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 Weather Service using the National Fire Danger Rating System.
- 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 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

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

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.

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. In the Pecos MOA, 45 percent of the 4,735 sortie-operations are conducted from 500 feet AGL to 2,000 feet AGL. On VRs-100/125, 95 percent of the 564 sortie-operations are flown between 500 to 2,000 feet AGL.

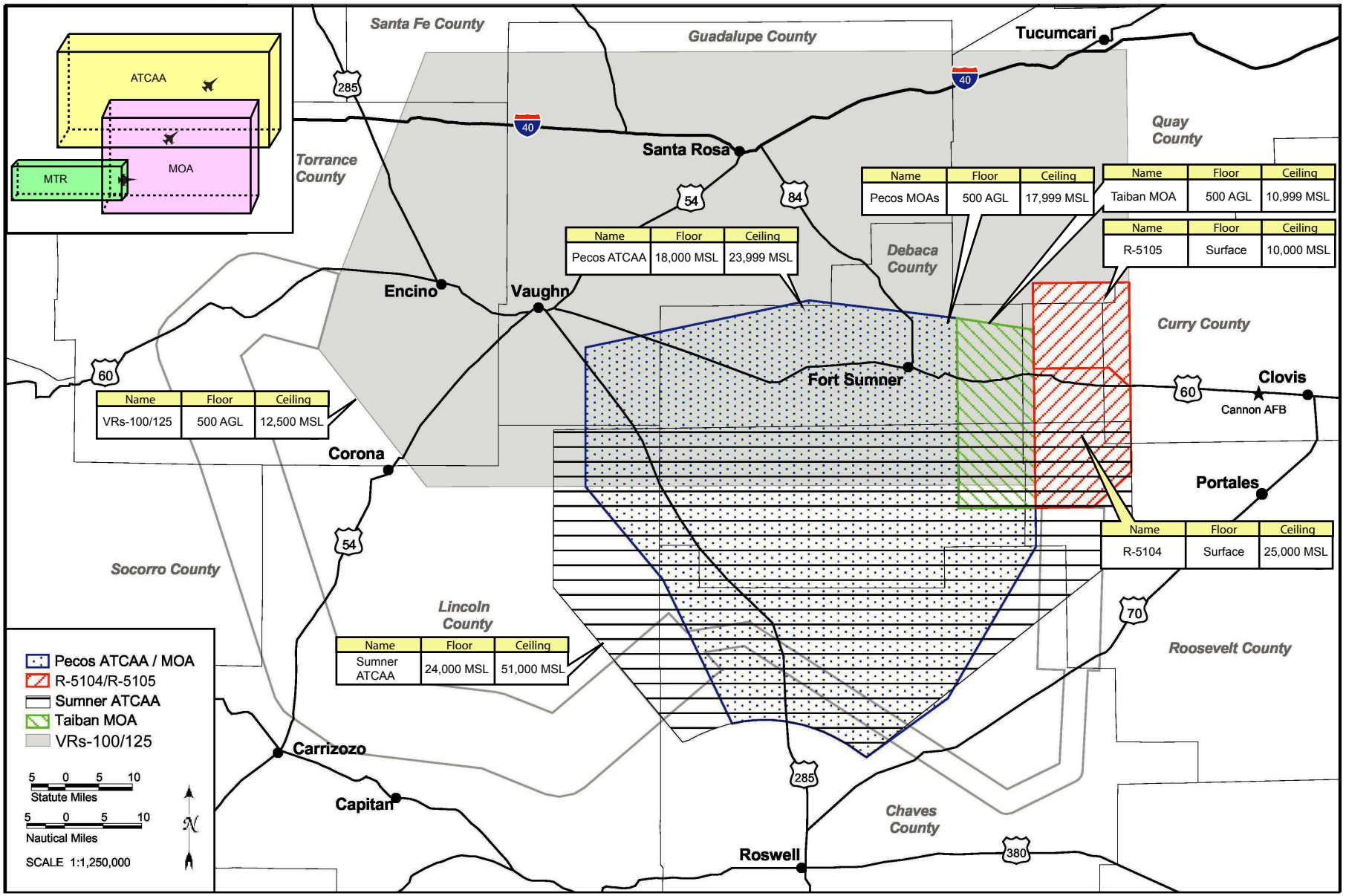

Figure 2-1. Airspace Associated with Cannon AFB

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

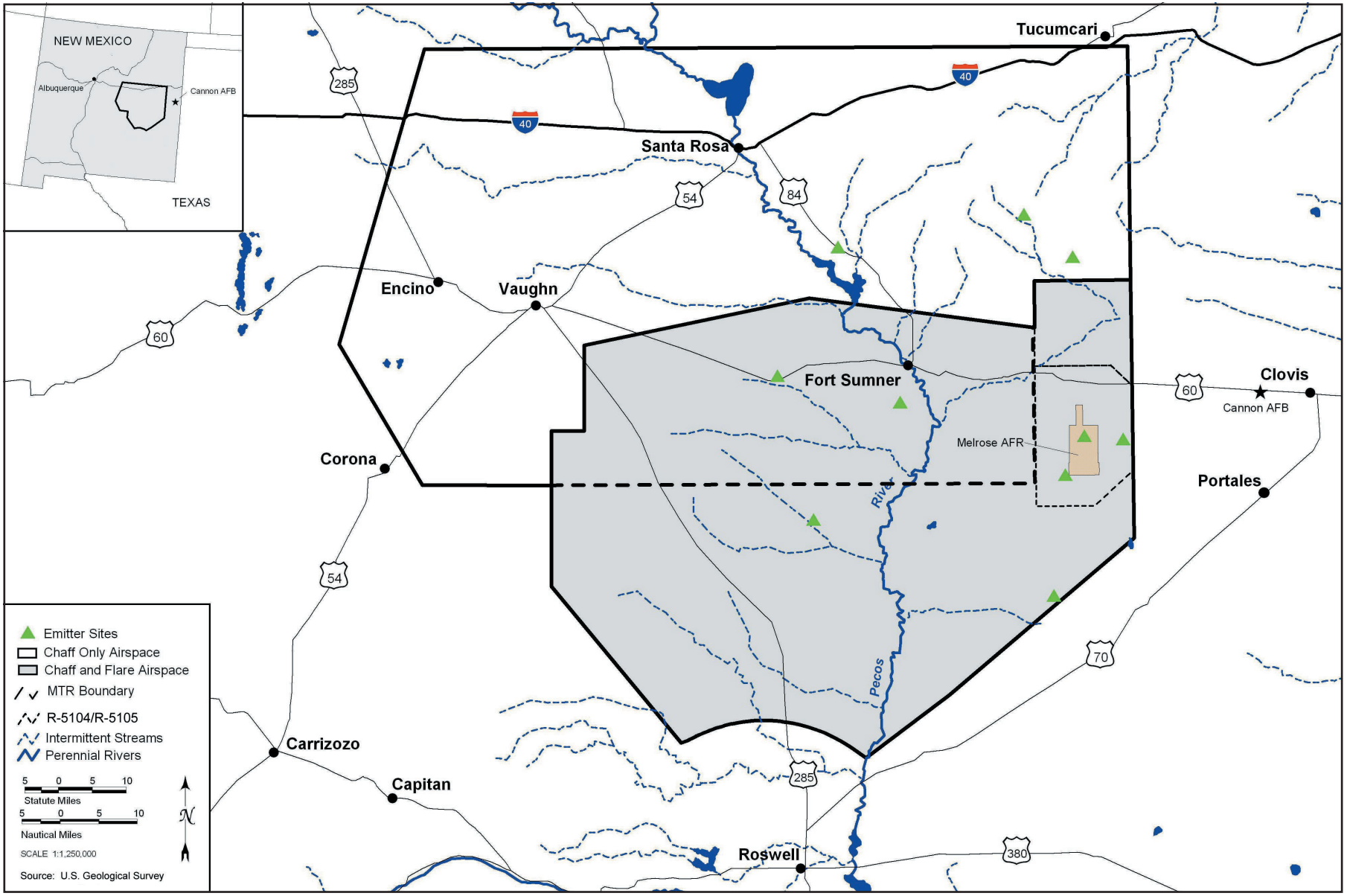

