105, Taiban MOA, Pecos MOA/ATCAA, and Sumner ATCAA will be addressed collectively with the physical resources impacts on VRs-100/125.

4.5.2 Issues and Concerns

Through the Air Force's public involvement program, several issues and concerns regarding physical resources have been identified. These include concern over the impacts of chaff on soil chemistry, and leaching of chemicals associated with chaff into livestock water impoundments, open tanks, and the groundwater column itself.

4.5.3 Impacts

4.5.3.1 ALTERNATIVE A: (PREFERRED)

Soils. A study of chaff and flare residue in the environment was conducted at two ranges, Nellis Range in Nevada and Townsend Range in Georgia, where chaff and flares have been heavily used for many years (Air Force 1997a). Results from Nellis are useful in evaluating potential impacts from this proposed action because of the similarity in climate, soil type, and soil chemistry.

At Nellis, 103 soil and sediment samples were collected in locations that were representative of the geomorphologic variation found in an arid environment. These locations included the ridgeline, bajada, basin floor, and drainage bottom. These geomorphic areas are also characteristic of the land under the airspaces in New Mexico. At Nellis, specific sample locations included the range itself, where chaff use is relatively heavy, and under the Desert MOA, where chaff use is less concentrated. Generally, sampling transects were established with six to eight samples taken systematically along each transect at intervals ranging from 20 to 100 meters in length. Once obtained, the soil samples were analyzed using several methods including visual inspection, magnification with a hand lens to determine the presence of chaff fibers, and scanning with an electron microscope to determine the extent of breakdown of the chaff covering (Air Force 1997a).

Of the 103 samples obtained at Nellis, silica fiber chaff (the type used for this proposed action) was recovered from 57 samples. Concentrations of silica fiber chaff within the soil ranged from 0.02

milligram (mg)/kilogram (kg) to 251 mg/kg, with most of the samples containing less than 0.5 mg/kg. The majority of detections were in samples taken from the range areas. Distribution of chaff occurs over a wide area due to the various altitudes of chaff deployment, aircraft speed, and wind speed. To put this in the context of the proposed action, if 60,770 chaff bundles were deployed over the entire airspace throughout the course of a year, approximately 0.27 grams of elemental aluminum (Al) per acre per year and 0.96 grams of silicon dioxide (SiO_2) per acre per year would be deposited. At this rate of deposition, it would take approximately 35 years for the mass of a single aluminum soda can to accumulate on one acre of land. Over the course of one year's time, trace elements associated with the aluminum chaff coating (including copper, manganese, magnesium, zinc, vanadium, and titanium) would account for no more than 0.0008 grams per acre per element. The concentration of trace elements present within a chaff bundle are less than 0.05 percent by weight and are therefore considered insignificant. The silica present in chaff is chemically the same as sand and is therefore inert.

The Nellis study also determined that the pH of the soil significantly affects the stability of the aluminum coating and its likelihood to dissociate in an aqueous environment. Aluminum solubility is highest in solutions with a pH less than 5.0 or more than 8.5. According to the Natural Resources Conservation Service, formerly known as the Soil Conservation Service, soil surveys for this region of New Mexico, the soil pH ranges from 6.6 to 8.4 and is largely characterized as neutral to alkaline. In rare instances where soil pH may exceed 8.4, it is unlikely that the aluminum present in the soil due to chaff deposition would solubilize given the typically arid environment and resultant lack of sufficient water (Air Force 1997a).

The potential for chaff to adversely affect soil chemistry is dependent upon the quantity of material deposited in a given area, the stability of the chaff material, and the chemical composition of the receiving soil. Given the exceedingly low concentrations of expected chaff deposition, coupled with the non-reactive, arid, alkaline environment in which it would be deposited, the proposed action will not bring about a discernible change in the soil chemistry.

Flare use under the proposed action would result in the statistical deposition of 4.5 grams of inert magnesium oxide per acre of soil per year. Magnesium is a naturally occurring material comprising approximately 2.2 percent of the Earth's crust. It and its compounds are significant constituents of native soils in the region and effects of its deposition are therefore benign.

The end caps for both chaff and flares are composed of plastic material. This material will exist in the environment for many years. The plastic materials are chemically inert and non-toxic to the environment. It is expected that the end caps will become buried with blown dust in the local environment.

Surface Water. Results from visual surveys conducted at Nellis and Townsend Ranges indicated that chaff did not accumulate on water surfaces other than that which had been dropped within the past 24-hour period. Once deposited in a water body, chaff begins to sink or break apart. In highly acidic and highly alkaline aqueous environments (rarely encountered in natural surface waters), erosion of the aluminum chaff coating is more rapid. Laboratory analyses have determined that for aluminum toxicity to be achieved, a chaff-to-water ratio of 1:20 would be required. Given the exceedingly low chaff per acre concentration described above in Soils, the concentration of aluminum and trace elements due to chaff deposition is not a concern in aquatic environments (including livestock impoundments and open water tanks) and no effect is expected under the airspace in question. Furthermore, if an un-dispersed bundle of chaff were to deposit within a

surface water body or artificial impoundment (water tank or stock pond), the resulting concentration of aluminum and trace elements would most likely produce no measurable effect (Air Force 1997a).

There is limited information on the effects of unignited flares on surface water bodies. However, it is unlikely that the deposition of a flare within a surface water body or artificial impoundment would have any adverse effects, particularly given the very low probability that such an event would occur (see section 4.6.2). Magnesium, the primary component of flares, is not considered toxic and is an unregulated material.

Groundwater. Neither chemical nor physical effects are expected to occur to drinking water sources from the deployment of chaff. The only mechanism for groundwater contamination is through the infiltration of contaminated surface water through the parent material overlying the aquifers. However, given the extremely low concentration of chemicals released from chaff coupled with the natural filtering mechanism provided by the soils overlying the aquifers, no detectable effect is expected.

4.5.3.2 ALTERNATIVE B

Alternatives A and B are similar in the increased amount of chaff bundles released annually (56,067 bundles). However, the area under which the chaff is released is smaller for Alternative B. As a result, the density of deposited chaff (in grams per acre per year) under this alternative would be greater than Alternative A. Despite the increased density, actual deposition of chaff would remain very low at 0.3 grams per acre per year of aluminum and 1.05 grams per acre per year of silicon dioxide. Potential impacts to physical resources under Alternative B are similar to those under Alternative A and can be considered very minimal.

4.5.3.3 ALTERNATIVE C: (NO ACTION)

Under the No Action alternative chaff and flares would continue to be dropped on Melrose AFR. Physical resources as a result of this use would remain the same as identified in Chapter 3.

4.6 BIOLOGICAL RESOURCES

4.6.1 Methodology

This section evaluates the potential for impacts to biological resources under the proposed and no action alternatives. Although common mechanisms of potential effects are shared by all living resources, different criteria are used for evaluating impacts to humans and other living resources. Each of these criteria is described below.

Determination of the significance of potential impacts to non-human living resources (e.g., habitat, wildlife, livestock; see section 3.6.1 for definition) is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration of ecological ramifications. Because of the broad area considered under the proposed action and alternatives, a habitat perspective will provide an overriding framework for analysis of general classes of effects. Impacts to resources are significant if species or habitats of high concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of high concern.

Impacts to humans (biological or health related) will be termed *not significant* if no measurable risk to human health would occur. Impacts would be considered significant if measurable effects on health would occur or if a statistically detectable increased risk to human health would occur.

4.6.2 Issues and Concerns

General issues and concerns related to chaff use under the proposed action are associated with both the physical and chemical aspects of chaff material. Relevant physical aspects would include those related to chaff filament shape and size, mechanical breakdown patterns, behavior of chaff fragments in aquatic environments, potential for transport (both aerial and fluvitile), and the ultimate fate of fragments in natural environments. Relevant chemical aspects would include those related to chemical content and the environmental chemistry of constituent materials. Issues and concerns related to flare use under the proposed action are associated primarily with fire risk and fire frequency changes on arid rangelands. Fire risk is discussed under Safety (section 4.2). Discussion of these aspects and their potential impacts are discussed within the framework of specific issues. These specific issues have been identified by specific Department of Defense (DoD) research (Air Force 1997a; Cook 2001), General Accounting Office review (United States General Accounting Office 1998), independent review (Spargo 1999), resource agency instruction, and public concern and perception.

Degradable chaff is under development. However, the environmental effects of this material are unknown, and current DoD efforts fall short of demonstrating beneficial degradability, ultimate fate, and environmental effects.

Confined aquatic habitats. Impacts to confined aquatic habitats would be related to the physical presence of chaff fibers and their potential for accumulation in small isolated water bodies or wetland areas. Physical presence of chaff fragments in aqueous systems could also result in chemical activity of chaff constituents in the appropriate chemical settings (extreme pH). Additional impacts may be related to presence of unburned flare material (magnesium pellets) in small aquatic bodies.

Wetland areas comprise a small percentage (<2) of the area to be exposed to chaff release under Alternative A, which would affect the greatest area. The majority of the area of effect comprises relatively flat, arid rangeland with few permanent drainages. Most wetlands and water bodies are associated with 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 probability of the relatively short, Neofat-coated RR-188 fibers forming substantial wads is extremely low. Chaff (i.e., angel hair chaff) is specifically engineered not to clump but rather to bloom into a diffuse cloud upon release. However, it is possible for small (a few milligrams), interlocked aggregations of fibers to fall en masse to earth. The probability of a theoretical clump then settling in an aquatic environment would also be low. There would be little opportunity for dabbling waterfowl or other bottom feeding wildlife to encounter or gather chaff fragments. Given the small amount of diffuse or aggregate chaff material that could possible reach water bodies and the mild pH (neither excessively acid nor excessively alkaline) in regional water bodies, water chemistry would not be expected to be affected.

A variety of organisms such as golden algae, diatoms, and sponges in freshwater systems produce silica structures. These structures provide support and protection and include glass-like silica shells, rods, scales, and spicules. They are natural components of aquatic bodies occurring within intact organisms in the water column and as part of decaying organic debris. Many are similar in size and shape to chaff core material fragments. Livestock and other animals regularly encounter, ingest, and process these structures. The small fibers used in training chaff would be expected to be processed by livestock in a similar manner.

The probability of an intact dud flare leaving an aircraft during training is exceedingly low (less than 1 percent). The probability of this intact flare then being deposited in an aquatic system is even

smaller. The product of these probabilities is the likelihood of an intact flare being released and falling into a wetland, small water body, reservoir, lake, or river. Such an event is improbable, but not impossible. Such an event would result in the presence of a 196-gram pellet of metallic magnesium and its wrapping tape in an aquatic system. Magnesium is a naturally occurring material comprising approximately 2.2 percent of the earth's crust. It and its compounds are significant constituents of soils in the region and ground water buffering systems (see section 3.5.2). No effect on water quality would be expected.

Inhalation of chaff filaments. Potential for effects related to the inhalation of intact chaff filaments or fragments by livestock or wildlife (or human) receptors is related to two factors: (1) the probability of inhalation opportunities occurring; and (2) potential for inhalation, given an opportunity, and the result of the introduction of chaff into animal respiratory systems. Based on calculations of the application rate of chaff under the proposed action and alternatives, the probability of an individual animal (livestock or wildlife) or person encountering single filaments or fragments of chaff or groups of filaments is highly unlikely. Annual rates of application would amount to less than 1.71 grams of chaff per acre per year. Statistically, this would amount to approximately 5 individual fibers per square yard.

Much of the work done on the effects of respiring chaff-sized fragments of siliceous material has been done on humans. As a representative organism, humans are midway between large herbivores, such as cattle, and small terrestrial animals such as rodents. Research has shown that, for humans, the upper respiratory pathway is very effective at catching particles as they enter the airway (Carpenter n.d.). Large particles are trapped and expelled. Because chaff is primarily composed of a non-crystalline structure, fragmentation occurs in planes perpendicular to its long axis (like breaking strands of spaghetti) resulting in no terminal fragments less than 25 microns in diameter. Particles that are respirable have diameters that are less than or equal to 10 microns (USEPA 1997). Penetration of deep respiratory areas is related to specific length-to-width ratios and sizes of particles. The tiny number of fibers that could be inhaled because they are of respirable size or have degraded to such size are insufficient to produce disease (Spargo 1999). Airborne chaff fibers have never been found to be the cause of any disease or any outbreak of symptoms in humans (Spargo 1999). Intact chaff filaments are too large and fragments do not have the appropriate fragmentation properties for pathogenic effects to respiratory tissue of wildlife, livestock, or humans.

Mobilization of aluminum in soils and subsequent uptake by plants. For discussion of the activity of aluminum in soils see Physical Resources, section 3.5. Application of chaff at rates described under the proposed action and alternative would not result in a statistically significant increase in elemental aluminum in soils within the area of potential effect. On average, crust material, such as soils, are approximately 8 percent aluminum by weight. The proposed action, under its most conservative estimates, would result in the application of 0.27 grams of elemental aluminum per acre per year. Under current local conditions of soil pH (neutral to alkaline), mobility of this aluminum would not be expected to occur. It would likely remain inactive in an elemental state and not represent a significant intrusion into current soil aluminum compounds equilibria. Uptake by plants in natural communities or agricultural settings would not be expected to occur. No additional aluminum would enter the food chain or affect plant growth or calcium uptake under the action alternatives.

Toxicity of compounds and trace elements found in chaff and flare constituents. Defensive training under the proposed action and alternative would result in the application of some substances with biological activity or potential toxicity. However, these chemicals would be

deposited in the environment at rates that are not only sub-toxic but also undetectable. Many of these chemicals are present as statistical contaminants (impurities associated with the manufacturing process) in amounts less than one percent by weight (two to three orders of magnitude less than major chemical constituents (see Appendix B). Most are already present in natural environments at detectable concentrations. The application of major chaff and flare chemical constituents (aluminum, silicon dioxide, magnesium oxide ash) would certainly be undetectable across the area of potential effect. The amount of magnesium dispersed from flares (as the combustion product magnesium oxide) is too small to result in exposure levels that would be associated with acute exposure (Air Force 1997a; see section 4.4.3, Air Quality). Flare use under the proposed action would result in no pathways of potential exposure to flare-associated magnesium oxide. Magnesium oxide is an insoluble compound that is poorly absorbed by the body. It takes the form of a white powder or dust, similar to the white residue associated with Fourth of July sparklers. Ingestion of massive amounts (2 to 4 grams) of the material can cause some discomfort and increased bowel activity; it is widely marketed as an oral laxative. No lethal dose for humans or animals has been established; it is not a federally regulated pollutant and is not considered an environmental hazard. In confined workplace areas, Occupational Safety and Health Administration sets permissible exposure limits for industry at 10 milligrams per cubic meter of air for respiratory irritation. Flare use under the proposed action would result in the statistical deposition of 4.5 grams of inert magnesium oxide per acre of soil per year.

Previous studies have been conducted to address ingestion effects of chaff on animals. Cattle and goats apparently avoided eating clumps of chaff placed in their feed. Calves fed chaff in dry meal consumed the chaff only when it was mixed with molasses and thoroughly mixed into the meal (Barrett and Mackay 1972).

Fire potential. Release of defensive flares is not expected to affect the potential for fire. The deployment of defensive flares above 2,000 feet AGL is expected to result in complete combustion of the magnesium pellets more than 1,500 feet above the ground. Any materials, such as end caps, that would reach the ground would not have the ability to cause a fire. Non-functional dud flares that are released would result in an intact flare landing on the ground. The intact flare would consist of a tape-wrapped pellet of gray metal (magnesium). Magnesium in this massive form is, thermally, quite stable with ignition requiring furnace heat at a temperature of 1,202 degrees Fahrenheit. Nevertheless, any additional potential for fire is of concern for both native species and livestock. Most native species of the high plains have adapted to lightning and man-made fires that regularly sweep through the area. Although the potential for fires is not expected to increase as a result of the deployment of flares, the accidental deployment at too low an altitude could result in a fire. Based on similarity of habitat types and climate, the intrinsic potential for fire in habitats under affected airspace are presumed to be similar to Melrose AFR. Melrose AFR has supported flare use for over 17 years. The single recorded incident of a flare-caused fire on Melrose AFR (under a much more intense and less restrictive training regime than the proposed action) would have affected native species much as a lightning-caused fire would.

4.6.3 Impacts

4.6.3.1 ALTERNATIVE A: (PREFERRED)

Because of the minute amount of chaff per unit area dispensed, the benign nature of chaff constituent materials (aluminum and amorphous aluminosilicate), and the apparent rapid mechanical breakdown rate of chaff filaments in natural environments (Cook 2001), effects on biological resources from chaff use under Alternative A would not be biologically significant and would likely

be undetectable. Impacts of chaff use to wetland habitats, special status species, or habitats at the community or ecoregional level would not be expected to occur. Overall impacts to natural living resources are expected to be negligible.

Impacts from chaff to human related living resources, including humans and their associated livestock and agricultural plants would be similar to those described for natural systems. No toxic effects would be expected; neither would mechanical irritation of the respiratory system or pathogenic inhalation risk. Changes in natural uptake rates of aluminum or competitive inhibition of calcium metabolism by aluminum in plant tissues would not occur. Biological impacts to the human environment would be negligible. Impacts to human health would be expected to be non-significant.

