CHAPTER 4

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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Potential environmental impacts cannot be determined without first understanding the existing conditions in the affected environment. For this reason, the impact analysis process involves two steps. First, this EIS helps the reader develop an understanding of the existing environmental setting, or the "affected environment." Second, it uses details of the RBTI alternatives (see Chapter 2) to assess their impacts on the existing environment, or the "environmental consequences." As required by NEPA, this EIS addresses impacts associated with Alternative A: No-Action, as well as the environmental effects of implementing the action alternatives.

This chapter contains a discussion of:

- Airspace and Aircraft Operations
- Land Management and Use
- Biological Resources
- Socioeconomics and Environmental Justice
- Cultural Resources
- Soils and Water

The impact analysis process requires collecting scientifically valid and up-to-date information. Data collection involves:

- Reviewing previous studies, such as technical publications, agency databases, management plans, and other NEPA documents.
- Talking to agencies and others with information on specific resources, such as the U.S. Fish and Wildlife Service, Bureau of Land Management, Texas and New Mexico State Historic Preservation Officers, tribal resource specialists, park superintendents, and community planners.
- Reviewing public input during the scoping process.
- Conducting field studies. For this EIS, field studies at candidate emitter and Electronic Scoring Site locations were conducted for biological resources, cultural resources, and hazardous waste.

The resources analyzed in this EIS are interdependent. For example, a change in soils at a candidate emitter site might affect local vegetation, which in turn could affect wildlife that depend on the plants for food. An increase in aircraft sortie-operations might affect noise conditions in the affected area. Changes in noise could affect how the land is used or managed. These types of interrelationships are why the EIS is prepared by an interdisciplinary team.

Assessment of environmental consequences is also based on an understanding that different resources are not equally sensitive to all elements of an action. For example, cultural resources--especially archaeological sites--are most likely affected by activities that disturb the ground (such as construction at emitter sites) and are usually not affected by changes in noise (which could occur under the affected airspace). On the other hand, certain animal species may be more sensitive to aircraft noise than to short-term construction activities.

The environmental impact analysis process is designed to focus analysis on those environmental resources that could potentially be affected by the RBTI proposal. Potential effects may result from different aspects of an alternative--flying activities, construction of the emitters and Electronic Scoring Sites or decommissioning of existing Electronic Scoring Sites. For this EIS, resources have been either grouped

or analyzed individually according to individual or collective resource categories. Six categories, listed below, are analyzed for each action alternative, as well as for the No-Action Alternative.

- Airspace and Aircraft Operations (Section 4.1)--This section includes discussions of airspace management and use, air safety, aircraft emissions, and air quality, as well as general aircraft noise and associated human health considerations. Additional discussion of noise impacts as applied to specific resources can be found in the associated sections as follows:

  Noise impacts on land use: Land Management and Use (Section 4.2)

  Noise impacts on wildlife and livestock: Biological Resources (Section 4.3)

  Noise impacts on archaeological sites, historic buildings, and traditional cultural properties: Cultural Resources (Section 4.5)

- Land Management and Use (Section 4.2)--Land management and use includes issues such as effects of overflights, emitter construction, and ground operations on residential use, recreation, special management areas, prime farmland, and rangeland.

- Biological Resources (Section 4.3)--Biological resources includes discussion of potential impacts from overflights and construction on wetlands, vegetation, rare plants, and wildlife. The discussion focuses on threatened, endangered, and other sensitive species.

- Socioeconomics and Environmental Justice (Section 4.4)--Socioeconomics focus on employment and income, including the effects of decommissioning on the local economy. The analysis of environmental justice considers whether minority or low-income groups experience a disproportionate share of any impacts.

- Cultural Resources (Section 4.5)--This section addresses potential impacts to archaeological sites, historic buildings and structures, and traditional cultural properties from overflights and construction.

- Soils and Water (Section 4.6)--This discussion considers the effects of RBTI and the No-Action Alternative on water availability, soil erosion, fugitive dust, and paleontological remains that may potentially occur in the areas affected by construction and operation.

4.1 AIRSPACE AND AIRCRAFT OPERATIONS

Training activities involving aircraft operations by B-52 and B-1 bombers form the focus of the RBTI proposal. These activities occur in airspace, a finite resource controlled and administered by the FAA. For RBTI, the extent and nature of the airspace and its use defines the location of the affected environment for each alternative. Within the airspace, aircraft performing training activities generate noise and emit exhaust, so they can affect the noise environment and air quality. These activities must also be performed safely and with regard for all other users of the airspace. Because these training activities have the potential to affect air safety and airspace management, the Air Force has analyzed them in this EIS.