Figure 2-2. Chaff and Flare Use Associated with Alternative A

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	N/A	2,538

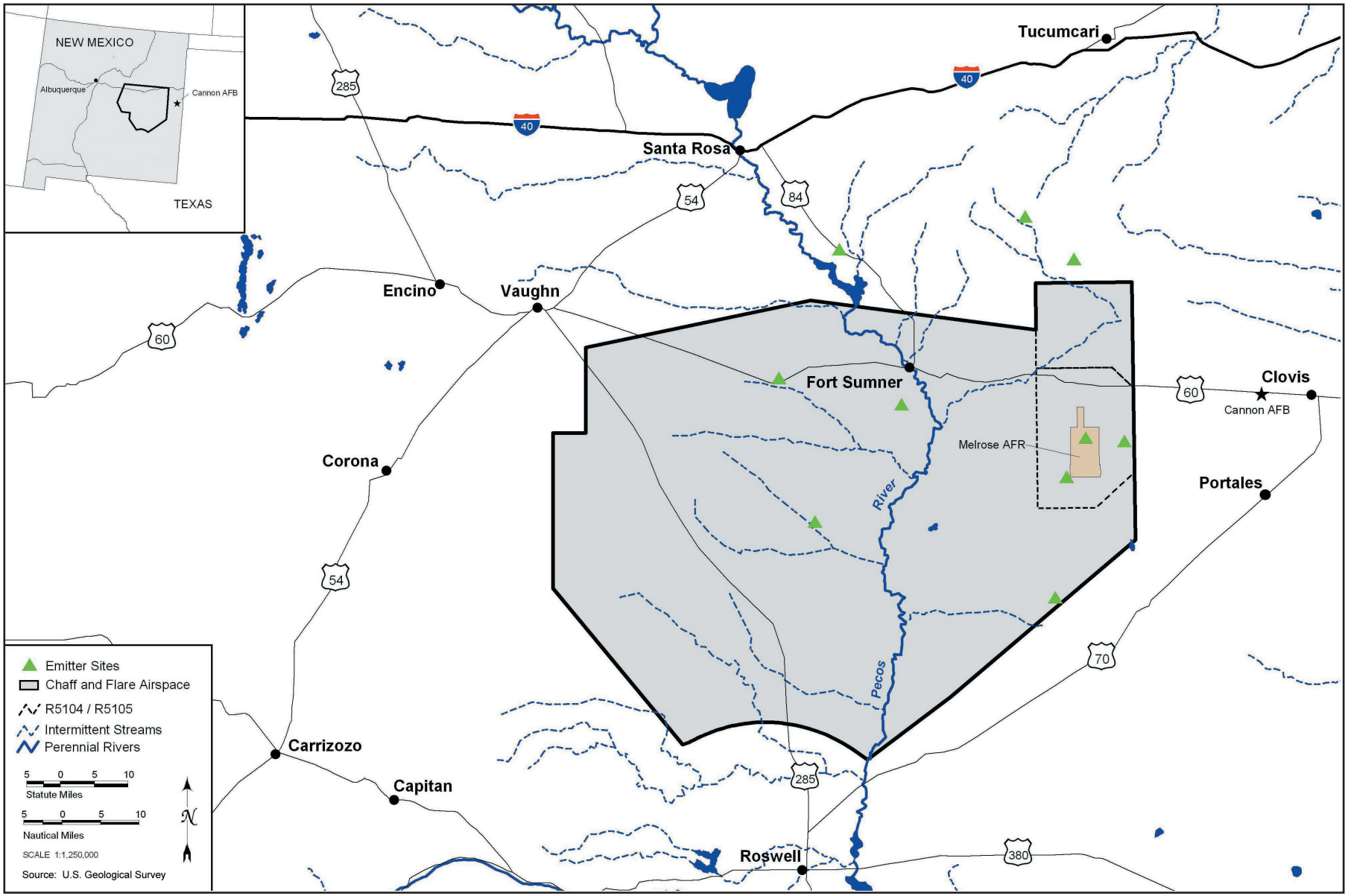

Figure 2-3. Chaff and Flare Use Associated with Alternative B

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 operational altitude restrictions 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.