Historically, there have been very few flare-caused fires on Melrose AFR. Under this alternative, the potential for flare-caused fires is not expected to increase. Several factors reduce the likelihood of a flare-caused fire and environmental impacts from a fire: (1) the operational altitude restrictions on the release of flares, (2) the restrictions of any flare use during high fire conditions, (3) the adaptations of species to other grassland fires, and (4) the provisions for supporting suppression for all fires.

Fires from all sources (natural and human caused) are a regular constituent of the natural environment. The frequency of these fires is not expected to change as a result of flare use. However, should a fire occur from any source, Cannon AFB has in place a rapid response capability that could assist. This was demonstrated recently when Cannon AFB closed the flightline and sent all available base capabilities to support local fire suppression in a fire related to rail operations west of the base.

When fires occur, they can result in substantial short-term damage to vegetation, rangeland infrastructure such as fencing, and species unable to avoid the grassland fires. The vegetation and species have demonstrated the ability to recover from infrequent fires. In addition, any damage from a fire that could be traced to a flare would be handled in accordance with the Air Force procedures for damage claims.

Consequences to biological species from chaff or flare residual components are likewise not anticipated. In over 15 years of concurrent deployment of chaff and flares and ranching operations on and immediately adjacent to the Melrose AFR, there are no reported cases where ranchers have experienced a loss as a result of an inquisitive calf or any other animals ingesting a chaff or flare end cap or being injured by a chaff bundle or flare.

4.6.3.2 ALTERNATIVE B

Alternatives A and B involve release of 56,067 chaff bundles outside Melrose AFR. Because the same amount of chaff would be released in a smaller area in Alternative B, density of deposited chaff under this alternative would be greater than under Alternative A. Croplands, pastures, and rangelands are represented in similar proportions under affected airspace for both alternatives. Actual deposition of chaff material would remain small, 0.27 gram per acre per year of aluminum and 0.96 gram of silicon dioxide per acre per year. Impacts from Alternative B would be similar to Alternative A. The same flare usage would occur under Alternatives A and B. The consequences would be the same as those described for Alternative A.

4.6.3.3 ALTERNATIVE C: (NO ACTION)

Under the No Action alternative, chaff and flare use would continue at Melrose AFR but would not be expanded across broader airspace. Wildlife, habitats, livestock, crops, and humans within the

Melrose AFR would continue to experience release of defensive chaff and flare materials as they have for the past 30 years.

4.7 CULTURAL RESOURCES

4.7.1 Methodology

A number of federal regulations and guidelines have been established for the management of cultural resources. Section 106 of the National Historic Preservation Act, as amended, empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion on the National Register of Historic Places (NRHP). Significance evaluation is the process by which resources are assessed relative to NRHP significance criteria for scientific or historic research, for the general public, and for traditional cultural groups. Those cultural resources determined to be significant are protected under the National Historic Preservation Act. Executive Order (EO) 13084, *Consultation and Coordination with Indian Tribal Governments* requires that federal agencies have an effective process to permit elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities. DoD *American Indian and Alaska Native Policy* provides guidance for interacting and working with federally-recognized American Indian governments. DoD policy requires that installations provide timely notice to, and consult with, tribal governments prior to taking any actions that may have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands.

Analysis of potential impacts to cultural resources for the proposed action considers direct impacts that 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.

4.7.2 Issues and Concerns

According to an Air Combat Command study on chaff and flares (Air Force 1997a), there is little potential for chaff to have physical or chemical effects on cultural resources. Chaff strands are broken down by natural forces, which render the strands difficult to detect in the surrounding environment (Air Force 1997a). Because of the breakdown of the chaff fibers and the wide dispersion of chaff, it is unlikely that chaff residual components such as end caps would accumulate in sufficient quantities to impair the appreciation or use of cultural resources or Native American traditional areas through visual or littering effects.

Potential concerns regarding flare use include fire risk and aesthetic issues. Existing procedures require deployment of flares above altitudes that ensure a complete burnout of flares before they contact the ground. Under the proposed action, Cannon AFB regulations prohibit release of flares below 2,000 feet AGL (refer to section 4.2). However, potential inadvertent releases of flares could result in fires under certain conditions. Cultural resources can be damaged by fire, smoke, fire suppression, or fire rehabilitation actions. Potential fire-related damage to cultural resources would be minimized using existing procedures to control fire risk. In small quantities, flare residual components do not alter landscape conditions and have little effect on the overall aesthetic quality

of cultural resources (Air Force 1994b). Section 4.8, Land Use, provides additional consideration of landscape issues.

4.7.3 Impacts

4.7.3.1 ALTERNATIVE A: (PREFERRED)

The preferred alternative assesses MOA and ATCAA airspace for defensive training including chaff and flare use. The northern portion of the MTRs (VRs-100/125) are assessed for chaff use only. Total area of chaff use would consist of airspace above 6,247,500 acres. Of that area, 2,931,896 acres would also include flare use. Chaff and flare use over Melrose AFR would continue as it is presently conducted.

Special Use Airspace. No impacts to cultural resources under special use airspace are expected. Chaff and flare use generally is not considered to have the potential to affect these resources, either chemically or from an aesthetic perspective (Air Force 1997a). They tend to be widely dispersed when used within MOAs (Air Force 1997a), reducing the potential for encountering residual components (i.e. plastic end caps) in association with cultural resources. The release of 60,770 chaff bundles annually under all airspace (including the MTRs) would result in the deposit of 0.019 plastic end cap per acre annually. Flare use would be limited to special use airspace and would result in the deposit of approximately 0.014 end cap per acre annually. Chaff and flare end caps together would total approximately 0.032 end cap per acre annually under special use airspace. Due to the wide dispersion of chaff and flare end caps, the visual impact is not expected to significantly effect cultural resources. In addition, some of these end caps would eventually be buried by blowing dust.

No Indian reservations underlie special use airspace (Bureau of Indian Affairs 1998). A monument to the Navajo Long Walk underlies MOA airspace at Fort Sumner. The Air Force contacted the Mescalero Apache, Jicarilla Apache, Comanche, and Navajo people to identify potential concerns associated with the proposed action. The Mescalero Apache Tribe has indicated that chaff and flare use will not affect objects, sites, or locations important to their traditional culture or religion (refer to Appendix C).

The Air Force has also contacted the New Mexico Historic Preservation Division (HPD) to identify potential cultural resource issues. Their response to the initial contact is in Appendix C.

Melrose AFR. No impacts to cultural resources are expected at Melrose AFR. Existing chaff and flare use has not been known to impact significant cultural resources at the range. No traditional resources have been identified on the range to date.

Military Training Routes. No impacts to cultural resources under the project MTRs are expected. No Indian reservations underlie the MTRs (Bureau of Indian Affairs 1998). The potential effects of chaff use would be similar to those described for special use airspace.

4.7.3.2 ALTERNATIVE B

This alternative assesses the same special use airspace as Alternative A for chaff and flare use, but does not include the MTRs (VRs-100/125). Chaff and flare use over Melrose AFR would continue as it is presently conducted.

Potential effects to cultural resources under Alternative B are essentially the same as those described for Alternative B, except that the concentrations of chaff would be greater in the special use airspace and slightly more residual components (i.e., plastic end caps) would be deposited under airspace. The release of 60,770 chaff bundles and 40,286 flares annually in special use airspace would result in

the deposit of approximately 0.055 plastic end cap per acre annually, an increase of 0.02 end cap per acre over Alternative A.

Under Alternative B, no flares or chaff would be used in MTR airspace and there would be no effects to cultural resources.

4.7.3.3 ALTERNATIVE C: (NO ACTION)

Under the No Action alternative, chaff and flare use over Melrose AFR would continue as it is presently conducted. No impacts to archaeological, architectural, or traditional resources would be expected. Cultural resources on Air Force lands would continue to be managed in compliance with federal law and military regulation.

4.8 LAND USE AND VISUAL RESOURCES

4.8.1 Methodology

The methodology to assess impacts on individual land uses required identifying those uses and determining the degree to which they would be affected by the use of chaff and flares during training missions. Analysis of visual impacts involves determining the visual sensitivity of an area, taking into account social considerations. Social considerations include the public's value placed on the resource, public awareness of the area, and general community concern for visual resources. These social considerations are addressed as visual sensitivity, and are defined as the degree of public interest in a visual resource and concern over adverse changes in the quality of that resource. Prior studies on the impacts of chaff and flares were utilized to assess potential effects on land use and visual resources.

General land use patterns and land management practices were based on existing environmental studies and reports, field visits, and personal communications. Federal management plans and comprehensive plans prepared by local jurisdictions provide general information and a regulatory framework for development in the region. Sensitive land use areas underlying the airspace were identified utilizing digitized Geographic Information System maps and databases.

4.8.2 Issues and Concerns

Four general areas of concern regarding land use were identified during scoping for this environmental assessment (EA) and are listed below:

- Identifiable residual components from chaff or flares. This specifically included end caps from the chaff or flares and any chaff or flare duds that would land on property used for agriculture, including ranching.
- Effects of the accumulation of chaff fibers on existing, designated or planned use, as well as the visual quality of an area.
- Possible flare-caused fire ignition or fire damage (Air Force 1997a). Any potential for fires caused by flares could effect land use patterns and ownership, and affect the visual quality of an area.
- Potential effects to property values.

4.8.3 Impacts

4.8.3.1 ALTERNATIVE A: (PREFERRED)

This alternative assesses MOA and ATCAA airspace for defensive training including flare use from 2,000 feet AGL to 50,999 feet mean sea level (MSL) and chaff use from 500 feet AGL. The northern portion of VRs-100/125 are assessed for chaff use only. Chaff and flare use over Melrose AFR would continue as it is presently conducted.

There would be no anticipated change in general land use patterns, land ownership, land management plans, and special use areas for the land use underlying the airspace associated with the action. The proposal for the defensive training initiative does not increase the number of sortie-operations occurring in any of the airspace units.

The predominant land use is agriculture. Potential incidental ingestion of end caps by livestock was cited as a concern during scoping. In the past 15 years of chaff and flare use over rangeland or near Melrose AFR, there has been no reported case of a calf or other livestock being impacted by ingesting an end cap or other chaff or flare residual components (personal communication, Rogers 2001). As presented in the biological resources section, adverse effects to livestock are unlikely. In areas of high visual sensitivity such as state parks, any foreign object could detract from the recreation experience. Although the likelihood of encountering any chaff or flare residual components is low (chaff and flare end caps together would total approximately 0.032 end cap per acre annually), if such were found it could result in annoyance to the observer.

Chaff fibers are rarely discernible from other types of material that may be found in the area (Air Force 1997a). It is unlikely that chaff and its residual components would accumulate in sufficient quantities to impact land uses or affect visual resources.

Potential concerns regarding flare use include fire risk and aesthetic issues. Existing procedures require deployment of flares above altitudes that ensure a complete burnout of flares before they contact the ground. However, potential inadvertent releases of flares could result in fires under certain conditions. Should a fire occur, the effects would be the same as those experienced from a lightning or other fire.

While property values of land under the airspace may be affected by local perceptions of environmental issues, the complex interactions of multiple economic and real estate factors make the estimation of such effects highly speculative. Public concerns have been expressed regarding potential detrimental effects to property values due to the presence of chaff and flare residual components and the fire hazard of flares. With regard to both chaff and flares, the likelihood of adverse impacts associated with these elements is far less than that of impacts from alternate sources. For example, in the northern portions of VRs-100/125 proposed to be limited to the use of chaff only, concentrations would be estimated to be approximately 0.14 grams (0.005 ounce) per acre per year of chaff. For flares, an estimated one flare per 73 acres would be dispensed under the MOAs, ATCAA, and Restricted Area airspace. The risk of fire associated with flare use is extremely low and virtually indistinguishable compared to other potential sources of fire (e.g., lightning, campfire). Current property values in the region presumably account for existing environmental conditions and fire hazard in the region. In the unlikely incidence of a flare-caused fire, the Air Force has established procedures for damage claims reimbursement.

Melrose AFR. No impacts to land use and visual resources would occur at Melrose AFR. Existing chaff and flare use by jet aircraft have been part of the land use under the military airspace for nearly five decades.

Special Use Airspace. Impacts to land uses under the special use airspace are not expected. Chaff and flare use are widely dispersed when used within MOAs (Air Force 1997a), reducing the potential for encountering residual components on private residences or within sensitive land use areas.

Fort Sumner State Monument and a variety of Areas of Critical Environmental Concern (ACECs) and Special Recreation Management Areas (SRMAs) underlie the airspace designated for both chaff and flare use. The likelihood of the presence of chaff or flare residual components in these areas of public visitation occurring at a level that would disturb scenic quality or diminish the recreation experience is remote. Similarly, the potential for effects resulting in changes in land use, ownership, or management practices is negligible.

To address public concerns regarding dud flares, an Air Force information page (see Appendix F) would be made available to local fire departments within the ROI. This information could support the identification of the dud flares and provide measures to inform the Air Force for location of the dud flare and proper disposal. For dud flares, citizens would be encouraged to call Cannon AFB at their toll free number 800-446-4595 Ext. 4131.

Northern Portion of VRs-100/125. No impacts to land use under the northern portions of VRs-100/125 are expected. Although Sumner Lake State Park is located under the MTRs corridor, and it is the only sizable developed recreation facility located within the study area, the potential effects of chaff use would be similar to those described for the special use airspace.

4.8.3.2 ALTERNATIVE B

This alternative assesses the same MOA, ATCAA, and Restricted Area airspace as Alternative A for chaff and flare use, but does not include the MTRs (VRs-100/125). Potential effects to land use under Alternative B are the same as those described for Alternative A, except that the MTRs would not be used. Chaff accumulation rate under this alternative would be 1.87 grams (0.07 ounces) per acre per year. Since flare use under this alternative would be the same as under Alternative A, on average, an expected one flare per year would continue to be released over every 73 acres.

4.8.3.3 ALTERNATIVE C: (NO ACTION)

Under the No Action alternative, the proposed action extending chaff and flare use to additional airspace would not be implemented. No impacts to land use or visual resources under that airspace would be expected. The existing use of chaff and flares over Melrose AFR would continue.

4.9 ENVIRONMENTAL JUSTICE

4.9.1 Methodology

In order to assess the potential environmental justice and protection of children impacts of the proposed action, an analysis of race, ethnicity, poverty status and age characteristics of populations in the New Mexico counties associated with affected airspace was conducted. These county figures were compared to regional and state demographics to determine proportional differences. Areas containing relatively high environmental justice-related populations were given special consideration regarding potential impacts in order to address the potential of disproportionately high or adverse human health or environmental effects on these communities.

4.9.2 Issues and Concerns

The only potential issue that could apply to the protection of children is the remote possibility that a child located a dud flare. No Native American communities or reservations underlie the affected airspace. Potential impacts to traditional resources are discussed in section 4.8, Cultural Resources.

4.9.3 Impacts

4.9.3.1 ALTERNATIVE A: (PREFERRED)

Minority, low income, and youth populations are not disproportionately represented in the area under the airspace proposed for improved training. The New Mexico Boys Ranch, Inc. will be closing its operations at the Hart Youth Ranch in the summer of 2001 due to the ranch's remote location, limited staff, and the number of teens the ranch may accept. On one occasion, over 10 years ago, a flare was found just west of the property (personal communication, Kull 2001). No other incidents of flares found by children have been reported at the ranch.

The proposed action evaluated in this EA would not create significantly adverse environmental or health effects. Consequently, no disproportionately high and adverse human health or environmental effects on minority and low-income populations have been identified. In addition, there are no known environmental health or safety risks associated with the proposed action or alternatives that may disproportionately affect children. Given the large geographic area beneath the airspace and the less than 1 percent possibility of a flare release resulting in a dud reaching the ground, the probability of a dud flare being found is extremely low. In the unlikely event of a child finding a dud flare, Cannon AFB would expand the local education program for fire departments to include an Air Force contact to ensure proper handling of a dud flare.

4.9.3.2 ALTERNATIVE B

This alternative would cover a smaller area than the preferred alternative. Minority, low income, and youth populations are not disproportionately represented in the area under the airspace associated with Alternative B. No disproportionately high or adverse environmental or health effects on minority or low-income populations have been identified. In addition, there are no known environmental health or safety risks that may disproportionately affect children.

4.9.3.3 ALTERNATIVE C: (NO ACTION)

Under No Action, activities in the affected airspace would remain unchanged from current conditions. Consequences for the population under the restricted airspace would remain unchanged. No areas under the MOAs, ATCAA, or MTRs would be affected. Chaff and flare use on Melrose AFR would continue.

5.0 *CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES*

5.1 CUMULATIVE EFFECTS

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis in an EA 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 Code of Federal Regulations 1508.7). Recent CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involves defining the scope of the other actions and their interrelationship with the proposed action. The scope must consider other projects that coincide with the location and timetable of the proposed action and other actions. Cumulative effects analysis must also evaluate the nature of interactions among these actions.

Military Actions. Recent past military projects in the region include the expansion of German Air Force Operations at Holloman AFB, New Mexico (United States Army Corps of Engineers [USACE] 1998), a cooperative program at Cannon Air Force Base (AFB) to train Republic of Singapore Air Force personnel (Air Force 1998), the Realistic Bomber Training Initiative (RBTI) (Air Force 2000), Joint Training Exercise (JTX) Roving Sands (USACE 1994), and the reconstruction of Cannon AFB runways that resulted in the temporary relocation of Cannon AFB aircraft to Nellis AFB, Nevada. All of these past or ongoing actions were included as part of the baseline activities associated with the base in the analysis of the proposed action.