4.1.1 Methods and Approach

AIRSPACE MANAGEMENT

Under Title 49, U.S. Code and Public Law 103-272, the United States government has exclusive sovereignty over the nation's airspace. This sovereignty extends from the surface to above 60,000 feet MSL. The FAA has the responsibility to plan, manage, and control the structure and use of all airspace over the United States, including that associated with RBTI. Like the highway system and traffic laws, FAA rules govern the national airspace system, and regulations establish how and where aircraft may fly. Collectively, the FAA uses these rules and regulations to make airspace use as safe, effective, and compatible as possible for all types of aircraft, from private propeller-driven planes to large, high-speed commercial and military jets.

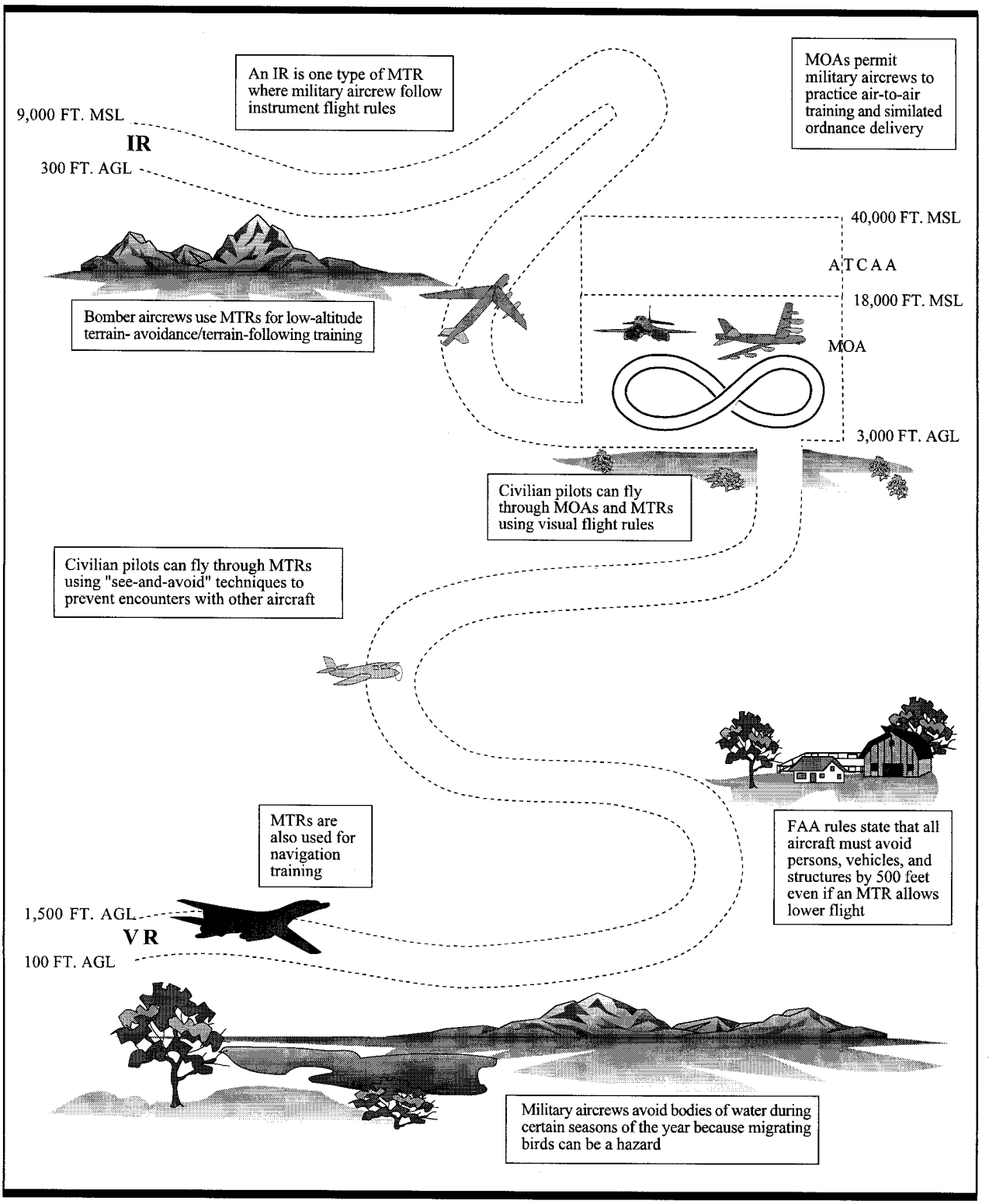
FAA rules and regulations govern all civilian and military airspace use.