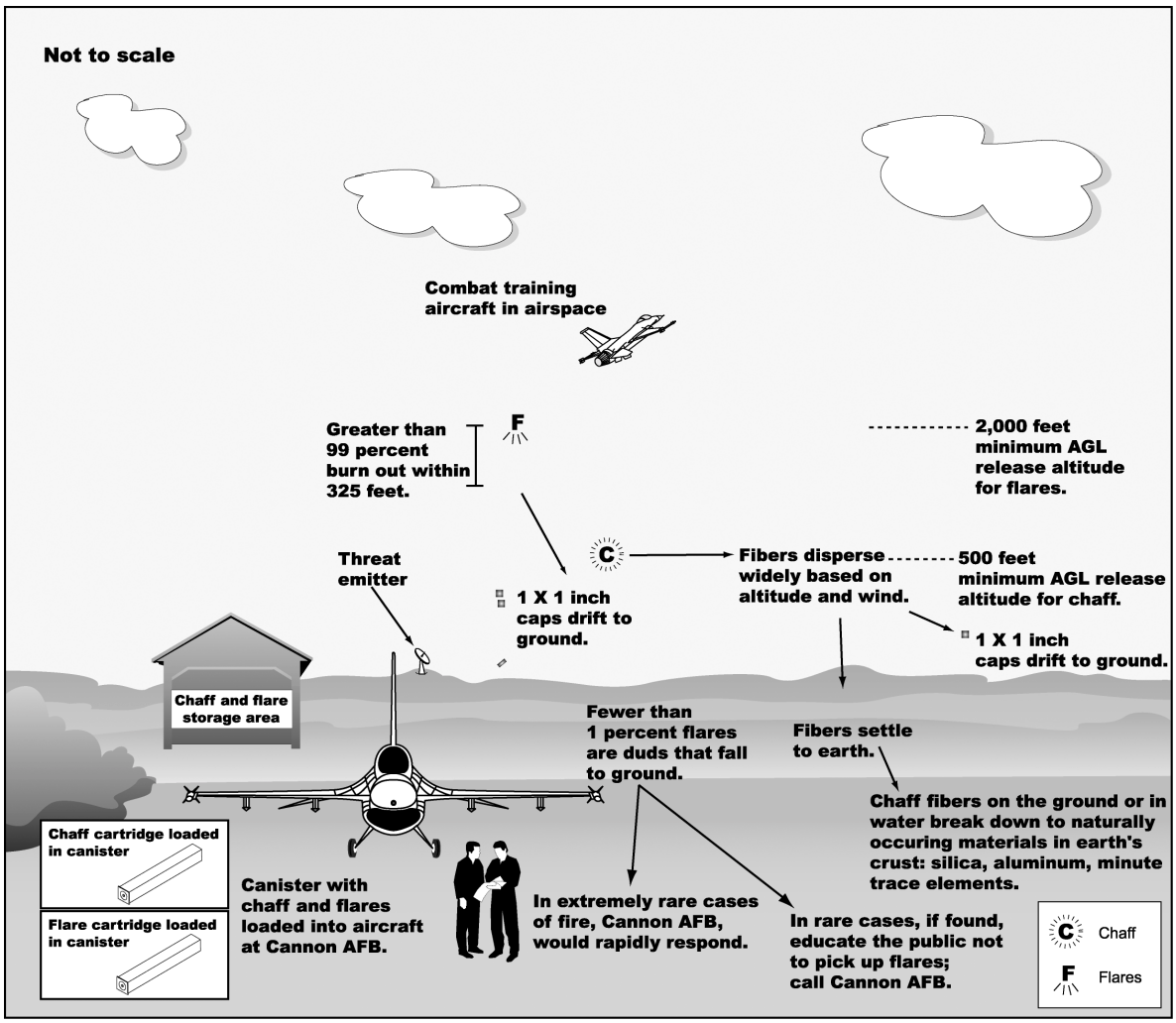

Figure 2-4. Life Cycle of Dispensing Chaff and a Flare

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.
- Biodegradable 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)

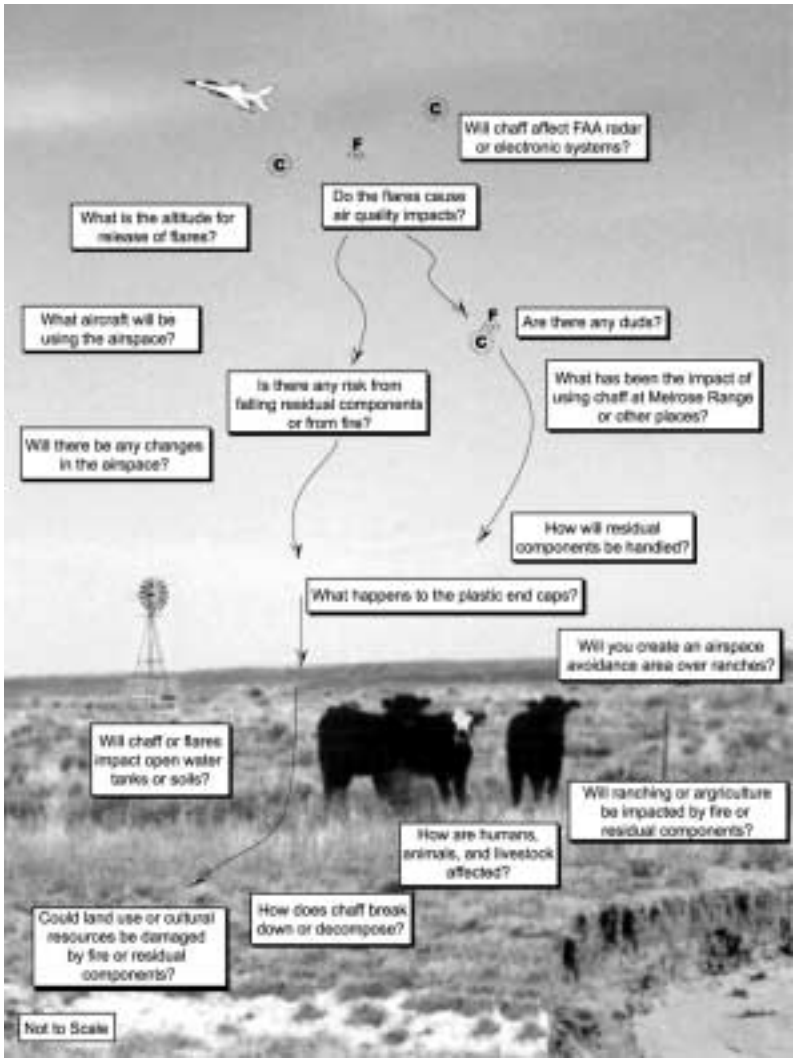

Figure 2-5. Representative Environmental Issues Raised During Scoping

- 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	Alternative C
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.	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.