The German Air Force operations at Holloman AFB are distant enough from Cannon airspace that there is currently, and would continue to be, minimal use of Cannon airspace. A combined U.S. Air Force/Republic of Singapore squadron at Cannon AFB uses some of the same airspace as the proposed action (Pecos Military Operations Area [MOA]/Air Traffic Control Assigned Airspace [ATCAA] and Visual Routes [VRs]-100/125). However, no change in existing airspace use by the program would occur as a result of the proposed action. RBTI links military airspace and ground-based training in support of aircrews from Barksdale AFB and Dyess AFB. No change in existing RBTI use of Cannon airspace would occur as a result of the proposed action. JTX Roving Sands is an annual air defense exercise sponsored by the United States Army. This exercise has included Cannon AFB aircraft and airspace. No change would occur in this occasional use under the proposed action. The reconstruction of Cannon AFB runways is not associated with the proposed action, but is noted here as a recent past action.

Non-Military Actions. The airspace evaluated in this environmental assessment (EA) covers a broad region under which there are numerous ongoing or proposed non-military actions. Examples include existing and new non-military air traffic, management and development of public lands, and private land development. Section 3.1.3 describes the coordination of overlapping airspace in the vicinity of the proposed action. Such coordination between military and non-military airspace uses is expected to continue.

The Roswell Airport has upgraded its radar, although not under ROI airspace. Previously the Roswell Airport radar was not affected by chaff use over Melrose AFR and chaff used under this proposed action is designed not to interfere with Air Traffic Control Radar throughout the National Airspace System. Therefore, it is unlikely that the proposed defensive training would affect Roswell Airport's upgraded radar system.

The proposed action does not involve construction or other on-the-ground actions, and is not expected to interact with projects developed on land under airspace. Such projects include the planned 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).

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Aircraft training operations would continue the existing consumption of non-renewable resources such as the gasoline used in vehicles and jet fuel used in aircraft. Chaff and flares also would be expended. These uses are not expected to significantly affect environmental resources.

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PERSONS AND AGENCIES CONTACTED

Foltz, Art. 2001. Air Combat Command, Explosive Ordnance Disposal Program Manager, Langley AFB, Virginia.

Fullmer, Kent. 2001. Equipment Specialist, Hill AFB, Utah.

Givney, Rich. 2001. Deputy Fire Chief, Cannon AFB, New Mexico.

Kull, Mike. 2001. President, New Mexico Boys Ranch, Inc. Albuquerque, New Mexico.

McCord, Dianne. 2001. Real Estate, HQ ACC/CERR, Langley AFB, Virginia.

O'Hara, Mick L., PhD. 2001. Fort Sumner State Monument Education and Outreach Coordinator.

Rogers, John. 2001. Range Control Officer, Melrose AFR, New Mexico.

Travis, Odell. 2001. Flight Safety Officer, Cannon AFB, New Mexico.

Schuler, John. 2001. Airspace Manager, Cannon AFB, New Mexico.

Wheeless, Col. Lynn. 2001. DOR Airspace and Ranges. Langley AFB, Virginia.

7.0 PREPARERS AND CONTRIBUTORS

John K. Austin, Environmental Analyst, Noise, HQ ACC/CEVP
B.S., Biology; University of Virginia, 1999
Years of Experience: 1

G. Michael Brown, Project File/Land Use, SAIC
B.S., Environmental Science, University of Idaho, 1998
Years of Experience: 1

Maureen Cunningham, Biological Resources, SAIC
B.A., Botany, University of Tennessee, 1976
M.S., Botany, University of Tennessee, 1983
Ph.D., Ecology and Evolutionary Biology, University of Tennessee, 2000
Years of Experience: 25

Linda Devine, REM, Project Manager, HQ ACC/CEVP
A.S. Science, Undergraduate Studies, Environmental Science
Years of Experience: 17

Dave Dischner, Safety, SAIC
B.A., Urban Affairs, Virginia Polytechnic Institute, 1974
Hazardous Materials Management Certificate, University of California, 1988
Years of Experience: 24

Bill Doering, Biological Resources, SAIC
B.A., Biology, University of San Diego, 1988
M.S., Zoology, Idaho State University, 1996
Years of Experience : 10

Jerry Dougherty, Materials Management, SAIC
B.S., Civil Engineering, New Mexico State University, 1960
M.S., Civil Engineering, University of Oklahoma, 1972
Years of Experience: 40

Claudia Druss, Cultural Resources, SAIC
B.A., University of Colorado, Boulder, 1977
M.A., Anthropology, Idaho State University, 1980
Years of Experience: 22

Michele Fikel, Project Manager, SAIC
B.A., Geography, University of California, Santa Barbara, 1985
Years of Experience: 13

Kimberly Freeman, Production Manager, SAIC
Years of Experience: 16

Sheri Freemuth, QA/Land Use, SAIC
B.A., Political Science, Scripps College, 1982
M.C.P., City Planning, San Diego State University, 1985
Years of Experience: 14

Susan Hale, Public Involvement, SAIC
Environmental and Occupational Health Technician Certification, U.S. Air Force
Years of Experience: 31

Irene Johnson, Environmental Justice, SAIC
M.A., Economics, University of Washington, 1991
B.S., Economics, George Mason University, 1989
Years of Experience: 10

Claudia Laughlin, Graphics, SAIC
5 Years undergraduate study, Advertising Design, Boise State University
Years of Experience: 6

David Lingner, Air Quality, SAIC
Ph.D., Chemistry, Purdue University, 1985
B.S., Mathematics and Chemistry, Bates College, 1978
Years of Experience: 19

Kathy Lombardi, P.E., Physical Resources, SAIC
B.S., Environmental Engineering, Humboldt State University, 1994
M.S., Water Resources Engineering, University of Wisconsin-Madison, 2000
Years of Experience: 8

Forrest Smith, Editor, SAIC
B.A., History and Political Science, University of California Santa Barbara, 1970
Years of Experience: 27

Bob Thompson, Airspace, SAIC
B.S., Mathematics, Heidelberg College, 1968
M.A., Human Resources Management, Pepperdine University, 1979
Years of Experience: 30

Robert Van Tassel, Program Manager/QA, SAIC
B.A., Economics, University of California-Santa Barbara, 1970
M.A., Economics, University of California-Santa Barbara, 1972
Years of Experience: 27

Chris Wildt, Project File, SAIC
B.S., Anthropology, Portland State University, 1991
Years of Experience: 9

APPENDIX A
CHARACTERISTICS OF CHAFF

CHARACTERISTICS OF CHAFF

The proposed action would employ RR-188 training chaff. 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). RR-188 training chaff has D and E band dipoles removed to avoid interference with FAA radar.

Chaff Composition

The RR-188 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.

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 small plastic end cap is ejected, followed by the chaff fibers. The plastic tube remains within the aircraft. Debris from the ejection consists of two small, square pieces of plastic 1/8-inch thick (i.e., the piston and the end cap) and the felt spacer. Table 3 lists the characteristics of BBU-35/B impulse cartridges used to pyrotechnically eject chaff.

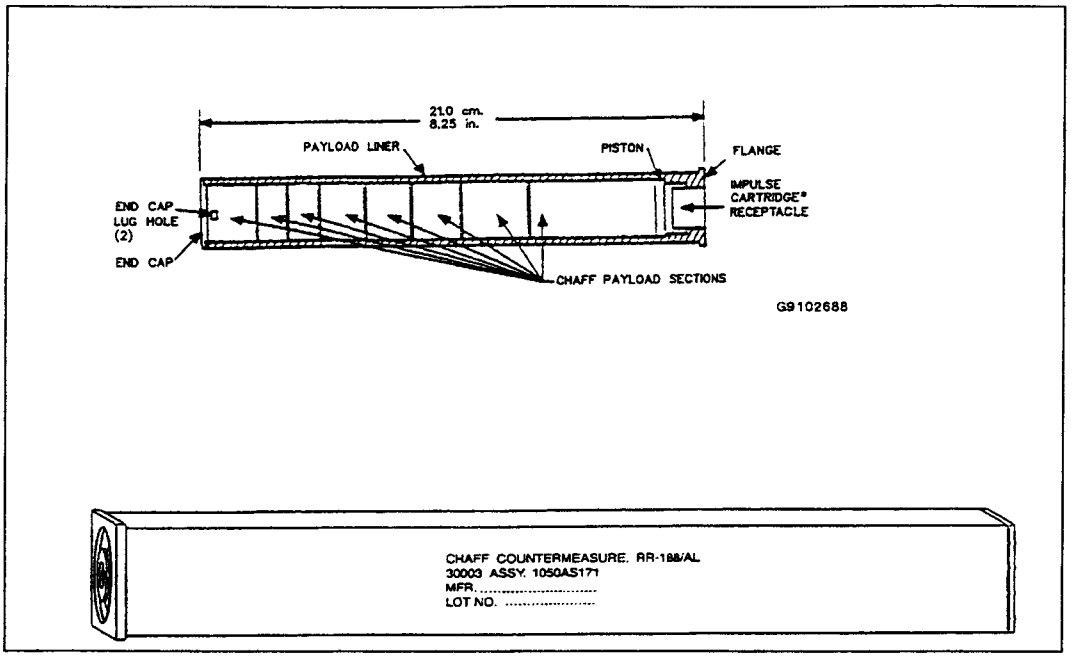

Figure 1. RR-188/AL Chaff Cartridge (*Source: Air Force 1999*)

Table 1. Components of RR-188 Chaff

Element	Chemical Symbol	Percent (by weight)
Silica Core		
Silicon dioxide	SiO_2	52-56
Alumina	Al_2O_3	12-16
Calcium Oxide and Magnesium Oxide	CaO and MgO	16-25
Boron Oxide	B_2O_3	8-13
Sodium Oxide and Potassium Oxide	Na_2O and K_2O	1-4
Iron Oxide	Fe_2O_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

Attribute	RR-188
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	

Table 3. BBU-35/B Impulse Charges Used to Eject Chaff

Component	BBU-35/B
Overall Size Overall Volume Total Explosive Volume	0.625 inches x 0.530 inches 0.163 inches^3 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%

Upon release from an aircraft, chaff forms a 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

Condition	Performance Requirement	
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, July 1994. 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 Aircrew and Weapons Director and Terminal Attack Controller Procedures for Air Operations, July 1994. This instruction delineates procedures for chaff and flare use. It prohibits use unless in an approved area.

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APPENDIX B
CHARACTERISTICS OF FLARES

CHARACTERISTICS OF FLARES

The proposed action would employ M-206 self-protection flares. 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 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 (polytetrafluorethylene) molded into rectangular shapes (Air Force 1997). Longitudinal grooves provide space for materials that aid in ignition such as:

- 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

Typically, 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 illustrations of an M-206 flare.

Table 1. Description of M-206 Flares

Attribute	M-206
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	

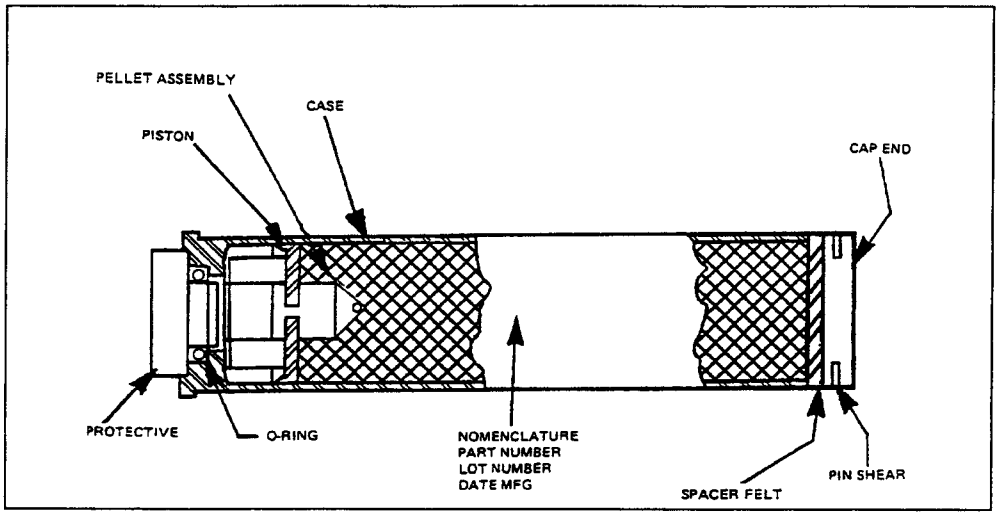

Figure 1. M-206 Flare (*Source: Air Force 1997*)

Table 2. Typical Composition of M-206 Self-Protection Flares[1]

Part	Components
Combustible	
Flare Pellet	Polytetrafluoroethylene (Teflon) (-[C_2F_4]$_n$ - n=20,000 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) (-[C_2F_4]$_n$ - n=20,000 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

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 ignitor gases to contact the first fire mixture on top of the flare pellet. The parasitic type flare is less likely to produce duds. The plastic end cap falls to the ground following flare ejection. Flares are tested to ensure they meet performance requirements in terms of ejection, ignition, and effective radiant intensity. If less than 1 percent or more of the flares fail the test, the flares are returned to the manufacturer. Table 3 describes the components of M-796 Impulse charges.

Table 3. Components of M-796 Impulse Charges

Component	M-796
Overall Size Overall Volume Total Explosive Volume	0.449 x 0.530 inches 0.104 cubic inches 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: USAF 1997

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 prohibits using flare systems except in approved areas with intent to dispense, and sets certain conditions for employment of flares. Flares are authorized over government-owned and controlled property and over-water Warning Areas with no minimum altitude restrictions when there is no fire hazard. If a fire hazard exists, minimum altitudes will be maintained in accordance with the applicable directive or range order. An ACC supplement to AFI 11-214 (30 May 1997) prescribes a minimum flare employment altitude of 2,000 feet AGL over non-government owned or controlled property (Air Force 1997).

APPENDIX C
AGENCY AND PUBLIC CORRESPONDENCE

EA Distribution List

Agencies

Mr. Dave Wingert
FAA ABQ ARTCC ZAB-530
Federal Aviation Administration
8000 Louisiana Blvd., NE
Albuquerque, NM 87109-5000

Mr. Clyde Dehart
FAA Southwest Region
ASW-900/AF Representative
Fort Worth, TX 76193-0001

Mescalero Apache Tribe
Tribal Historic Preservation Office
P.O. Box 227
Mescalero, NM 88340

NM Aviation Division
Aviation Director
604 West San Mateo
Santa Fe, NM 87505

Mike Rice
NM Aviation Division
1550 Pacheco
Santa Fe, NM 87504

Frank Dubois
NM Department of Agriculture
Box 30005, Dept 3189
Las Cruces, NM 88003

Brian Sanford
NM Department of Agriculture
Gregg and Espina Streets
Las Cruces, NM 88003

Jerry Maracohini, Director
NM Department of Game and Fish
Vilagra Bldg
500 Old Santa Fe Trail
Santa Fe, NM 87105

David Skazik
NM Department of Parks and Recreation
P.O. Box 1147
Santa Fe, NM 87501

Gedi Cibas
NM Environment Department
Env Impact Review Coordinator
Harold Runnels Bldg.
1190 St. Francis Drive
Santa Fe, NM 87505

Ed Kelty
NM Environment Department
P.O. Box 26110
Water and Waste Div
Santa Fe, NM 87502

Rita Trujillo
NM Environment Department
Air Quality Bureau
2044 Galisteo
Santa Fe, NM 87505

District Forester
NM Forestry Division
District VI, Bernalillo District
Box 458
Bernalillo, NM 87004

NM Forestry Division
District Forester
District III, Socorro District
HC 32, Box 2
Socorro, NM 87801

NM Forestry Division
District Forester
District IV, Las Vegas District
HC 33, Box 109
Las Vegas, NM 87701

NM Forestry Division
District Forester
District V, Capitan District
P.O. Box 277
Capitan, NM 88316

Tony Martinez, Director
NM Forestry Division
1220 S. Saint Francis Dr.
Santa Fe, NM 87505

Ray Polasky
NM State Forestry Division
P.O. Box 1948
Santa Fe, NM 87504

NM State Heritage Program
1220 S. St. Francis Dr.
Santa Fe, NM 87501

Ray Powell
NM State Land Office
Commissioner of Public Lands
P.O. Box 1148
Santa Fe, NM 87504

NRCS
State Conservationist
6200 Jefferson NE
Albuquerque, NM 87109-3734

Elizabeth Oster
Office of Cultural Affairs
Historic Preservation Division
228 E. Palace Ave.
Santa Fe, NM 87501

Ms. Joy Nicolopolus
U.S. Fish and Wildlife Service
2105 Osuna NE
Albuquerque, NM 87113

Charles Cartwright
USDA, Forest Service
Regional Forester
517 Gold Avenue SW
Albuquerque, NM 87102

Richard Whitley
USDI, Bureau of Land Management
Deputy Stat Director
P.O. Box 27115
Santa Fe, NM 87502