Civil, commercial, and military air traffic all use the airspace within the study area for RBTI. FAA rules, airspace management, and procedures provide for safe operations by each and all types of aviation users. As presented in Section 3.4, the military was one of, if not the first, users of the skies over Texas and New Mexico. Training with aircraft ranging from biplanes to B-29s to F-16s has occurred over these areas for 90 years. Given the vast expanses of land and the importance of ranching and farming, there is a long tradition of civil aviation as well. Today, civil aviation activities in the study area include weather modification (cloud seeding), pest (e.g., boll weevils) eradication, crop spraying, range distribution and water assessments for livestock, emergency medical flights, pipeline surveillance, predator control, wildlife management, drug interdiction, and pleasure flights. In northern New Mexico hot air ballooning is quite popular. Neither the FAA nor state aviation agencies maintain comprehensive records on visual flight rules traffic for civil aviation. Commercial aviation also uses the area. Dozens of jet routes and federal airways transit the study area, and thousands of commercial flights use them every year.

Two types of flight rules (visual flight rules [VFR] and instrument flight rules [IFR]) apply to airspace, providing a general means of managing its use. Both military and civil aviation abide by these rules to ensure safe operations. For example, private pilots flying between airports to survey oil fields or livestock within familiar territory normally operate under VFR. VFR pilots fly using visual cues along their desired route of flight, as long as appropriate visibility conditions exist, day or night. IFR pilots undergo much more training and operate under greater restrictions, but they may fly during periods of reduced visibility. Only those pilots qualified for IFR may use them in flying; commercial pilots generally have IFR ratings.

FAA rules and regulations serve to separate VFR and IFR flights from each other and from other aircraft using the same rules. These rules always recommend that VFR pilots carefully examine aeronautical charts and communicate with the nearest FAA facility to obtain information on what other aircraft are flying in the area. The rules also separate VFR air traffic by designating altitudes for flying based on the direction of flight. IFR air traffic is under more stringent flight controls and requires consistent communication with the FAA.

Aircraft use different kinds of airspace according to the specific rules and procedures defined by the FAA for each type of airspace. For RBTI, airspace used by the military consists of MTRs and MOAs/ATCAAs (Figure 4.1-1). MTRs are essentially aerial "highways" that vary in length, width, and altitude; some permit flight to 100 feet AGL or extend up to 16,000 feet MSL or higher. Under RBTI, no bombers would fly below 300 feet AGL. Aircrews use MTRs for many different types of training, including terrain masking and low-altitude navigation. Two types



How MOAs/ATCAAs and MTRs Typically Work **Figure 4.1-1**

of high-speed MTRs exist: Instrument Routes (IR) and Visual Routes (VR). The FAA requires publication of the hours of operation for any MTR so that all pilots, both military and civilian, are aware of when other aircraft could be in the airspace. Each military organization responsible for an MTR develops a daily schedule for use. Although the FAA designates MTRs for military use, other pilots may occupy the airspace. When flying VFR, the FAA urges pilots to contact the nearest flight service station for detailed information on use of the MTR at that time, and VFR pilots must use see and avoid techniques to prevent conflicts with military aircraft using the MTR. Pilots flying IFR must follow essentially the same procedures, but need to communicate with air traffic controllers consistently during their flight.

An IR, or instrument route, is used by military aircraft for low-altitude, high-speed navigation training under both instrument and visual flight conditions. A VR, or visual route, is used for the same purpose but only under visual flight conditions.

The FAA has designated MOAs as special use airspace. MOAs provide military aircrews the opportunity to perform many different training activities within a large horizontal and vertical expanse of airspace. The ceiling of all MOAs can extend to no more than 18,000 feet MSL, while the floor can be established at any altitude. Any military or civilian pilot flying VFR can enter and fly through a MOA using see and avoid techniques. Users of MOAs under VFR employ see and avoid techniques. When flying IFR, nonparticipating (those not using the MOA for training) military or civilian aircraft must obtain an air traffic control clearance to enter a MOA, if it is active.

An ATCAA commonly overlies a MOA and extends above 18,000 feet MSL. Once established, an ATCAA is activated for the time it is required in accordance with the controlling letter of agreement between the FAA and the Air Force.

Federal airways and jet routes form another type of airspace within the national airspace system controlled by the FAA. Federal airways are normally used by air traffic below 18,000 feet MSL while flying between airports. Airway traffic seldom conflicts with MTR or MOA sortie-operations for two reasons:

Commercial aircraft typically fly well above the levels military aircraft would fly in MTRs and MOAs.

- Aircraft on airways, because of fuel efficiency and flight safety related to aircraft malfunctions, commonly operate at altitudes well above most MTR ceilings and the lower altitudes used by military aircraft; and

- The FAA normally ensures that airways do not conflict with MOAs through planning.

Jet routes exist at altitudes from 18,000 to 60,000 feet MSL. Commercial aircraft fly within that structure, well above the altitudes used by military aircraft in MTRs and MOAs. Jet routes and ATCAAs can occur at the same altitudes, but FAA air traffic control prevents conflicts of use.