Nancy Skinner, Chief
USDI, National Park Service
P.O. Box 728
Santa Fe, NM 87504

Glenn Sekavec
USDI, Office of the Secretary
Office of Env Policy and Compliance
PO Box 649
Albuquerque, NM 87103

Individuals and Government Officials

The Honorable Leandro Abeyeta
City of Vaughn
P.O. Box 278
Vaughn, NM 88353

The Honorable Rod Adair
State Senator, District 33
2606 Sherrill Ln.
Roswell, NM 88202

Col. Mike Anderson
SAF/LL
1160 Air Force Pentagon
Room 5D927
Washington, DC 20330-11160

Leonard Atole
President
Jicarilla Apache Tribe
P.O. Box 507
Dulce, NM 87528

The Honorable Shirley Bailey
State Senator, District 42
14305 Shady Ln.
Hobbs, NM 88242

The Honorable Jeff Bingaman
U.S. Senate
703 Hart Senate Office Building
Washington, DC 20510

Kelsey Bogaye
Speaker for the Navajo Nation Council
Office of the Speaker
P.O. Box 3390
Window Rock, AZ 86515

The Honorable Joseph Campos
City of Santa Rosa
P.O. Box 429
Santa Rosa, NM 88435

President Wendell Chino
Mescalero Apache Tribe
P.O. Box 176
Mescalero, NM 88340

The Honorable Larry Combest
U.S. House of Representatives
1026 Longworth House Office Building
Washington, DC 20515

The Honorable Pete Domenici
U.S. Senate
328 Hart Senate Office Building
Washington, DC 20510

D.S. Elliott
HCR 32, Box 25
Uvalde, TX 78801-9700

Richard Evans
Double V Ranch
HC 64, Box 12
Fort Sumner, NM 88119

The Honorable Daniel Foley
District 57
806 Deborah Dr.
Roswell, NM 88201

Randy Harris
Committee of Fifty
300 Main
Clovis, NM 88101

William & Peggy Haverlah
HC 68, Box 978
Santa Rosa, NM 88435

The Honorable Stuart Ingle
State Senator, District 27
2106 W. University Dr.
Portales, NM 88130

The Honorable Gary Johnson
Governor, State of New Mexico
500 Old Santa Fe Trail
Santa Fe, NM 87501

The Honorable David Lansford
City of Clovis
P.O. Box 760
Clovis, NM 88101

The Honorable Raymond Lopez
City of Fort Sumner
P.O. Box 110
Fort Sumner, NM 88119

Magdalena Monserrat
New Mexico CowBelles
HC 68, Box 943
Santa Rosa, NM 88435

The Honorable Bill Owen
City of Roswell
P.O. Box 1838
Roswell, NM 88202

The Honorable Pauline Ponce
District 58
1020 S. Mulberry
Roswell, NM 88201

Dan Scurlock
RR1, Box 162
Fort Sumner, NM 88119

The Honorable Joe Skeen
U.S. House of Representatives
Rayburn House Office Building - Room 2302
Washington, DC 20515

Gene Smith
1517 U.S. Hwy 60-84, #33
Clovis, NM 88101

Karen Steele
HC 64, Box 12A
Fort Sumner, NM 88119

The Honorable Charles Stenholm
U.S. House of Representatives
1211 Longworth House Office Building
Washington, DC 20515

Doc Stewart
2706 E. 21st St.
Clovis, NM 88101

The Honorable William Thornberry
U.S. House of Representatives
131 Cannon House Office Building
Washington, DC 20515

The Honorable Tom Udall
U.S. House of Representatives
502 Cannon House Office Building
Washington, DC 20515

Johnny Wauqua
Chairman of the Comanche Nation
P.O. Box 908
Lawton, OK 73502

The Honorable Heather Wilson
U.S. House of Representatives
318 Cannon House Office Building
Washington, DC 20515

The Honorable Sue Wilson
State Senator, District 19
812 Sagebrush Court, SE
Albuquerque, NM 87123

Repositories

Clovis Community College Library
417 Schepps Blvd
Clovis, NM 88101-8345

Clovis-Carver Public Library
701 N Main St
Clovis, NM 88101-6658

Eastern New Mexico University
Golden Library
ENMU, Station 32
Portales, NM 88130

Fort Sumner Public Library
220 Sumner Avenue
Fort Sumner, NM 88119

Moise Memorial Library
208 5th St
Santa Rosa, NM 88435

Roswell Public Library
301 N. Pennsylvania
Roswell, NM 88201

Kenneth Schlientz Memorial Library
602 South 2nd Street
Tucumcari, NM 88401

Vaughn Public Library
Diana Gallegos, Head Librarian
P.O. Box 278
Vaughn, NM 88353

HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769
ATT: Ms Linda DeVine.

HC64 Bx 12A
Fort Sumner, NM 88119

Dear Ms DeVine;

I protest the government plan to drop chaff and flares from planes stationed at Cannon AFB, Clovis, NM.

When private citizens drive up and down roads throwing out beer cans and cigarette butts, they are irresponsible litters. Just because the government proposes to dump chaff and flares from planes, it doesn't make them any less irresponsible.

There private citizens never think they will cause a fire with their cigarette butts, but sometimes they do. The flares might also cause fires, even though you think they won't. If even one in a thousand does, it is still one too many.

The beer cans are not environmental hazards but either some one must pick them up or they continue to be an eyesore. Your chaff is little, too. At least a private citizen might be unaware of the problem they are causing. The government ought to know better. Who is going to go out and pick the chaff up? I don't think it will be your pilots.

Sincerely
Karen Steele

HAVERLAH RANCH

WILLIAM C. "BILL" & PEGGY HAVERLAH
HC 68, Box 978
Santa Rosa, New Mexico 88435
(505) 472-4695

April 11, 2001

HQ ACC/CEVP
129 Andrews St., Suite 102
Langley AFB, VA 23665-2769
Attn: Ms Linda DeVine

Subject: Defensive Training Initiative of Cannon AFB on New Mexico Rangeland

Dear Ms DeVine:

It has recently come to my attention that the United States Air Force is planning to start Defensive Training Initiative (DTI) of Cannon AFB on New Mexico rangeland. This DTI program would allow your F16's to drop flares on fragile New Mexico rangeland. Though you assure ranchers that the flares will be out cold before they hit our rangeland, an even remote chance of a range fire caused by one of your flares is every rancher's nightmare. I am requesting that **An Environmental Impact Study should be done before you start your DTI.**

In addition:

- Semi-arid range land of the Pecos MOA is a very fragile environment; it is slow to degrade most human trash. Both chaff and flare residue are not biodegradable.

- The flares contain hazardous waste in chromium and vanadium content. By AF admission, prolonged inhalation of chaff fibers causes respiratory inflammatory response. My livestock will smell it and die.

- The fires that the flares can potentially start will not be tolerated. **All fire departments in New Mexico (professional and volunteer) should be trained** in all aspects of handling all situations in all scenarios associated with the deployment of flares from your F16's over fragile New Mexico range land.

- In the US there are currently 14 designated MOA's for chaff and 8 for flares. DTI should continue to be conducted at these designated sites as it has been since the F16 arrived at Cannon AFB six years ago.

Please do not put this program into place. Use the existing sites for your testing. Our livelihood depends on our rangeland. We, New Mexico environmentalists, care for our rangeland as we care for our children. Please do not drop flares on New Mexico rangeland.

Sincerely,

Bill & Peggy Haverlah

MAGDALENA MONSERRAT
1st Vice President
New Mexico CowBelles
HC 68 Box 943
Santa Rosa NM 88435

April 11, 2001

HQ ACC/CEVP
129 Andrews St., Suite 102
Langley AFB, VA 23665-2769
Attn: Ms Linda DeVine

Subject: Defensive Training Initiative of Cannon AFB on New Mexico Rangeland

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- The fires that the flares can potentially start will not be tolerated. **All fire departments in New Mexico (professional and volunteer) should be trained** in all aspects of handling all situations in all scenarios associated with the deployment of flares from your F16's over fragile New Mexico range land.
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Please do not put this program into place. Use the existing sites for your testing. Our livelihood depends on our rangeland. We, New Mexico environmentalists, care for our rangeland as we care for our children. Please do not drop flares on New Mexico rangeland.

Sincerely,

Magdalena Monserrat

Written Comment Sheet

Defensive Training Initiative Environmental Assessment (EA)

Cannon AFB, New Mexico

ank you for your input

DATE 4- -01

EASE PRINT

I WAS VERY DISAPPOINTED, BUT NOT SURPRISED, WHEN I WAS DENIED THE RIGHT TO ASK ALL MY QUESTIONS WITHIN A REASONABLE TIME FRAME, ESPECIALLY SINCE NON-CHAFF AND FLARE QUESTIONS AND COMMENTS TOOK PRECEDENCE AT THE HEARING ON THURSDAY APRIL 5 IN FORT SUMNER, AND I WAS NOT REALLY SURPRISED WHEN THERE WERE LOW-LEVEL FLYOVERS BY JETS ABOVE THE TREE PLANTING CEREMONY AT FORT SUMNER STATE MONUMENT AT C 12:15 pm THE NEXT DAY. MY DISILLUSIONMENT WITH THE MILITARY BEGAN DURING THE 1960s WHEN JOHNSON MCNAMARA, HAIG AND OTHERS WITHHELD INFORMATION OR LIED ABOUT VARIOUS ASPECTS OF THE VIETNAM WAR AS EXPOSED BY THE PRESS AND SOLDIERS IN VIETNAM, AS WELL AS OTHERS. THE SAME COVER-UPS, MISLEADING STATEMENTS HAVE CONTINUED SINCE THEN. THUS I DO NOT BELIEVE EVERYTHING THAT WAS SAID* AT THE RECENT HEARING SO I CANNOT ACCEPT ANY OF THE ORAL OR PRINTED WORDS WHICH WERE

**** CONTINUE ON BACK FOR MORE SPACE ****

Please be advised that by including your name and address, you are agreeing to it being part of the EA public record.

AME: DAN SCHLOCK

DDRESS: RR1, Box 161

TY: FORT SUMNER

TATE, ZIP CODE: NM 88119

355-0182

☐ Please check if you would like to receive a copy of the Draft EA

PLEASE HAND THIS FORM IN OR MAIL BEFORE MAY 10, 2001 TO:

HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769
Attn: Ms. Linda DeVine

PAGE 2 | YOUR NAME: Dan Saurbeck

EMANATED LAST THURSDAY EVENING. THUS, MY QUESTIONS NOT ASKED HAVE NO SIGNIFICANCE. THE OPPORTUNITY TO WRITE CRITICAL LETTERS TO THE PRESS, POLITICAL FIGURES AND TO REVIEW THE DRAFT EA, HOLDS SOME PROMISE, HOWEVER.

Dan Saurbeck
HISTORIAN

P.S. The sonic booms (two) which I heard at Fort Sumner last Friday, between 5:25 pm and 5:35 pm, were retaliation for those of us who question, who protest? Are were they Chinese pilots in military jets? Indeed, without doubt 11:00 am, 4-12-01.

cc

copies: Senator Jeff Bingaman, Representative Tom Udall, Secretary Jennifer Salisbury.

* One of the pilots stated that the chaff were biodegradable - I challenged - and another team member said they were not. "Fact Sheet" states "chaff" impacts on agricultural operations "are negligible and far less than those from other man-made emissions." (p. 4).

cc

1. I have personally invested over 10 million dollars in land and cattle in the MOA of Cannon AFB in the last three years. Would I have spent this much knowing the AF might be dumping "*Protective Chaff*" (i.e. *trash)* and "*Flares*" (i.e. *incendiary devices*) on this land? The answer is **NO**! This proposed dumping amounts to a *taking of value* from me without just compensation, and that should be illegal in anyone's book.

2. If a commercial trunk carrier airline were to make a statement that they could improve fuel and overall operating efficiency (profitability) of their airline by ejecting compacted food waste and other trash at 20,000 to 30,000 feet, and they would ignite it so that it would burn and fall harmlessly to the ground, they would be laughed into oblivion with such a scurrilous statement. The proposed Defensive Training Initiative (DTI) of Cannon AFB is for efficiency purposes only (to save money and to make their job easier). In the U.S. alone there are currently 14 designated MOA's for chaff and 8 for flares. DTI should continue to be conducted at these designated sites as it has been since the F16 arrived at Cannon AFB 6 years ago.

3. The semi-arid range land of the Pecos MOA is a very fragile environment, and is very slow to degrade most human trash. For example, a tin can will take several generations to blend into the background or disintegrate as compared to 10 years or less in more humid areas of the country. Part of the appeal of the rangeland is its pristine cleanliness. If I were to have an employee throwing cola cans or snuff tins out of his vehicle, I would warn him a couple of times, then fire him. If I were to have an employee who starts a fire carelessly with a match or discarded cigarette, I could probably fire him on the spot. What can I do with the USAF? Both chaff and flare residue are not biodegradable.

4. Hazardous contamination The chromium in the flares is a terrible health hazard by AF admission. Vanadium isn't good. By AF admission, prolonged inhalation of chaff fibers causes respiratory inflammatory response. Normal cow response to something different on the ground is to smell it. (95% of snakebites to cows are on the nose from trying to sniff the snake.) Most of the serious threats to bovine health come through their lungs.

5. The AF assures me that it has calculated that the flares will be out cold before they hit my ranch. While I haven't asked, I'm certain that they would calculate that the probability of an F16 crashing and burning on my ranch is mush smaller than the probability of a flare causing a fire. Cannon AFB has crashed two F16 jet fighters on the ranch (at different times) in the last 2 1/2 years. I have a monstrous credibility problem with the AF not causing more fires!

6. I have had 3 man-caused fires (not by AF) on my ranch in the last 14 months, burning about 3800 acres. An additional 50,000+/- acres of man-caused fires occurred locally in DeBaca Co., NM last year. We really can't stand any additional probabilities. There are large expanses of true desert with 5-7 inches of yearly rainfall in southern NM that don't carry enough vegetative cover to support a fire. The DTI should be moved to one of these areas 100-200 miles south. (That is only 20 F16-minutes away!)

7. Wild rivers, Native Americans, wilderness areas, coastal management zones, wetlands, national parks and national monuments all get special environmental assessment treatment. ***What about me!***

Richard H. Evans
Double V Ranch
HC 64, Box 12
Ft. Sumner, NM 88119 (505) 355-3425

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

April 16, 2001

Cons. # 2-22-01-I-279

Linda DeVine, EIAP Project Manager
HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769

Dear Ms. DeVine:

This letter responds to your March 16, 2001, letter requesting information on threatened or endangered species or important wildlife habitats that could be affected on sites proposed for defensive training exercises in and around Cannon Air Force Base in portions of Curry, Roosevelt, Chaves, Lincoln, Torrance, San Miguel, Guadalupe, De Baca and Quay counties of New Mexico.

We have enclosed a current list of federally-endangered, threatened, candidate species, and species of concern that may be found in the larger preferred alternative project area. Additional information about these species is available on the internet at, <http://nmnhp.unm.edu/bisonm/bisonm.cfm>, <http://nmrareplants.unm.edu>, and <http://ifw2es.fws.gov/endangeredspecies>. Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" any threatened, endangered, or proposed species, or critical habitat, and if necessary, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be done during the appropriate flowering or breeding season to evaluate any possible project-related impacts.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We are required to monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Under Executive Order 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under Section 404 of the Clean Water Act if your proposed action could impact wetlands. These habitats should be conserved through avoidance or mitigation should occur to ensure no net loss of wetlands functions and values.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and if necessary, avoided until nesting is complete.

Please keep in mind that the scope of federally-listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect and cumulative effects.

We have three broad concerns with chaff and flare use based on recent documents such as the Air Force 1997 report on environmental effects of chaff and flares, the General Accounting Office 1998 report on management issues related to chaff and the 1999 Navy select panel report on environmental effects of chaff. First, if there will be significant increases in the amounts of chaff used in training as compared to use in the recent past and/or the use of degradable chaff then the Environmental Assessment (EA) should analyze these effects. These were identified in the Navy report as issues requiring further consideration of environmental impact. The EA should detail the amount of chaff being proposed for use under the three alternatives and how the use compares with Melrose Range and other areas using chaff in training exercises in the West, e.g., Fallon Naval Air Station and Nellis Air Force Range Complex. The extent of break-up and abrasion of chaff and the resulting shapes, resuspension and fate of chaff particles should also be analyzed. The Navy report recommended further research on these topics and we are interested in any results of such research.

Second, we see a need to analyze potential impacts to highly sensitive, confined aquatic habitats that support threatened and endangered species or migratory birds in areas underlying airspace proposed for chaff use. This issue was identified in the 1997 Air Force report. Lastly, the potential risk of wildfire from flare-induced ignitions, along with possible impacts to existing vegetation, plant species composition, and current wildlife habitat should be assessed in the EA. We are interested in the effects analysis of contingency plans should wildlife occur during a proposed training exercise.

If you have any questions regarding this information, please contact Maureen Murphy at the letterhead address or at (505) 346-2525, ext. 115.