To avoid conflicts, MTRs and MOAs are designed to avoid busy airports entirely or establish specific avoidance procedures around small private and municipal airfields. Such avoidance procedures are maintained for each MTR and MOA, and military aircrews build them into daily flight plans.

In addition to the lower limits of charted airspace, all aircrews adhere to FAA avoidance rules. Aircraft must avoid congested areas of a city, town, settlement, or any open-air assembly of persons by 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Outside of congested areas, aircraft must avoid any person, vessel, vehicle, or structure by 500 feet. Bases may establish additional avoidance restrictions under MTRs and MOAs.

AIRCRAFT OPERATIONS AND THE NOISE ENVIRONMENT

Factors Influencing Annoyance

Physical Variables

- Type of neighborhood
- Time of day
- Season
- Predictability of noise
- Control over the noise source
- Length of time an individual is exposed to a noise

Emotional Variables

- Feelings about the necessity or preventability of the noise
- Judgment of the importance and value of the activity that is producing the noise
- Activity at the time an individual hears the noise (conversation, sleep, recreation)
- Attitude about the environment
- General sensitivity to noise
- Belief about the effect of noise on health
- Feeling of fear associated with the noise

Noise represents the most identifiable concern associated with aircraft operations. Although communities and even isolated areas receive more consistent noise from other sources (e.g., cars, trains, construction equipment, stereos, wind), the noise generated by aircraft overflights often receives the greatest attention. General patterns concerning the perception and effect of aircraft noise have been identified, but attitudes of individual people toward noise is subjective and depends on their situation when exposed to noise. Annoyance is the primary consequence of aircraft noise. The subjective impression of noise and the disturbance of activities are believed to contribute significantly to the general annoyance response. A number of nonnoise related factors have been identified that may influence the annoyance response of an individual. These factors include both physical and emotional variables.

Personal opinions on noise vary widely. For example, one person might consider loud rock music as pleasing but opera music as offensive. A second person may perceive just the opposite. Likewise, opinions on noise associated with military overflights vary from positive to negative.

Aircraft Noise Assessment Methods. An assessment of aircraft noise requires a general understanding of how sound is measured and how it affects people and the natural environment. Appendix G provides a detailed discussion of noise and its effects on people and the environment. The primary information needed to understand the noise analysis is summarized below.

To quantify sound levels, the Air Force uses three noise-measuring techniques, or metrics: first, a measure of the highest sound level occurring during an individual aircraft flyover (single event); a second to combine the maximum level of that single event with its duration; and a third to describe the noise environment based on the cumulative flight activity. This EIS describes single noise events with L_{max} and the Sound Exposure Level (SEL). The cumulative energy average noise metric uses the Day-Night Average Sound Level (DNL). Each metric uses A-weighted sound levels (in decibels [dBA]), which approximate how humans perceive sounds by de-emphasizing the high and low frequency portions of the noise. All noise levels discussed in this EIS reflect dBA but may simply be stated as dB.

A-weighted sound levels best approximate human hearing. Appendix G presents more information on this topic.

L_{max} comprises the highest sound level measured during a single aircraft overflight. This would be an instantaneous sound level, occurring for a fraction of a second. For an observer, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. Table 4.1-1 lists the L_{max} sound levels for bomber aircraft, and Figure 4.1-2 shows examples of the rise and fall of noise levels during the short duration of an overflight. Maximum sound level is important in judging the interference caused by an aircraft noise event with conversation, sleep, or other common activities.

Table 4.1-1
Representative A-Weighted Instantaneous Maximum (L_{max}) Levels at Various Altitudes

Aircraft Type	*Airspeed (nm/hour)*	*Altitude (Feet AGL)*						
		300	*500*	*1,000*	*2,000*	*3,000*	*5,000*	*10,000*
B-1	**420**	**117**	**112**	**106**	**98**	**93**	**86**	**75**
B-1	**550**	**117**	**112**	**106**	**98**	**93**	**86**	**75**
B-52	**360**	**110**	**105**	**96**	**86**	**83**	**70**	**58**
F-16	500	106	101	94	86	83	74	63
Tornado	420	104	99	92	84	78	72	62
F-14	550	115	110	103	94	88	80	67
F-18	500	120	116	108	99	93	85	71
B-2	200	114	110	102	94	88	82	71

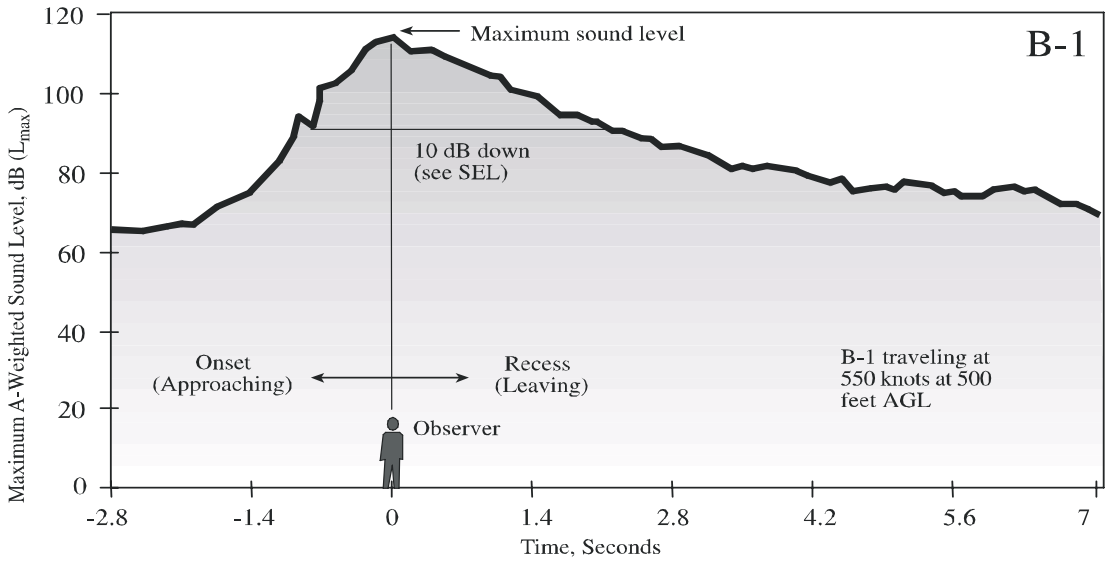
Note: Based on steedy, level flight and using Omega 108 data from actual overflight noise meaasurements.

The SEL metric is a single-number representation of a noise energy dose. This measure takes into account the effect of both the duration and intensity of a noise event. During an aircraft flyover, it would include both the maximum noise level and the 10 dB lower levels produced during onset and recess periods of the flyover (this is also known as 10 dB down; refer to Figure 4.1-2). Because an individual overflight takes seconds and the maximum sound level (L_{max}) occurs instantaneously, SEL forms the best metric to compare noise levels from overflights. SELs decrease as altitude increases and vary according to the type of aircraft, its altitude or distance from the observer, and its speed (Figure 4.1-3). As evidenced by the L_{max} and SEL data, L_{max} noise level during an overflight is typically 0 to 15 dB lower than the SEL with flights above an altitude of 500 feet AGL.

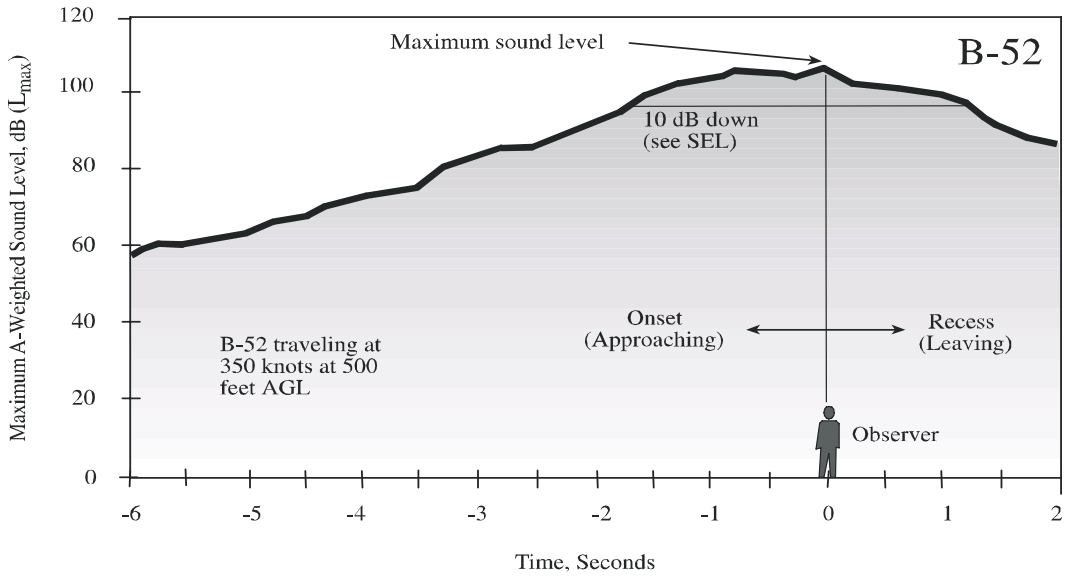
SEL values differ numerically from those expressed for the cumulative noise metric, DNL. The only reason this difference occurs is that the noise metric for SEL is expressed with respect to a one-second period and DNL uses a 24-hour period. Many different combinations of SEL values created by the noise of individual overflights can result in the same DNL value. For example, a single direct daytime overflight of a B-1 at 500 feet AGL would generate an SEL of 113 dB and a DNL of about 63 dB. An F-16 at the same altitude would generate an SEL value of 103 dB and a DNL of about 54 dB. Because of the logarithmic nature of decibel notation, the 11 dB difference in SEL value indicates that a DNL value of 63 dB could result from either a single B-1 overflight at 500 feet or eight F-16 overflights at 500 feet in a 24-hour period. The process of normalizing to a 24-hour period with DNL neither adds to nor diminishes the aircraft noise energy. It is accounted for by the DNL modeling method. Nothing is concealed or underestimated by the process of using the DNL scale.