Sincerely,

Joy E. Nicholopoulos

Joy E. Nicholopoulos
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Rev: August, 2000

FEDERALLY LISTED and CANDIDATE PLANT and ANIMAL SPECIES and SPECIES OF CONCERN -- COUNTY LIST FOR NEW MEXICO

(specific to Cannon Air Force Base Defense Training Initiative Proposal, March 2001)

Mammals

ENDANGERED

Black-footed ferret, Mustela nigripes
statewide *except* Hidalgo, Luna, Doña Ana

CANDIDATE SPECIES

Swift fox, Vulpes velox
Chaves, Colfax, Curry, De Baca, Eddy, Guadalupe, Harding, Lea, Mora, Quay, Roosevelt, San Miguel, Union

Black-tailed prairie dog, Cynomys ludovicianus
Chaves, Colfax, Curry, De Baca, Eddy, Guadalupe, Harding, Hidalgo (introduced), Lea, Lincoln, Mora, Otero, Quay, Roosevelt, San Miguel, Sierra (introduced), Socorro, Torrance, Union

SPECIES OF CONCERN

Cave myotis, Myotis velifer
Catron, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero

Desert pocket gopher, Geomys bursarius arenarius
Chaves, Doña Ana, Luna, Otero, Socorro

Fringed myotis, Myotis thysanodes
Bernalillo, Catron, Chaves, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Luna, McKinley, Mora, Otero, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia

Gray-footed chipmunk, Tamias canipes
Eddy, Lincoln, Otero

Long-eared myotis, Myotis evotis
Catron, Chaves, Cibola, Colfax, McKinley, Rio Arriba, Sandoval, San Juan, San Miguel, Sierra, Socorro, Taos, Valencia

New Mexican meadow jumping mouse, Zapus hudsonius luteus
Bernalillo, Colfax, Lincoln, Los Alamos, Mora, Otero, Rio Arriba, San Miguel, Sandoval, Santa Fe, Socorro, Taos, Valencia

Occult little brown bat, Myotis lucifugus occultus
Bernalillo, Catron, Chaves, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, San Juan, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

Organ Mountains Colorado chipmunk, Eutamias quadrivittatus australis
Doña Ana, Lincoln, Sierra, Socorro

Townsend's big-eared bat, Corynorhinus townsendii
Bernalillo, Catron, Chaves, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Luna, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union

Western red bat, Lasiurus blossevillii
Catron, Chaves, Doña Ana, Eddy, Hidalgo, Roosevelt

Pecos River muskrat, Ondatra zibethicus ripensis
Bernalillo, Chaves, Doña Ana, Eddy, Guadalupe, Lincoln, San Miguel, Socorro, Valencia

Spotted bat, Euderma maculatum
Bernalillo, Catron, Cibola, Doña Ana, Grant, Guadalupe, Hidalgo, Los Alamos, Luna, McKinley, Mora, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

Birds

ENDANGERED

Interior least tern, Sterna antillarum
Catron, Chaves, DeBaca, Doña Ana, Eddy, Otero, Rio Arriba, Socorro

Northern aplomado falcon, Falco femoralis septentrionalis
Chaves, Doña Ana, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero, Sierra, Socorro

Southwestern willow flycatcher, Empidonax traillii extimus (with critical habitat only in Catron, Grant, and Hidalgo counties) Bernalillo, Catron, Cibola, Colfax, Doña Ana, Grant, Guadalupe, Hidalgo, Los Alamos, Luna, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Valencia

THREATENED

Bald eagle, Haliaeetus leucocephalus
statewide

Mexican spotted owl, Strix occidentalis lucida (with proposed critical habitat except Doña Ana and Eddy counties) Bernalillo, Catron, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

NONESSENTIAL EXPERIMENTAL

Whooping crane, Grus americana
Bernalillo, Doña Ana, Grant, Los Alamos, Luna, Rio Arriba, Roosevelt, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union, Valencia

CANDIDATE SPECIES

Lesser prairie chicken, Tympanuchus pallidicinctus
Chaves, Curry, De Baca, Eddy, Guadalupe, Harding, Lea, Quay, Roosevelt, Union.

PROPOSED THREATENED

Mountain plover, Charadrius montanus
Bernalillo, Catron, Chaves, Cibola, Colfax, De Baca, Guadalupe, Harding, Hidalgo, Lincoln, Luna, McKinley, Mora, Otero, Quay, Sandoval, San Juan, San Miguel, Santa Fe, Socorro, Taos, Torrance, Union, Valencia

SPECIES OF CONCERN

American peregrine falcon, Falco peregrinus anatum
statewide
Arctic peregrine falcon, Falco peregrinus tundrius
statewide in migration
Baird's sparrow, Ammodramus bairdii
Bernalillo, Catron, Chaves, Colfax, Curry, De Baca, Doña Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Luna, Mora, Otero, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia
Black tern, Chlidonias niger
Bernalillo, Chaves, Doña Ana, Eddy, McKinley, Otero, Quay, Rio Arriba, San Juan, San Miguel, Sierra, Socorro, Torrance
Ferruginous hawk, Buteo regalis
statewide
Loggerhead shrike, Lanius ludovicianus
statewide
Northern goshawk, Accipiter gentilis
Bernalillo, Catron, Chaves, Cibola, Colfax, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia
Western burrowing owl, Athene cunicularia hypugaea
Bernalillo, Catron, Chaves, Cibola, Colfax, Curry, De Baca, Doña Ana, Eddy, Harding, Hidalgo, Lea, Luna, McKinley, Mora, Otero, Quay, Roosevelt, Sandoval, San Juan, San Miguel, Sierra, Union, Valencia
White-faced ibis, Plegadis chihi
Bernalillo, Chaves, Colfax, De Baca, Doña Ana, Eddy, Guadalupe, Harding, Los Alamos, McKinley, Mora, Otero, Quay, Rio Arriba, San Juan, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union, Valencia
Yellow-billed cuckoo, Coccyzus americanus
statewide

Reptiles

SPECIES OF CONCERN

Sand dune lizard, Sceloporus arenicolus
Chaves, Eddy, Lea, Roosevelt
Texas horned lizard, Phrynosoma cornutum

Bernalillo, Chaves, Cibola, Colfax, Curry, De Baca, Doña Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Luna, Mora, Otero, Quay, Roosevelt, San Miguel, Santa Fe, Sierra, Socorro, Torrance, Union

Amphibians

SPECIES OF CONCERN

Sacramento mountain salamander, Aneides hardii
Lincoln, Otero

Fish

ENDANGERED

Pecos gambusia, Gambusia nobilis
Chaves, Eddy

THREATENED

Pecos bluntnose shiner, Notropis simus pecosensis (with critical habitat)
Chaves, De Baca, Eddy
Arkansas River shiner, Notropis girardi (native population only)
Colfax, Harding, Mora, Quay, San Miguel, Union

SPECIES OF CONCERN

Arkansas River speckled chub, Macrhyobopsis aestivalis tetranemus
Quay
Flathead chub, Platygobio (=Hybopsis) gracilis
Bernalillo, Colfax, DeBaca, Guadalupe, Harding, Los Alamos, Mora, Quay, Rio Arriba, Sandoval, San Miguel, Santa Fe, Socorro, Taos, Union, Valencia
Headwater catfish, Ictalurus lupus
Chaves, DeBaca, Eddy
Longfin dace, Agosia chrysogaster
Catron, Grant, Hidalgo, Lincoln*, Luna, Sierra*, Socorro*
Pecos pupfish, Cyprinodon pecosensis
Chaves, Eddy
Plains minnow, Hybognathus placitus
Chaves*, Colfax, DeBaca*, Eddy*, Guadalupe*, Harding, Quay, San Miguel, Union
Rio Grande shiner, Notropis jemezanus
Chaves, De Baca, Eddy, Guadalupe
White Sands pupfish, Cyprinodon tularosa
Lincoln, Otero, Sierra

* = introduced populations

Invertebrates - Arthropods

SPECIES OF CONCERN

Albarufan dagger moth, Acronicta albarufa
unknown
Bonita diving beetle, Deronectes neomexicana
Lincoln
Desert viceroy butterfly, Limenitis archippus obsoleta
Doña Ana, Grant, Lincoln, Sierra, Socorro
Los Olmos tiger beetle, Cicindela nevadica olmosa
unknown
New Mexico silverspot butterfly, Speyeria nokomis nitocris
Catron, Cibola, Grant, Los Alamos, McKinley, Mora, Rio Arriba, Sandoval, San Juan, San Miguel, Taos
Noel's amphipod, Gammarus desperatus
Chaves
Sacramento Mountains blue butterfly, Icaricia icariodes new subspecies
Lincoln, Otero
Sacramento Mountains checkerspot butterfly, Euphydryas anicia cloudcrofti
Lincoln, Otero
Sacramento Mountains silverspot butterfly, Speyeria atlantis capitanensis
Lincoln, Otero

Invertebrates - Molluscs

CANDIDATE SPECIES

Koster's tryonia (springsnail), Tryonia kosteri
Chaves
Pecos assiminea snail, Assiminea pecos
Chaves
Roswell springsnail, Pyrgulopsis roswellensis
Chaves

Plants

ENDANGERED

Holy Ghost ipomopsis, Ipomopsis sancti-spiritus
San Miguel
Kuenzler hedgehog cactus, Echinocereus fendleri var. kuenzleri
Chaves, Eddy, Lincoln, Otero

THREATENED

Pecos sunflower, Helianthus paradoxus
Chaves, Cibola, Valencia, Guadalupe

SPECIES OF CONCERN

Chiricahua dock, Rumex orthoneurus
Catron, Mora, Otero, San Miguel, Santa Fe, Taos
Dwarf milkweed, Asclepias uncialis var. uncialis
Colfax, Grant, San Miguel, Union
Goodding's onion, Allium gooddingii
Catron, Lincoln, Otero, San Juan
Sandhill goosefoot, Chenopodium cycloides
Doña Ana, Roosevelt, Sierra, Socorro
Sierra Blanca cliffdaisy, Chaetopappa elegans
Lincoln, Otero
Wright's marsh thistle, Cirsium wrightii
Chaves, Guadalupe, Lincoln, Otero

Index

E	=	Endangered (in danger of extinction throughout all or a significant portion of its range).
PE	=	Proposed Endangered
PE w/CH	=	Proposed Endangered with critical habitat
T	=	Threatened (likely to become endangered within the foreseeable future throughout all or a significant portion of its range).
PT	=	Proposed Threatened
PT w/CH	=	Proposed Threatened with critical habitat
PCH	=	Proposed critical habitat
C	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
SC	=	Species of Concern (Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies). Species of Concern are included for planning purposes only.
S/A	=	Similarity of Appearance
*	=	Introduced population
†	=	May occur in this county from re-introductions in Colorado.
XN	=	Nonessential experimental
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (Cynomys gunnisoni) and/or 80-acres or

more for any subspecies of Black-tailed prairie dog (Cynomys ludovicianus). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.

*** = Extirpated in this county

CERTIFIED MAIL
P 757 488 704

Written Comment Sheet

Defensive Training Initiative Environmental Assessment (EA)
Cannon AFB, New Mexico

LINDA DeVINE
HQ ACC/CEVP
LANGLEY AFB, VA 23665-2769

Thank you for your input

DATE 09 APR 01

PLEASE PRINT A.S. ELLIOTT FOR GOTTOMITEE, LTD. DE BACA CO, NM

I ATTENDED THE CAFB EA PUBLIC SCOPING MEETING IN SANTA ROSA, NM, ON 04 APR 01. I, A.S. ELLIOTT, SUBMIT THE FOLLOWING COMMENTS AND CONCERNS:

1) WE, "IN THE SPARSELY POPULATED, PRIMARILY AGRICULTURAL PRODUCING AREA..." DO NOT NEED ANY MORE POTENTIAL FIRE DANGER FROM ACCIDENTAL OR FAULTY DEFENSIVE FLARES. I HELPED FIGHT A RANGE FIRE ON 17 FEB 00 THAT CONSUMED OVER 45,000 ACRES IN 5 HOURS.

2) WE, "... IN THE 'SAME' SPARSELY POPULATED... AREA..." DO NOT NEED ANY MORE MILITARY TRASH DEPOSITED UPON OUR PROPERTY IN TIME OF PEACE., I.E., THE CAPS FROM FLARE AND CHAFF CONTAINERS, AND THE CHAFF ITSELF. THIS IS KNOW AS LITTERING AND IS NOT ACCEPTABLE. WE'RE STILL FINDING 50 CAL BRASS FROM WWII ON S. TEXAS RANCH, AND 2- F-4 DROP TANKS.

I'VE EXPERIENCED 20+ YEARS OF AGREEMENTS, BROKEN AGREEMENTS, NSAs, EXPANDED NSAs, AND CONTINUOUS "ACCIDENTS", INDIFFERENCES, AND FAILURE TO IMPLEMENT EXPANDED NSA, DAMAGES, INCONVENIENCES, ETC ALL THE WHILE NOTIFYING USAF, ANG, AND OTHERS.

YES, ACCIDENTS WILL HAPPEN, BUT, CAN BE AVOIDED. TO PERFORM THESE DEFENSIVE AERIAL FUNCTIONS OVER PRIVATE LAND, SUCH AS OURS, IS NOT ACCEPTABLE.

THEREFORE, I, WE, ARE IN OPPOSITION TO THIS NEW PROCEDURE.

**** CONTINUE ON BACK FOR MORE SPACE ****

A.S. Elliott, INDIVIDUALLY, AND FOR GOTTOMITEE, LTD.

Please be advised that by including your name and address, you are agreeing to it being part of the EA public record.

NAME: A.S. ELLIOTT FOR GOTTOMITEE, LTD. LANDOWNER

ADDRESS: HCR 32, BOX 25

CITY: UVALDE, TX 78801-9700

STATE, ZIP CODE: TX 78801-9700

☑ Please check if you would like to receive a copy of the Draft EA

PLEASE HAND THIS FORM IN OR MAIL BEFORE MAY 10, 2001 TO:

ENCLOSED NOTE

HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769
Attn: Ms. Linda DeVine

MAIL BY MAY 10, 2001

STATE OF NEW MEXICO
OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION
LA VILLA RIVERA BUILDING
228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87501
(505) 827-6320

GARY E. JOHNSON
Governor

Ms Linda DeVine, EIAP Project Manager
Department of the Air Force, Headquarters Air Combat Command

HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

2 May 2001

RE: Defense Training Initiative (DTI) for Cannon Air Force Base (AFB), New Mexico

Dear Ms. DeVine:

I am writing in response to a description of the draft Environmental Assessment for the DTI, received in this office on 19 March 2001. The letter from Alton Chavis of the Environmental Analysis Branch identified you as the point of contact for comments.

Chavis' letter requested information about cultural resources that may be present in the area of potential effect (APE) for the undertaking, and identified an area of approximately 10,125 square miles that encompasses acreage in Torrance, Guadalupe, Quay, Curry, Chaves, and Lincoln counties, New Mexico. Undoubtedly, historic properties—which, in the language of the National Historic Preservation Act could consists of archaeological sites as well as historic structures—that may be eligible to, or listed on, the National Register of Historic Places are located in such a large APE. Conducting the research necessary to determine where inventory survey for historic properties has been completed, or may need to be performed for this undertaking, is beyond the scope of the services that can be provided by this office.

I recommend that you engage the services of a professional archaeologist in order to organize the cultural resources information and assist you in determining whether additional inventory may be needed. A list of permitted archaeologists and archaeological firms do perform work in New Mexico is available from this office upon request or can be downloaded from our web site http://museums.state.nm.us/hpd/; a copy is enclosed. Federal agencies with which you are working in New Mexico, including Cannon AFB, could also provide assistance in securing the services of a qualified professional. The results of this research could be presented to this office in the form of a report, or folded into the EA document as a chapter or an appendix. Whatever form the results are presented in, the historic properties data must be presented to this office for review and consultation regarding any historic located in the APE and any effects of the

proposed project upon them. The results, whether in the form of an EA or a separate report, should be accompanied by a cover letter from your office requesting a formal determination of effect for the undertaking.

The letter from Chavis described tribal consultation activities that are already underway. I suggest that you include documentation of your tribal consultation, and the results, as an appendix in the EA document or cultural resources report that you submit to this office when you are ready to request a determination of effect for the undertaking.

Along with a copy of the state permittee list, I am enclosing a copy of an information sheet that describes in more detail the kinds of data needed by this office for review as per Section 106 of the NHPA. Much of this information you have undoubtedly already planned to incorporate into the EA, but in order to expedite review by this office when you initiate the formal consultation for determination of effect, it would be most helpful if the cultural resources component were to be complete and presented in a format similar to the standards normally used for cultural resources reporting.

If you have any questions regarding these comments, please call me at (505) 827-6315.