The cumulative metric, DNL (also known as L_{dn} or by extension, L_{dnmr}), is a 24-hour average A-weighted sound level measure. DNL sums the individual noise events and averages the resulting level over a specified length of time. It is a composite metric accounting for the maximum noise levels, the duration of the events (sortie-operations), and the number of events. DNL is also adjusted to include penalties for nighttime operations--all operations occurring after 10:00 PM and before 7:00 AM are assessed a 10-dB penalty for the added intrusiveness and potential annoyance associated with nighttime flights. DNL is further adjusted up to 11 dB to account for the startle or "surprise" effect of the sudden onset of aircraft noise. This metric accounts for all of the factors shown to influence people's reaction to noise, such as how loud the sounds are, how long each sound lasts, how often they occur, and when in the day they occur. In total, DNL cumulatively incorporates all noise generated by all the different types of aircraft using the airspace, reflects both the number and duration of the flights, and recognizes the difference between noise occurring during the day and at night. An example of calculating a hypothetical DNL is presented in Figure 4.1-4.

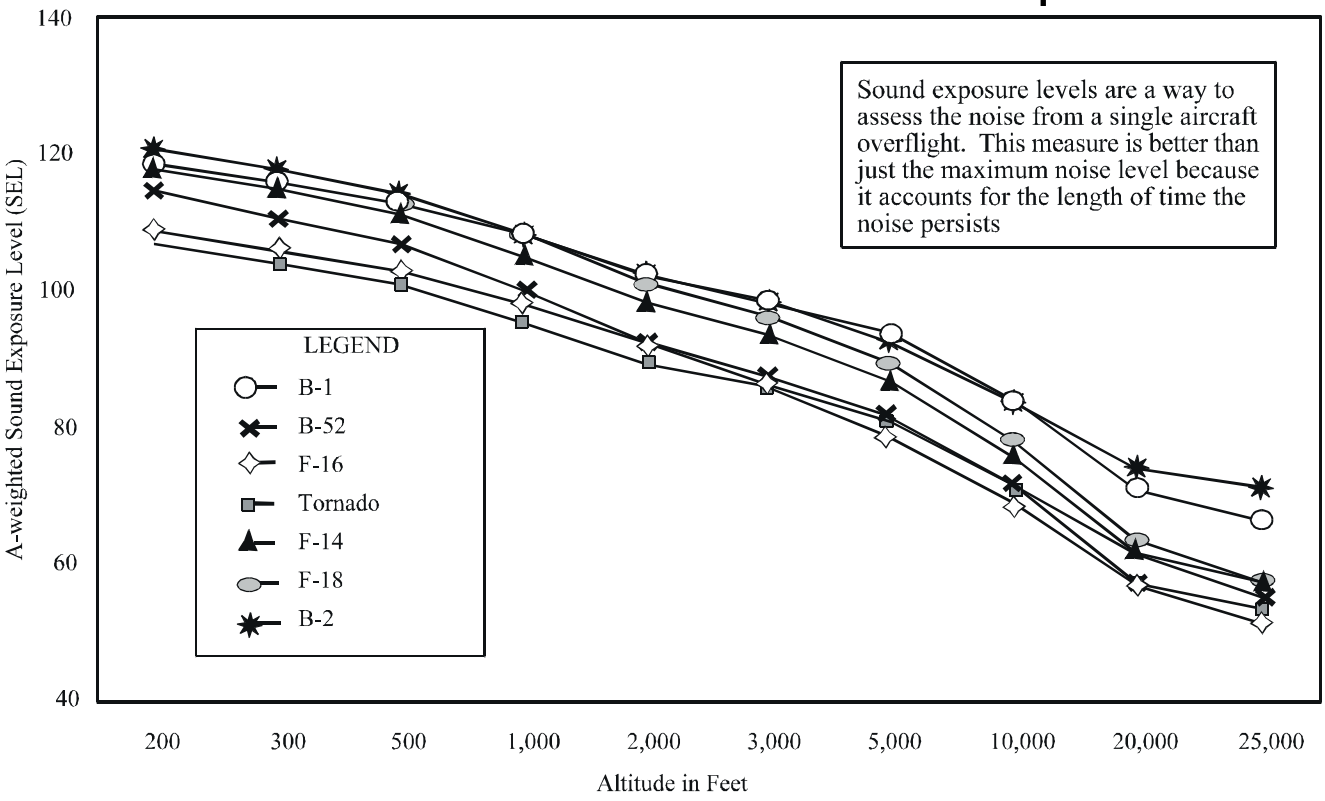
L_{dnmr} is the monthly average of the Onset-Rate Adjusted Day-Night Average Sound Level (DNL). Noise levels are calculated the same way for both DNL and L_{dnmr}. The annual sortie-operations for an MTR or MOA are divided by 12 to define the monthly average sortie-operations. For this EIS, all noise levels were calculated using L_{dnmr}. However, to enhance readability, these noise levels will be referred to as DNL throughout the document.



The onset phase occurs as the aircraft comes toward the observer and continues until the aircraft reaches the closest point to the observer. Sound levels increase rapidly during the onset phase, reaching a maximum at the instantaneous moment that the aircraft passes the observer. After that, the sound decreases to background levels as the aircraft moves away (recess phase). Actual perception of sound levels depends upon many factors, including wind speed and direction, intervening hills or mountains, air temperature, speed and altitude of flight, and the position of the observer relative to the aircraft's path.



Noise Levels from an Overflight Last Several Seconds **Figure 4.1-2**



Representative A-Weighted Sound Exposure Levels at Various Altitudes

Representative A-Weighted Sound Exposure Levels[1] at Various Altitudes[2]

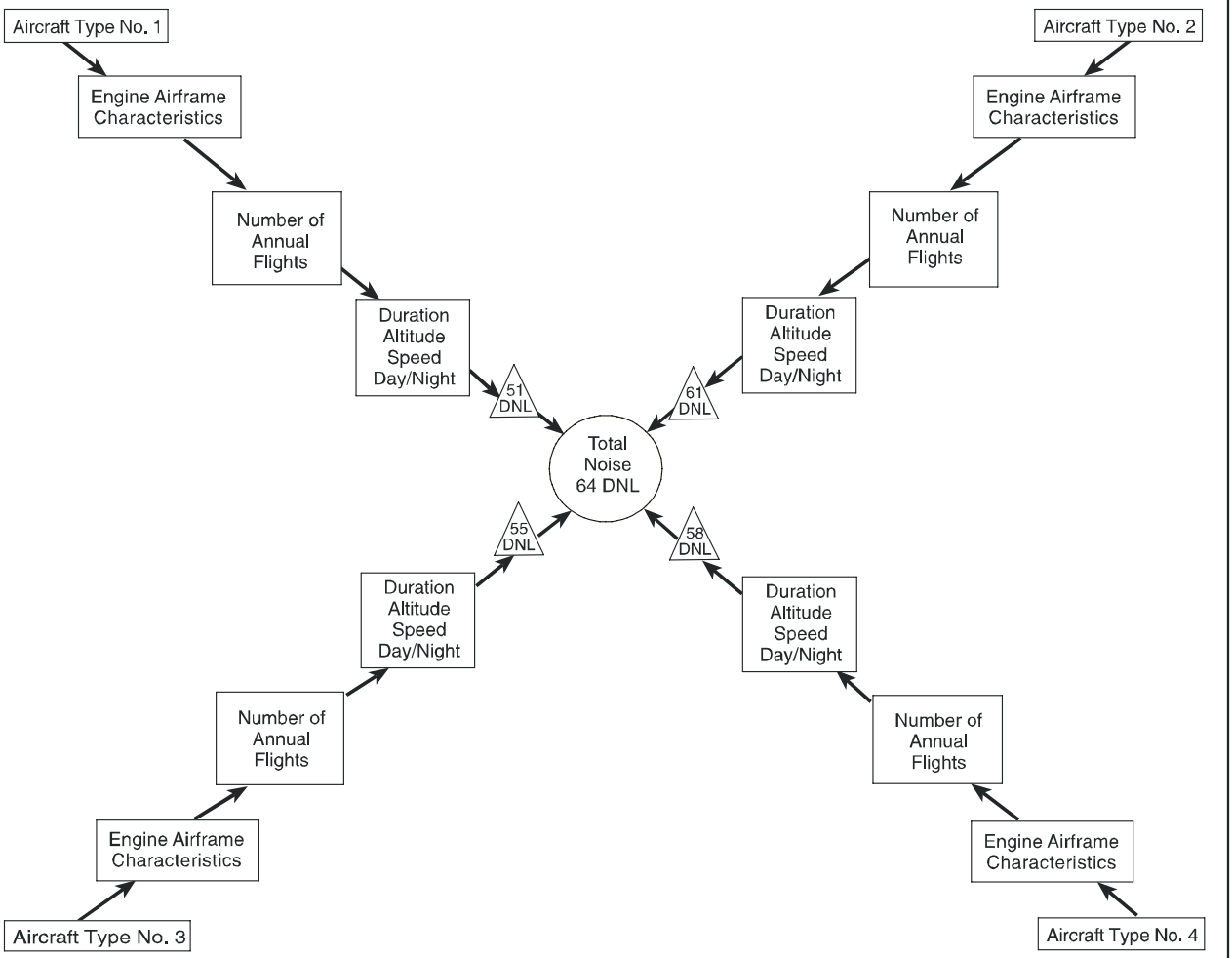
Aircraft Type	*Airspeed (nm/hour)*	*Altitude (Feet AGL)*								
		300	*500*	*1,000*	*2,000*	*3,000*	*5,000*	*10,000*	*20,000*	*25,000*
B-1	420	116	113	108	102	98	93	83	71	65
B-1	550	116	112	107	101	97	92	82	70	64
B-52	360	111	107	100	92	86	78	68	56	52
F-16	500	106	103	98	92	87	81	70	56	50
Tornado	420	104	101	95	89	85	80	71	60	56
F-14	550	115	111	105	98	93	86	75	60	54
F-18	500	118	114	108	101	96	89	77	62	56
B-2	220	118	114	108	102	98	92	83	73	70