Sincerely,

Elizabeth A. Oster
Staff Archaeologist
Log: 61815

STATE OF NEW MEXICO
OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION
LA VILLA RIVERA BUILDING
228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87501
(505) 827-6320

GARY E. JOHNSON
Governor

Standard Information Needed for Section 106 Consultation

- Detailed description of the proposed project, including related activities to be carried out in conjunction with the project *and* the land status of real property in the area of effect. This description should explain the scope of work. Preliminary drawings or plans of the project design on USGS and/or other appropriate map should be included.
- Descriptions of the size of the project area, terrain, and present land uses of the project and adjacent land. Current photographs (originals) of the land to be used for the proposed project are helpful. Any additional information on kind and degree of prior or existing surface disturbance should also be included.
- A portion of the **U.S. Geological Survey 7.5 quadrangle map** with the project area clearly marked on it. The **name of the quadrangle**, and the **Township, Range, and Section** of the project area must be included with the map (or displayed on it). A legible photocopy of the portion of the quad in which the project area appears is fine, as long as the name of the quad and the other locational information are provided with the map.
- A *written* description of the proposed boundaries of the project's Area of Potential Effects (APE). This should also be marked on the map, if the APE does not coincide with the project area (if, for example, effects extend beyond the area of ground disturbance).
- A detailed description of efforts that are being made or on-going in order to identify and evaluate properties (including historic structures and archaeological sites) in the APE that are listed on or eligible to the National Register of Historic Places (and the NM State Register of Cultural Properties). Results from these efforts must be provided to this office before a determination of effect can be made. Any archaeological sites, historic buildings, or other cultural resources identified in the general area must be noted.
- A description of efforts to identify whether Native American tribes, that may be culturally affiliated with traditional cultural properties or other kinds of sites within the APE, have any concerns related to the proposed undertaking.
- Identification of the funding source: federal, state, state trust, private, a combination?

For historic building rehabilitation, accessibility improvements, demolition, or construction also include:

- Approximate construction dates for buildings or structures in the Area of Potential Effect.
- Current photographs (originals) of any building(s) or structure(s) to be affected by the project. Overall exterior photos are sufficient. Photos need to be clear enough for HPD staff to evaluate the historic integrity of the building(s).
- Project location clearly marked on a street map within a municipality, or, if it will occur in a rural location, the USGS quadrangle map as described above.
- Preliminary drawings or plans of the project design on topo and/or street map as appropriate.

Allow 30 days for HPD review as per 36 CFR 800.3(c)(4), 800.4(d)(1), 800.5(c), and 800.11

Useful information, including lists of cultural properties on the national and state registers, can be obtained from our web site: http://museums.state.nm.us/hpd/

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GARY E. JOHNSON
Governor

How to Compile the Requested Information

The locational information is requested to help us determine whether any previous archaeological survey or historic structure documentation has been conducted in the APE. Commonly, agencies and organizations preparing for an undertaking of this nature contact environmental or cultural resources consulting firms to determine the status of cultural property inventory in a given APE, complete an archaeological and/or historic structure survey if none has been performed, and assist an agency in deciding which, if any, Native American tribes should be consulted. A list of permitted archaeologists and archaeological firms is available from this office upon request or can be downloaded from our web site (http://museums.state.nm.us/hpd/). The cultural resources specialist will write a report of the survey results and recommendations and submit it to your office. Please send us the report for review and consultation regarding any historic properties that might be found during the survey and any effects of the proposed project upon them. The report should be accompanied by a cover letter requesting a formal determination of effect for the undertaking.

Please note that, pursuant to the revised 36 CFR 800 guidelines issued by the Advisory Council for Historic Preservation, Native American tribes that may be culturally affiliated with traditional cultural properties (and other historic properties) in the area of effect must be consulted prior to the beginning of project work This is true even if the area of effect does not lie within the boundaries of an Indian Reservation; neighboring tribes may have concerns. In order to accomplish this consultation it is not necessary to contact every tribe in New Mexico, but you must make a good faith effort to identify tribes that may have issues in the area of effect and ensure that they are consulted. Some tribes may not wish to provide sensitive information to a consulting firm or local government agency. In these cases, tribes may wish to request that the federal agency be involved, or they may contact our office directly with their concerns. If you need further information about how such consultation should proceed, please contact this office. Staff at the federal offices that are helping you complete your funding application can also provide guidance and assistance regarding tribal consultation. The federal agency that you are working with can also provide the letter that authorizes you to initiate the consultation.

2001 Archaeological Survey Permit Holders

Organization	Name		Address	City	State	Zip	Phone	e-mail
Alpine Archaeological Consultants	Susan M.	Chandler	P.O. Box 2075	Montrose	CO	81402	(303) 249-6761	alpine@alpinearchaeology.com
AMEC Earth & Environmental, Inc.	Allan	Schilz	6400 Uptown Blvd. NE, Suite 340-W	Albuquerque	NM	87110	(505) 881-9228	allan.schilz@amec.com
American Studies Foundation	T.G.	Futch	P.O. Box 489	Alcalde	NM	87511	(505) 689-9709	tgfutch@worldnet.att.net
Arboles Contract Archaeology	John M.	Kershner	P.O. Box 5464	Farmington	NM	87499	(505) 325-6474	
Archaeological & Historical Research Institute	Jeanne	Schutt	P.O. Box 1108	Corrales	NM	87048	(505) 898-5141	jschutt@unm.edu
Archaeological Resource Service	Zofia	Sliwinski	P.O. Box 849	Cuba	NM	87013	(505) 289-3491	cuba_ems@yahoo.com
Archaeological Services by Laura Michalik	Laura	Michalik	P.O. Box 8262	Las Cruces	NM	88006	(505) 382-0247	
Archaeological Survey Consultants	James V.	Sciscenti	P.O. Box 2285	Roswell	NM	88202	(505) 623-5012	
Aztlan Archaeology Inc.	Laurie V.	Slawson	P.O. Box 44068	Tucson	AZ	85733	(520) 620-1480	aztlan@aztlan.com
Caprock Archaeological Services	Thoras R.	Dye	2706 W. Pinelodge Rd.	Roswell	NM	88201	(505) 828-1783	trdye66@hotmail.com
Centennial Archaeology, Inc.	Christian J.	Zier	300 E. Boardwalk, #4-C	Ft. Collins	CO	80525	(970) 225-6575	cenarch@worldnett.att.net
Cibola Research Consultants	Michael P.	Marshall	P.O. Box 743	Corrales	NM	87048	(505) 522-4328	cibolaresearch@SWCP.com
Complete Archaeological Service Associates	Dr. Laurens	Hammack	12400 Highway 666	Cortez	CO	81321	(303) 565-9229	casa@fone.net
Cross-Cultural Research Systems	David H.	Snow	P.O. Box 6122	Santa Fe	NM	87502	(505) 471-3038	
CSWTA, Inc.	Carol S.	Yazzie-Ward	P.O. Box 790	Tuba City	AZ	86045	(520) 283-4323	
Cultural Resource Management Consultants, Inc.	Kathleen C.	Reid	510 N. Behrend	Farmington	NM	87401	(505) 327-5901	crmc1@CyberPort.com
Cultural Resources Management Program	Meredith H.	Matthews	San Juan College, 4601 College Blvd.	Farmington	NM	87402	(505) 566-3344	
Division of Conservation Archaeology	Larry L.	Baker	P.O. Box 125	Bloomfield	NM	87413	(505) 632-2779	dca@outerbounds.net
Don Clifton	Don	Clifton	P.O. Box 30	Pep	NM	88126	(505) 675-2360	donc@yucca.net
Dos Rios Consultants, Inc.	Dr. Neal W.	Ackerly	P.O. Box 1247	Silver City	NM	88062	(505) 388-8980	nackerly@zianet.com

Organization	Name		Address	City	State	Zip	Phone	e-mail
Earth Analytic, Inc.	Wetherbee	Dorshow	15 Palacio Rd.	Santa Fe	NM	87505	(505) 466-3123	wdorshow@earthanalytic.com
Ecosystem Management, Inc.	Dr. Kennet	Brown	4004 Carlisle Blvd. NE, Suite C-1	Albuquerque	NM	87107	(505) 884-8300	ecosys3@nmia.com
Escondida Research Group	Dr. Robert	Dello-Russo	P.O. Box 1124	Socorro	NM	87801	(505) 838-4230	dellorus@nmt.edu
Feliz Colibri Archaeological Contract Services	Thomas H.	McGraw	7 Cerrado Rd.	Santa Fe	NM	87505	(505) 466-0668	THMcgraw@aol.com
Four Corners Anthropological Research	Roger	Moore	P.O. Box 1156	Aztec	NM	87410	(505) 334-1678	
Four Corners Research, Inc.	Dawn	Greenwald	P.O. Box 1265	Tularosa	NM	88352	(505)585-5566	dawng@zianet.com
Geo-Marine, Inc.	Mark	Slaughter	150A North Festival Drive	El Paso	TX	79912	(915) 585-0168	mslaughter@geo-marine.com
Historic Preservation Division	Jan V.	Biella	228 E. Palace Ave.	Santa Fe	NM	87501	(505) 827-4045	jbiella@oca.state.nm.us
Human Systems Research	Deborah M.	Dennis	P.O. Box 728	Las Cruces	NM	88004	(505) 524-9456	hsrinc@zianet.com
Independent Contract Archaeology	Ann S.	Chavez	P.O. Box 273	La Plata	NM	87418	(505) 326-7305	icarus@cyberport.com
James A. Quaranta	James A.	Quaranta	737 Don Diego Ave., Apt. D	Santa Fe	NM	87501	(505) 988-9124	James_Quaranta@msn.com
La Plata Archaeological Consultants	Steven L.	Fuller	26851 County Road P	Dolores	CO	81323	(970) 565-8708	laplata1@compuserve.com
Lone Mountain Archaeological Services, Inc.	Dr. Deni J.	Seymour	2625 Pennsylvania NE, Suite 2000	Albuquerque	NM	87110	(505) 881-0011	lonemtn94@aol.com
Louis Berger Group, Inc.	John W.	Hohmann	810 San Mateo, Suite 200A	Santa Fe	NM	87505	(505) 989-7788	Jhohmann@Louisberger.com
Meade Kemrer Archaeological Consulting	Dr. Meade	Kemrer	3112 Missouri Avenue	Las Cruces	NM	88011	(505) 522-7614	mkemrer@zianet.com
Mesa Field Services	Sean M.	Simpson	P.O. Box 3072	Carlsbad	NM	88221	(505) 628-8885	MFS@zianet.com
Moore Anthropological Research	Roger A.	Moore	P.O. Box 1156	Aztec	NM	87410	(505) 334-6675	mar@outerbounds.net
Muukui-CI, Cultural & Environmental Services	Douglas	Loebig	103 West Chaco	Aztec	NM	87410	(505) 334-6748	bkbradley@fisi.net
Navajo Nation Archaeology Dept.	Dr. Anthon	Klesert	P.O. Box 689	Window Rock	AZ	86515	(520) 871-6540	Tlkesert@juno.com
New Mexico State Land Office	David C.	Eck	P.O. Box 1148	Santa Fe	NM	87504	(505) 827-5857	deck@slo.state.nm.us
New Mexico State Parks	Christy S.	Comer	1220 S. St. Francis Drive	Santa Fe	NM	87505	(505) 476-3385	Ccomer@state.nm.us
NM Mining and Minerals Division	Lloyd A.	Moiola	1220 S. St. Francis Drive	Santa Fe	NM	87505	(505) 827-1179	lmoiola@state.nm.us
NM State Highway & Transportation Department	Craig	Conley	P.O. Box 1149	Santa Fe	NM	87504		

Organization	Name		Address	City	State	Zip	Phone	e-mail
Northern Research Group, Inc.	Susan	Swan	P.O. Box 2582	Las Vegas	NM	87701	(505) 454-9779	nrginc@zialink.com
OCA, University of New Mexico	Dr. Richard	Chapman	1717 Lomas Blvd. NE	Albuquerque	NM	87131	(505) 277-5853	chapman@unm.edu
Office of Archaeological Studies	Timothy D.	Maxwell	P.O. Box 2087	Santa Fe	NM	87504	(505) 827-6343	tmaxwell@oas.state.nm.us
Parsons-Brinckerhoff	Kirsten J.	Campbell	5801 Osuna Rd. NE, Suite 200	Albuquerque	NM	87109	(505) 881-5357	campbellki@pbworld.com
Pecos Archaeological Consultants	Robert J.	Martin	P.O. Box 1771	Carlsbad	NM	88221	(505)887-7029	
Quivira Research Center/Associates	Carol J.	Condie	1809 Notre Dame NE	Albuquerque	NM	87106	(505) 255-9264	cjcondie@aol.com
Rare Earth Studies	James	Gallison	1114 11th Street NW	Albuquerque	NM	87104	(505) 244-3351	hudouc@go.com
RDM Associates	Robert	McCracken	3930 S. Swenson St., Suite 810	Las Vegas	NV	89119	(702) 735-4988	
Southern New Mexico Archaeological Services, Inc	Joe Ben	Sanders	P.O. Box 1	Bent	NM	88314	(505) 671-4797	snmasinc@zianet.com
Southwest Archaeological Consultants	Cherie	Scheick	P.O. Box 8617	Santa Fe	NM	87504	(505) 984-1151	
Statistical Research, Inc.	Jeffrey	Altschul	P.O. Box 31865	Tucson	AZ	85712	(520) 721-4309	jhaltschul@scricrm.com
Steven A. Koczan	Steven A.	Koczan	P.O. Box 23417	Santa Fe	NM	87502	(505) 471-4978	sako1@worldnet.att.net
SWCA, Inc. Environmental Consultants	David A.	Phillips	8100 Mountain Rd. NE, Suite 109	Albuquerque	NM	87110	(505) 254-1115	dphillips@swca.com
Tamarch CRM Services	Tamara J.	Stewart	2891 State Rd. 14	Madrid	NM	87010	(505) 471-8888	zap23@earthlink.com
Taschek Environmental Consulting	Camille	Sayer	8901 Adams St. NE, Suite D	Albuquerque	NM	87113	(505) 821-4700	tascheck@aol.com
Tetra Tech NUS, Inc.	Kathy	Roxlau	2300 Buena Vista SE, Suite 110	Albuquerque	NM	87106	(505) 247-4933	roxlauk@ttnus.com
Thomas I. McIntosh	Thomas Irvi	McIntosh	P.O. Box 3275	Santa Fe	NM	87501	(505) 455-3099	jeraii@aol.com
Tierra Engineering	Rebecca S.	Proctor	1825 Market Center Blvd., Suite 510	Dallas	TX	75207	(214) 741-7777	rprocter@wendylopez.com
Townsend Archaeological Consultants	Stephen	Townsend	P.O. Box 2501	Las Vegas	NM	87701	(505) 425-5561	tactown@yahoo.com
TRC, Mariah Associates, Inc.	John	Acklen	4221-B Balloon Park Road NE	Albuquerque	NM	87109	(505) 828-2990	
URS Corporation, a Nevada Corporation	Dr. A.E.	Rogge	7720 N. 16th Street, Suite 100	Phoenix	AZ	85020	(602) 861-7414	gene_rogge@urscorp.com
Western Archaeological Services	Patrick	Harden	22491 Road D6	Cortez	CO	81321	(970) 564-9278	harden@frontier.net
Western Cultural Resource Management, Inc.	Dr. Thomas	Lennon	7765 Durham Circle	Boulder	CO	80301	(303) 449-1151	WCRM@ix.netcom.com

Organization	Name		Address	City	State	Zip	Phone	e-mail
Woods Canyon Archaeological Cons., Inc.	Linda	Honeycutt	P.O. Box 253	Yellow Jacket	CO	81335	(970) 562-4884	jerry@fone.net
Zia Archaeology	Stephen	Post	3924 Old Santa Fe Trail	Santa Fe	NM	87505	(505) 820-7785	post-flynn@prodigy.net
Zuni Cultural Resource Enterprise	Jonathan	Damp	P.O. Box 1149	Zuni	NM	87327	(505) 782-4814	zcre@nm.net/zcrelab@nm.net

2001 Human Burial Excavation Permit Holders

Organization	Name		Address	City	State	Zip	Phone	e-mail
Alpine Archaeological Consultants	Susan M.	Chandler	P.O. Box 2075	Montrose	CO	81402	(303) 249-676	alpine@alpinearchaeology.com
AMEC Earth & Environmental, Inc.	Allan	Schilz	6400 Uptown Blvd. NE, Suite 340-W	Albuquerque	NM	87110	(505) 881-922	allan.schilz@amec.com
American Museum of Natural History	David Hurst	Thomas	Central Park West at 79th Street	New York	NY	10024	(212) 769-589	thomasd@amnh.org
Arboles Contract Archaeology	John M.	Kershner	P.O. Box 5464	Farmington	NM	87499	(505) 325-647	
Archaeological & Historical Research Institute	Jeanne	Schutt	P.O. Box 1108	Corrales	NM	87048	(505) 898-514	jschutt@unm.edu
Archaeological Resource Service	Zofia	Sliwinski	P.O. Box 849	Cuba	NM	87013	(505) 289-349	cuba_ems@yahoo.com
Arizona State University	Michelle	Hegmon	Department of Anthropology	Tempe	NM	85287	(480) 965-621	mnelson@asu.edu
Aztlan Archaeology Inc.	Laurie V.	Slawson	P.O. Box 44068	Tucson	AZ	85733	(520) 620-148	aztlan@aztlan.com
Bradley F. Bowman	Bradley	Bowman	P.O. Box 582	Cedar Crest	NM	87008	(505) 281-200	debswe@earthlink.net
Cibola Research Consultants	Michael P.	Marshall	P.O. Box 743	Corrales	NM	87048	(505) 522-432	cibolaresearch@SWCP.com
Complete Archaeological Service Associates	Dr. Laurens C.	Hammack	12400 Highway 666	Cortez	CO	81321	(303) 565-922	casa@fone.net
Cross-Cultural Research Systems	David H.	Snow	P.O. Box 6122	Santa Fe	NM	87502	(505) 471-303	
Cultural Resource Management Consultants, Inc.	Kathleen C.	Reid	510 N. Behrend	Farmington	NM	87401	(505) 327-590	crmc1@CyberPort.com
Cultural Resources Management Program	Meredith H.	Matthews	San Juan College, 4601 College Blvd.	Farmington	NM	87402	(505) 566-334	
Division of Conservation Archaeology	Larry L.	Baker	P.O. Box 125	Bloomfield	NM	87413	(505) 632-277	dca@outerbounds.net
Don Clifton	Don	Clifton	P.O. Box 30	Pep	NM	88126	(505) 675-236	donc@yucca.net
Dos Rios Consultants, Inc.	Dr. Neal W.	Ackerly	P.O. Box 1247	Silver City	NM	88062	(505) 388-898	nackerly@zianet.com
Ecosystem Management, Inc.	Dr. Kenneth	Brown	4004 Carlisle Blvd. NE, Suite C-1	Albuquerque	NM	87107	(505) 884-830	ecosys3@nmia.com
Escondida Research Group	Dr. Robert	Dello-Russ	P.O. Box 1124	Socorro	NM	87801	(505) 838-423	dellorus@nmt.edu
Four Corners Anthropological Research	Roger	Moore	P.O. Box 1156	Aztec	NM	87410	(505) 334-167	

Organization	Name		Address	City	State	Zip	Phone	e-mail
Geo-Marine, Inc.	Mark	Slaughter	150A North Festival Drive	El Paso	TX	79912	(915) 585-016	mslaughter@geo-marine.com
Historic Preservation Division	Jan V.	Biella	228 E. Palace Ave.	Santa Fe	NM	87501	(505) 827-404	jbiella@oca.state.nm.us
Human Systems Research	Deborah M.	Dennis	P.O. Box 728	Las Cruces	NM	88004	(505) 524-945	hsrinc@zianet.com
La Plata Archaeological Consultants	Steven L.	Fuller	26851 County Road P	Dolores	CO	81323	(970) 565-870	laplata1@compuserve.com
Lone Mountain Archaeological Services, Inc.	Dr. Deni J.	Seymour	2625 Pennsylvania NE, Suite 2000	Albuquerque	NM	87110	(505) 881-001	lonemtn94@aol.com
Louis Berger Group, Inc.	John W.	Hohmann	810 San Mateo, Suite 200A	Santa Fe	NM	87505	(505) 989-778	Jhohmann@Louisberger.com
Moore Anthropological Research	Roger A.	Moore	P.O. Box 1156	Aztec	NM	87410	(505) 334-667	mar@outerbounds.net
Muukui-Cl, Cultural & Environmental Services	Douglas	Loebig	103 West Chaco	Aztec	NM	87410	(505) 334-674	bkbradley@fisi.net
Navajo Nation Archaeology Dept.	Dr. Anthony L	Klesert	P.O. Box 689	Window Rock	AZ	86515	(520) 871-654	Tlkesert@juno.com
New Mexico State Land Office	David C.	Eck	P.O. Box 1148	Santa Fe	NM	87504	(505) 827-585	deck@slo.state.nm.us
New Mexico State Parks	Christy S.	Comer	1220 S. St. Francis Drive	Santa Fe	NM	87505	(505) 476-338	Ccomer@state.nm.us
Northern Research Group, Inc.	Susan	Swan	P.O. Box 2582	Las Vegas	NM	87701	(505) 454-977	nrginc@zialink.com
OCA, University of New Mexico	Dr. Richard	Chapman	1717 Lomas Blvd. NE	Albuquerque	NM	87131	(505) 277-585	chapman@unm.edu
Office of Archaeological Studies	Timothy D.	Maxwell	P.O. Box 2087	Santa Fe	NM	87504	(505) 827-634	tmaxwell@oas.state.nm.us
Parsons-Brinckerhoff	Kirsten J.	Campbell	5801 Osuna Rd. NE, Suite 200	Albuquerque	NM	87109	(505) 881-535	campbellki@pbworld.com
Pecos Archaeological Consultants	Robert J.	Martin	P.O. Box 1771	Carlsbad	NM	88221	(505)887-702	
Quivira Research Center/Associates	Carol J.	Condie	1809 Notre Dame NE	Albuquerque	NM	87106	(505) 255-926	cjcondie@aol.com
Rare Earth Studies	James	Gallison	1114 11th Street NW	Albuquerque	NM	87104	(505) 244-335	hudouc@go.com
Southern Methodist University	Michael A.	Adler	Department of Anthropology	Dallas	TX	75275	(214) 768-294	madler@mail.smu.edu
Southwest Archaeological Consultants	Cherie	Scheick	P.O. Box 8617	Santa Fe	NM	87504	(505) 984-115	
SWCA, Inc. Environmental Consultants	David A.	Phillips	8100 Mountain Rd. NE, Suite 109	Albuquerque	NM	87110	(505) 254-111	dphillips@swca.com
Thomas I. McIntosh	Thomas Irvine	McIntosh	P.O. Box 3275	Santa Fe	NM	87501	(505) 455-309	jeraii@aol.com
Townsend Archaeological Consultants	Stephen	Townsend	P.O. Box 2501	Las Vegas	NM	87701	(505) 425-556	tactown@yahoo.com

Organization	Name		Address	City	State	Zip	Phone	e-mail
TRC, Mariah Associates, Inc.	John	Acklen	4221-B Balloon Park Road NE	Albuquerque	NM	87109	(505) 828-299	
University of New Mexico	Ann	Ramenofsk	Department of Anthropology	Albuqerque	NM			
University of Oklahoma	Don G.	Wyckoff	Department of Anthropology	Norman	OK	73019	(405) 325-056	xtrambler@ou.edu
URS Corporation, a Nevada Corporation	Dr. A.E.	Rogge	7720 N. 16th Street, Suite 100	Phoenix	AZ	85020	(602) 861-741	gene_rogge@urscorp.com
Western Archaeological Services	Patrick	Harden	22491 Road D6	Cortez	CO	81321	(970) 564-927	harden@frontier.net
Western Cultural Resource Management, Inc.	Dr. Thomas J.	Lennon	7765 Durham Circle	Boulder	CO	80301	(303) 449-115	WCRM@ix.netcom.com
Woods Canyon Archaeological Cons., Inc.	Linda	Honeycutt	P.O. Box 253	Yellow Jacket	CO	81335	(970) 562-488	jerry@fone.net
Zuni Cultural Resource Enterprise	Jonathan	Damp	P.O. Box 1149	Zuni	NM	87327	(505) 782-481	zcre@nm.net/zcrelab@nm.net

MESCALERO Apache TRIBE

Sara Misquez, President Mescalero, New Mexico 88340

Tribal Historic Preservation Office
P.O. Box 227
Mescalero, NM 88340
Phone: 505/464-4494 ext 279
Fax: 505/464-9191

HQ ACC/CEVP
Attention: Ms. Linda DeVine
129 Andrews St., Suite 102
Langley AFB, VA 23665-2769

(X) The ***Mescalero Apache Tribe*** has determined that the proposed action involving the use of chaff (aluminum-coated silica fibers) and flares **WILL NOT AFFECT** any objects, sites, or locations important to our traditional culture or religion.

( ) The ***Mescalero Apache Tribe*** has determined that the proposed _____ project by _____ **WILL AFFECT** objects, sites, or locations important to our traditional culture or religion. We request that the _____ undertake further consultations to evaluate the effects of the project on these sites.

Thank you for providing the Mescalero Apache Tribe the opportunity to comment on this project. We look forward to reviewing and commenting on future Department of the Air Force projects.

CONCUR:

Donna Stern-McFadden
Name

Donna Stern-McFadden
Signature

4/30/01
Date

Tribal Historic Preservation Officer
Title

COMMENTS:

_____

_____

_____

GARY E. JOHNSON
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT
AIR QUALITY BUREAU
2044 Galisteo
Santa Fe, New Mexico 87505
Telephone (505) 827-1494
Fax (505) 827-1543

PETER MAGGIORE
SECRETARY

PAUL R. RITZMA
DEPUTY SECRETARY

July 3, 2001

Ms. Linda DeVine
EIAP Project Manager
Department of the Air Force
HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, Virginia 23665-2769

Subject: Environmental Analysis, Defensive Training Initiative, Cannon AFB, New Mexico

Dear Ms. DeVine:

Please maintain us on the mailing list for commenting on the Environmental Assessment of the subject project.

Thank you.

Sincerely,

Rita Trujillo

Rita Trujillo
Program Manager
Control Strategy Section

Written Comment Sheet

Defensive Training Initiative Environmental Assessment (EA)

Cannon AFB, New Mexico

Thank you for your input

DATE 2 APR 01

PLEASE PRINT

The chaff to be released from aircraft as part of the proposed DTI contains Aluminum, copper, and Zinc. (Reference Table 3.2-1, p. 3-4 of the Environmental Effects

Aluminum dust, copper compounds, and Zinc compounds are all considered toxic substances by the U.S. E.P.A. They are regulated by CERCLA (see pg 3-11 of the above document). I believe that the New Mexico Environment Dept would consider these substances water contaminants.

Has this proposal been addressed to the NM Environment Dept? Will New Mexico require a permit to discharge these substances in surface water and soil.?

****** CONTINUE ON BACK FOR MORE SPACE ******

Please be advised that by including your name and address, you are agreeing to it being part of the EA public record.

NAME: Gene Smith

ADDRESS: 1517 U.S. Hwy 60-84, #33

CITY: Clovis, NM

STATE, ZIP CODE: NM, 88101

☒ **Please check if you would like to receive a copy of the Draft EA**

PLEASE HAND THIS FORM IN OR MAIL BEFORE MAY 10, 2001 TO:

HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769
Attn: Ms. Linda DeVine

APPENDIX D
RELEVANT STATUTES, REGULATIONS, AND GUIDELINES

RELEVANT STATUTES, REGULATIONS AND GUIDELINES

GENERAL

National Environmental Policy Act (NEPA) of 1969 (Public Law [PL] 91-190, 42 United States Code [USC] 4347, as amended). Requires federal agencies to take the environmental consequences of proposed actions into consideration in their decision-making process. The intent of NEPA is to protect, restore or enhance the environment through well informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process.

Air Force Instruction (AFI) 32-7061. Air Force implementation of the procedural provisions of NEPA and CEQ regulations.

AFPD 32-70, Environmental Quality. Requires that the Air Force comply with applicable federal, state, and local environmental laws and regulations, including NEPA. The implementing regulation for NEPA is AFI 32-7061, Environmental Impact Analysis Process. Executive Order (EO) 11514, Protection and Enhancement of Environmental Quality, as amended by EO 11991, sets policy directing the federal government in providing leadership in protecting and enhancing the environment.

Intergovernmental Coordination Act and EO 12372, Intergovernmental Review of Federal Programs, require federal agencies to cooperate with and consider state and local views in implementing a federal proposal. AFI 32-7061 requires the proponents to implement a process known as Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), which is used for the purpose of agency coordination and implements scoping requirements.

AIRSPACE

Federal Aviation Act of 1958. Created the Federal Aviation Administration (FAA) and charges the FAA Administrator with ensuring the safety of aircraft and the efficient utilization of the National Airspace System, within the jurisdiction of the United States.

Federal Aviation Regulation Part 71 (1975). Delineates the designation of federal airways, area low routes, controlled airspace, and navigational reporting points.

Federal Aviation Regulation Part 73 (1975). Defines special use airspace and prescribes the requirements for the use of that airspace.

Federal Aviation Regulation Part 91 (1990). Describes the rules governing the operation of aircraft within the United States.

FAA Handbook 7400.2C. Prescribes policy, criteria, and procedures applicable to rulemaking and non-rulemaking actions associated with airspace allocation and utilization, obstruction evaluation and marking airport airspace analyses, and the establishment of air navigation aids.

FAA Handbook 7110.65. Prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services in the United States.

NOISE

Executive Order (EO) 12088 Federal Compliance with Pollution Control Standards (1978). Requires the head of each executive agency to be responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution, including noise pollution, with respect to federal facilities and activities under the control of the agency.

Federal Interagency Committee on Urban Noise (1980). Defines noise levels for various land uses and may result in areas that will not qualify for federal mortgage insurance. Additional sections allow for noise attenuation measures that are often required for HUD approval.

SAFETY

AFI 32-2001 The Fire Protection Operations and Fire Prevention Program (1 April 1999). Defines the requirements for Air Force installation fire protection programs, including equipment, response times, and training.

AFI 32-3001 Explosive Ordnance Disposal Program (1 October 1999). Regulates and provides procedures for explosives safety and handling. Defines criteria for quantity distances, clear zones, and facilities associated with ordnance.

AFI 91-202 The US Air Force Mishap Prevention Program (1 August 1998). Establishes mishap prevention program requirements, assigns responsiblities for program elements, and contains program management information.

AFI 91-301, Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program implements AFPD 91-3, Occupational Safety and Health by outlining the AFOSH Program. The purpose of the AFOSH Program is to minimize loss of Air Force resources and to protect Air Force people from occupational deaths, injuries, or illnesses by managing risks.

Air Force Manual 91-201, Safety: Explosives Safety Standards establishes safety standards, provides planning guidance, and defines safety requirements for explosives operations of any kind (including testing, disassembling, modifying, storing, transporting, and handling explosives or ammunition) at Air Force facilities.

Department of Defense Flight Information Publication. Indicates locations of potential hazards (e.g., bird aggregations, obstructions, and noise sensitive locations under military airspace and defines horizontal and/or vertical avoidance measures. Updated monthly to present current conditions.

HAZARDOUS MATERIALS

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986. Provides liability and compensation for cleanup and emergency response from hazardous substances discharged into the environment and the cleanup of hazardous disposal sites.

Hazardous Materials Transportation Act (HTMA) of 1975 Title I Section 101. Establishes criteria for shippers and carriers that manage hazardous materials and includes training and qualifications of persons handling hazardous materials.

Resource Conservation and Recovery Act (RCRA) of 1976. Regulates the storage, transportation, treatment, and disposal of hazardous waste that could adversely affect the environment.

Solid Waste Disposal Act (SWDA) and Amendments of 1980. Amends RCRA with additional regulation of energy and materials conservation and the establishment of a National Advisory Council.

Hazardous and Solid Waste Amendments (HSWA) of 1984. Significantly expands the scope and requirements of RCRA and mandated underground storage tank (UST) regulations.

Toxic Substance Control Act (TSCA) of 1976. Principally regulates PCBs and ACM in schools.

Occupational Safety and Health Administration (OSHA) Asbestos Standard (29CFR 1926.58). Lists federal requirements during construction activities for handling and removal of asbestos from equipment and building structures. The chemical hazard communication program (29CFR 1910.120) requires the identification, information, and training on chemical hazards to be available to employees using hazardous materials and instituted material safety data sheets (MSDS) which provide this information.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended. Addresses the applications and disposal of pesticides and pesticide containers.

AFI 32-4002 Facility Hazardous Emergency Planning and Response (1 December 1997).

AFI 32-7005 Facility Environmental Protection Committee (25 February 1994).

AFI 32-7042 Hazardous Waste Management and Regulation (12 May 1994).

AFI 32-7080 Pollution Prevention Program (12 May 1994).

AFI 32-7086 Hazardous Material Management (1 August 1997).

NATURAL RESOURCES

Federal Water Pollution Control Act of 1948. Establishes procedures and programs for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's water's, thus protecting habitat conditions in aquatic and wetland ecosystems.

Clean Water Act of 1977 (33 USC 1251-1387). Requires a National Pollution Discharge Elimination System (NPDES) permit for all discharges into waters of the United States to reduce pollution that could affect any form of life. Section 404 of this act regulates development in streams and wetlands and requires a permit from the U.S. Army Corps of Engineers.

EO 19988 Floodplain Management (1977). Requires that governmental agencies, in carrying out their responsibilities, provide leadership and take action to restore and preserve the natural and beneficial values served by floodplains.

EO 11990 Protection of Wetlands (1977). Requires the governmental agencies, in carrying out their responsibilities, provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Factors to be considered include conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife.

North American Wetlands Conservation Act (16 USC 4401-4412). Supports the management and preservation of waterfowl by funding the implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the U.S., and Mexico.

Lacey Act of 1900 (16 USC 3371-13378). Brings the unlawful taking of fish, wildlife, and plants under federal jurisdiction by prohibiting specimens taken illegally from being shipped across state boundaries.

Migratory Bird Treaty Act of 1918 (16 USC 701-715s). Establishes protection for migratory birds and their parts (including eggs, nests, and feathers) from hunting, capture, or sale.

Fish and Wildlife Coordination Act of 1958 (16 USC 661-666c as amended). Provides for conservation and management of fish and wildlife by encouraging cooperation between the U.S. Fish and Wildlife Service and other federal, state, public, and private agencies.

Wilderness Act of 1964 (16 USC 1131). Directs the Secretary of the Interior to review every roadless area greater than or equal to 5,000 acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System. The act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on designated areas.

Fish and Wildlife Conservation Act of 1980 (16 USC 2901-2911 as amended). Promotes state programs, and authorizes funding for grants, aimed at developing and implementing comprehensive state non-game fish and wildlife management plans.

Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801). Requires federal agencies to consult with the National Marine Fisheries Service when activities may have adverse impacts on designated Essential Fish Habitat.

Bald Eagle Protection Act of 1940 (16 USC 668-668c). Protects Bald and Golden eagles by prohibiting the take, possession, or transportation of these species, dead or alive, and includes protection of their nests and eggs.

Endangered Species Act of 1973 (16 USC 1531-1544, as amended). Establishes measures for the conservation of plant and animal species listed, or proposed for listing, as threatened or endangered, including the protection of critical habitat necessary for their continued existence.

EO 12962 Recreational Fisheries (1995). Requires federal agencies to evaluate the effects of actions on aquatic systems and recreational fisheries and document these effects while promoting compatibility between the Endangered Species Act and recreational fisheries.

Clean Air Act (Title 40 CFR parts 50 and 51) amended in 1977 and 1990. Dictates the National Ambient Air Quality Standards (NAAQS) must be maintained nationwide. Delegates authority to state and local agencies to enforce the NAAQS and to establish air quality standards and regulations of their own. Section 169A states that a national goal is to prevent any further impairment of visibility within federally mandated Class I areas such as National Parks and Wilderness Areas from man-made sources of air pollution.

EO 12088 Federal Compliance with Pollution Control Standards (1988). Requires the head of each executive agency to be responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency.

CULTURAL RESOURCES

National Historic Preservation Act of 1966, **as amended.** Provides the principal authority used to protect historic properties, establishes the National Register of Historic Places (NRHP), and defines, in Section 106, the requirements for federal agencies to consider the effects of an action on properties listed on, or eligible for, the NRHP.

Protection of Historic and Cultural Properties (36 CFR section 800). Provides an explicit set of procedures for federal agencies to meet their obligations under the National Historic Preservation Act including inventorying resources and consultation with State Historic Preservation Officers (SHPOs) and federally recognized tribes.

Native American Grave Protection and Repatriation Act of 1990 (25 USC 3001-3013). Requires protection and repatriation of Native American burial items found or, or taken from, federal or tribal lands, and requires repatriation of burial items controlled by federal agencies or museums receiving federal funds.

Archaeological Resources Protection Act (ARPA) of 1979 (16 USC section 470aa-47011). Ensures the protection and preservation of archaeological sites on federal or Native American lands and establishes a permitting system to allow legitimate scientific study of such resources.

American Indian Religious Freedom Act of 1978 (42 USC section 1996). States that it is the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.

EO 13007 Indian Sacred Sites (1996). Requires that, to the extent practicable, federal agencies accommodate access to, and ceremonial use of, sacred sites by Native American religious practitioners, and to avoid adversely affecting the physical integrity of sacred sites.

EO 13084 Consultation and Coordination with Indian Tribal Governments (1998). Requires that federal agencies have an effective process to permit elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.

AFI 32-7065 Cultural Resource Management (1994). Sets guidelines for protecting and managing cultural resources on lands managed by the Air Force.

Department of Defense (DoD) American Indian and Alaska Native Policy (21 November 1999). This policy emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis and requires an assessment, through consultation, of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the services.

ENVIRONMENTAL JUSTICE

EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1995). Requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The essential purpose of EO 12898 is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

EO 13045 Protection of Children from Environmental Health Risks and Safety Risks (1998). This Executive Order directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

AF Guidance, Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process (November 1997). Provides guidance for implementation of EO 12898 in relevant Air Force environmental impact assessments.

APPENDIX E
FEDERALLY LISTED AND CANDIDATE PLANT AND ANIMAL SPECIES AND SPECIES OF CONCERN

Rev: August, 2000

FEDERALLY LISTED and CANDIDATE PLANT and ANIMAL SPECIES and SPECIES OF CONCERN -- COUNTY LIST FOR NEW MEXICO

(specific to Cannon Air Force Base Defense Training Initiative Proposal, March 2001)

Mammals

ENDANGERED

Black-footed ferret, Mustela nigripes
statewide *except* Hidalgo, Luna, Doña Ana

CANDIDATE SPECIES

Swift fox, Vulpes velox
Chaves, Colfax, Curry, De Baca, Eddy, Guadalupe, Harding, Lea, Mora, Quay, Roosevelt, San Miguel, Union

Black-tailed prairie dog, Cynomys ludovicianus
Chaves, Colfax, Curry, De Baca, Eddy, Guadalupe, Harding, Hidalgo (introduced), Lea, Lincoln, Mora, Otero, Quay, Roosevelt, San Miguel, Sierra (introduced), Socorro, Torrance, Union

SPECIES OF CONCERN

Cave myotis, Myotis velifer
Catron, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero

Desert pocket gopher, Geomys bursarius arenarius
Chaves, Doña Ana, Luna, Otero, Socorro

Fringed myotis, Myotis thysanodes
Bernalillo, Catron, Chaves, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Luna, McKinley, Mora, Otero, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia

Gray-footed chipmunk, Tamias canipes
Eddy, Lincoln, Otero

Long-eared myotis, Myotis evotis
Catron, Chaves, Cibola, Colfax, McKinley, Rio Arriba, Sandoval, San Juan, San Miguel, Sierra, Socorro, Taos, Valencia

New Mexican meadow jumping mouse, Zapus hudsonius luteus
Bernalillo, Colfax, Lincoln, Los Alamos, Mora, Otero, Rio Arriba, San Miguel, Sandoval, Santa Fe, Socorro, Taos, Valencia

Occult little brown bat, Myotis lucifugus occultus
Bernalillo, Catron, Chaves, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, San Juan, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

Organ Mountains Colorado chipmunk, Eutamias quadrivittatus australis
Doña Ana, Lincoln, Sierra, Socorro

Townsend's big-eared bat, Corynorhinus townsendii
Bernalillo, Catron, Chaves, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Luna, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union

Western red bat, Lasiurus blossevillii
Catron, Chaves, Doña Ana, Eddy, Hidalgo, Roosevelt

Pecos River muskrat, Ondatra zibethicus ripensis
Bernalillo, Chaves, Doña Ana, Eddy, Guadalupe, Lincoln, San Miguel, Socorro, Valencia

Spotted bat, Euderma maculatum
Bernalillo, Catron, Cibola, Doña Ana, Grant, Guadalupe, Hidalgo, Los Alamos, Luna, McKinley, Mora, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

Birds

ENDANGERED

Interior least tern, Sterna antillarum
Catron, Chaves, DeBaca, Doña Ana, Eddy, Otero, Rio Arriba, Socorro

Northern aplomado falcon, Falco femoralis septentrionalis
Chaves, Doña Ana, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero, Sierra, Socorro

Southwestern willow flycatcher, Empidonax traillii extimus (with critical habitat only in Catron, Grant, and Hidalgo counties) Bernalillo, Catron, Cibola, Colfax, Doña Ana, Grant, Guadalupe, Hidalgo, Los Alamos, Luna, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Valencia

THREATENED

Bald eagle, Haliaeetus leucocephalus
statewide

Mexican spotted owl, Strix occidentalis lucida (with proposed critical habitat except Doña Ana and Eddy counties) Bernalillo, Catron, Cibola, Colfax, Doña Ana, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Valencia

NONESSENTIAL EXPERIMENTAL

Whooping crane, Grus americana
Bernalillo, Doña Ana, Grant, Los Alamos, Luna, Rio Arriba, Roosevelt, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union, Valencia

CANDIDATE SPECIES

Lesser prairie chicken, Tympanuchus pallidicinctus
Chaves, Curry, De Baca, Eddy, Guadalupe, Harding, Lea, Quay, Roosevelt, Union.

PROPOSED THREATENED

Mountain plover, Charadrius montanus
Bernalillo, Catron, Chaves, Cibola, Colfax, De Baca, Guadalupe, Harding, Hidalgo, Lincoln, Luna, McKinley, Mora, Otero, Quay, Sandoval, San Juan, San Miguel, Santa Fe, Socorro, Taos, Torrance, Union, Valencia

SPECIES OF CONCERN

American peregrine falcon, Falco peregrinus anatum
statewide
Arctic peregrine falcon, Falco peregrinus tundrius
statewide in migration
Baird's sparrow, Ammodramus bairdii
Bernalillo, Catron, Chaves, Colfax, Curry, De Baca, Doña Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Luna, Mora, Otero, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia
Black tern, Chlidonias niger
Bernalillo, Chaves, Doña Ana, Eddy, McKinley, Otero, Quay, Rio Arriba, San Juan, San Miguel, Sierra, Socorro, Torrance
Ferruginous hawk, Buteo regalis
statewide
Loggerhead shrike, Lanius ludovicianus
statewide
Northern goshawk, Accipiter gentilis
Bernalillo, Catron, Chaves, Cibola, Colfax, Eddy, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia
Western burrowing owl, Athene cunicularia hypugaea
Bernalillo, Catron, Chaves, Cibola, Colfax, Curry, De Baca, Doña Ana, Eddy, Harding, Hidalgo, Lea, Luna, McKinley, Mora, Otero, Quay, Roosevelt, Sandoval, San Juan, San Miguel, Sierra, Union, Valencia
White-faced ibis, Plegadis chihi
Bernalillo, Chaves, Colfax, De Baca, Doña Ana, Eddy, Guadalupe, Harding, Los Alamos, McKinley, Mora, Otero, Quay, Rio Arriba, San Juan, Sandoval, San Miguel, Santa Fe, Sierra, Socorro, Taos, Union, Valencia
Yellow-billed cuckoo, Coccyzus americanus
statewide

Reptiles

SPECIES OF CONCERN

Sand dune lizard, Sceloporus arenicolus
Chaves, Eddy, Lea, Roosevelt
Texas horned lizard, Phrynosoma cornutum

Bernalillo, Chaves, Cibola, Colfax, Curry, De Baca, Doña Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Luna, Mora, Otero, Quay, Roosevelt, San Miguel, Santa Fe, Sierra, Socorro, Torrance, Union

Amphibians

SPECIES OF CONCERN

Sacramento mountain salamander, Aneides hardii
Lincoln, Otero

Fish

ENDANGERED

Pecos gambusia, Gambusia nobilis
Chaves, Eddy

THREATENED

Pecos bluntnose shiner, Notropis simus pecosensis (with critical habitat)
Chaves, De Baca, Eddy
Arkansas River shiner, Notropis girardi (native population only)
Colfax, Harding, Mora, Quay, San Miguel, Union

SPECIES OF CONCERN

Arkansas River speckled chub, Macrhyobopsis aestivalis tetranemus
Quay
Flathead chub, Platygobio (=Hybopsis) gracilis
Bernalillo, Colfax, DeBaca, Guadalupe, Harding, Los Alamos, Mora, Quay, Rio Arriba, Sandoval, San Miguel, Santa Fe, Socorro, Taos, Union, Valencia
Headwater catfish, Ictalurus lupus
Chaves, DeBaca, Eddy
Longfin dace, Agosia chrysogaster
Catron, Grant, Hidalgo, Lincoln*, Luna, Sierra*, Socorro*
Pecos pupfish, Cyprinodon pecosensis
Chaves, Eddy
Plains minnow, Hybognathus placitus
Chaves*, Colfax, DeBaca*, Eddy*, Guadalupe*, Harding, Quay, San Miguel, Union
Rio Grande shiner, Notropis jemezanus
Chaves, De Baca, Eddy, Guadalupe
White Sands pupfish, Cyprinodon tularosa
Lincoln, Otero, Sierra

* = introduced populations

Invertebrates - Arthropods

SPECIES OF CONCERN

Albarufan dagger moth, Acronicta albarufa
unknown

Bonita diving beetle, Deronectes neomexicana
Lincoln

Desert viceroy butterfly, Limenitis archippus obsoleta
Doña Ana, Grant, Lincoln, Sierra, Socorro

Los Olmos tiger beetle, Cicindela nevadica olmosa
unknown

New Mexico silverspot butterfly, Speyeria nokomis nitocris
Catron, Cibola, Grant, Los Alamos, McKinley, Mora, Rio Arriba, Sandoval, San Juan, San Miguel, Taos

Noel's amphipod, Gammarus desperatus
Chaves

Sacramento Mountains blue butterfly, Icaricia icariodes new subspecies
Lincoln, Otero

Sacramento Mountains checkerspot butterfly, Euphydryas anicia cloudcrofti
Lincoln, Otero

Sacramento Mountains silverspot butterfly, Speyeria atlantis capitanensis
Lincoln, Otero

Invertebrates - Molluscs

CANDIDATE SPECIES

Koster's tryonia (springsnail), Tryonia kosteri
Chaves

Pecos assiminea snail, Assiminea pecos
Chaves

Roswell springsnail, Pyrgulopsis roswellensis
Chaves

Plants

ENDANGERED

Holy Ghost ipomopsis, Ipomopsis sancti-spiritus
San Miguel

Kuenzler hedgehog cactus, Echinocereus fendleri var. kuenzleri
Chaves, Eddy, Lincoln, Otero

THREATENED

Pecos sunflower, Helianthus paradoxus
Chaves, Cibola, Valencia, Guadalupe

SPECIES OF CONCERN

Chiricahua dock, Rumex orthoneurus
Catron, Mora, Otero, San Miguel, Santa Fe, Taos
Dwarf milkweed, Asclepias uncialis var. uncialis
Colfax, Grant, San Miguel, Union
Goodding's onion, Allium gooddingii
Catron, Lincoln, Otero, San Juan
Sandhill goosefoot, Chenopodium cycloides
Doña Ana, Roosevelt, Sierra, Socorro
Sierra Blanca cliffdaisy, Chaetopappa elegans
Lincoln, Otero
Wright's marsh thistle, Cirsium wrightii
Chaves, Guadalupe, Lincoln, Otero

Index

E	=	Endangered (in danger of extinction throughout all or a significant portion of its range).
PE	=	Proposed Endangered
PE w/CH	=	Proposed Endangered with critical habitat
T	=	Threatened (likely to become endangered within the foreseeable future throughout all or a significant portion of its range).
PT	=	Proposed Threatened
PT w/CH	=	Proposed Threatened with critical habitat
PCH	=	Proposed critical habitat
C	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
SC	=	Species of Concern (Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies). Species of Concern are included for planning purposes only.
S/A	=	Similarity of Appearance
*	=	Introduced population
†	=	May occur in this county from re-introductions in Colorado.
XN	=	Nonessential experimental
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (Cynomys gunnisoni) and/or 80-acres or

more for any subspecies of Black-tailed prairie dog (Cynomys ludovicianus). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.

*** = Extirpated in this county

APPENDIX F
FLARE SAFETY INFORMATION

United States Department of the Air Force

Defensive Training Initiative Environmental Assessment

Fact Sheet

July 2001

Flares are not toys. They can be dangerous - Do not handle them.

What is a Flare?

Flares are used by Cannon AFB in training. They are composed primarily of magnesium metal and although considerably larger are similar in composition to Fourth-of-July sparklers. Flares are ejected from aircraft at high altitudes and burn completely before they fall to the ground. On rare occasions, a flare may not ignite and fall to the ground intact. The flare is not dangerous if you leave it alone. Flares burn at 2000° F and very serious burns could result! Remember, a flare is designed to simulate the exhaust of a jet fighter!

What does a flare look like?

A flare is an 8" long tube wrapped with tape. It does not have any writing on it.

What to do if you find a flare.

Do not touch the flare! Mark your location and call Cannon AFB at their toll free number 800-446-4595 Ext. 4131. The flare is not dangerous if you leave it alone, but please call the Air Force or Fire Department for proper disposal.

ACRONYMS AND ABBREVIATIONS

27 FW	27th Fighter Wing
AAQS	Ambient Air Quality Standards
AAM	Annual Arithmetic Mean
ACEC	Areas of Critical Environmental Concern
ACM	Air Combat Maneuvering
ACT	Air Combat Tactics
AEF	Aerospace Expeditionary Force
AFB	Air Force Base
AFPD	Air Force Policy Directive
AFR	Air Force Range
AGL	above ground level
AGM	Annual Geometric Mean
Air Force	United States Air Force
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BFM	Basic Fighter Maneuvering
BLM	Bureau of Land Management
BP	Before Present
BWD	Basic Weapons Delivery
CAA	Clean Air Act
CAS	Close Air Support
CEQ	Council on Environmental Quality
CO	carbon monoxide
CT	Combat Training
DoD	Department of Defense
DOPAA	Description of Proposed Action and Alternatives
DTI	Defensive Training Initiative
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FL	flight level
HAP	High Accident Potential
HPD	Historic Preservation Division
IT	Intercept Training
IFR	instrument flight rules
JTX	Joint Training Exercise
kg	kilogram
LANT	Low Altitude High Speed Navigation and Training
$\mu g/m^3$	micrograms per cubic meter
min	minutes
mg	milligram
MOA	Military Operations Area
mph	miles per hours
MSL	mean sea level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMGF	New Mexico Department of Game and Fish
NO_2	nitrogen dioxide
NM	nautical miles
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	ozone
Pb	lead
PM_{10}	particulate matter equal to or less than 10 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
RBTI	Realistic Bomber Training Initiative
RMP	Resource Management Plan
ROD	Record of Decision
ROI	region of influence
SAT	Surface Attack Tactics
SEAD	Suppression of Enemy Air Defenses
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SRMA	Special Recreation Management Area
SWA	Southwest Area Wildland
TFW	Tactical Fighter Wings
TWD	Tactical Weapons Delivery
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VFR	visual flight rules
VR	visual route