[1] The values shown represent average sound levels. These levels may vary by 1/ 2 dB depending on the application of power and speed. SELs are based on steady, level flight and use Omega 108 data from actual overflight noise measurements.

[2] It should be noted that in accordance with U.S. Air Force regulations [AFI 11-206 (USAF 1994) and Federal Aviation Regulation Part 91-119 (FAA, 1992)], aircraft must avoid congested areas and settlements by 1,000 feet, within a horizontal radius of 2,000 feet of the aircraft, and isolated people, vessels, vehicles, or structures by 500 feet.

Sound Exposure Levels

Figure 4.1-3



DNL accounts for the cumulative noise exposure of all aircraft over a 24-hour period. Each aircraft's contribution to the noise exposure is included. DNL emphasizes louder noise events and adds penalties for certain types of operations. A 10 dB penalty is included in the nighttime events to account for the added intrusiveness and a penalty of up to 11 dB is added to account for the startle effect from the rapid onset of some military aircraft. All events are then summed according to logarithm rules. In the above example, the DNL is 64, as opposed to the arithmetic average of 56. For additional information, see Appendix G

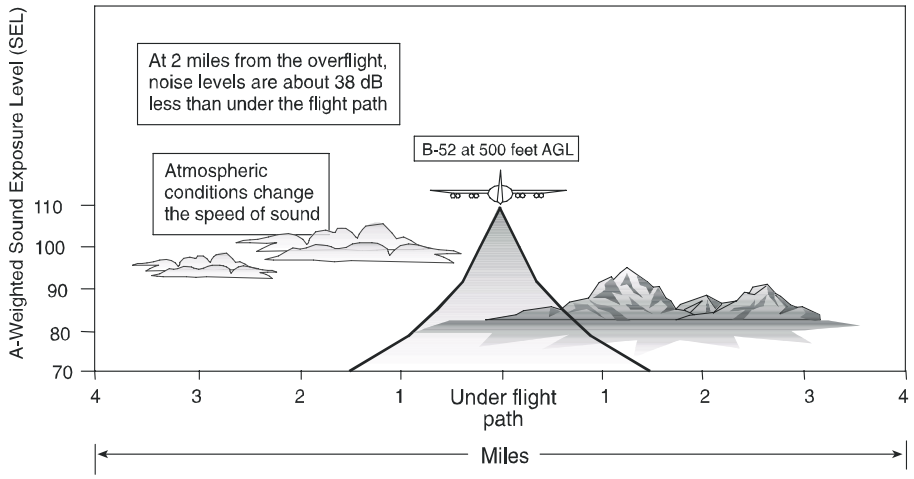
How Cumulative Noise is Modeled **Figure 4.1-4**

DNL has emerged as the most widely accepted metric for aircraft noise (USEPA 1972, FICON 1992). It correlates well with community response and is consistent with controlled laboratory studies of people's perception of noise. It was the primary metric used in the U.S. Environmental Protection Agency's (USEPA) "levels document" (USEPA 1972) and was further endorsed by the Federal Interagency Committee on Noise (FICON) (FICON 1992). DNL has been proven applicable to infrequent events (Fields and Powell 1985) and to rural populations exposed to sporadic military aircraft noise (Stusnick *et al.* 1992, 1993).

Predicting noise levels (in DNL) for this EIS involved the use of the Air Force's MR_NMAP (Lucas and Calamia 1996) noise model for activities in MTRs and MOAs. MR_NMAP calculates the noise levels based on aircraft operations data obtained from aircrews and airspace managers, as well as on patterns measured from radar data for the full inventory of aircraft flown by the U.S. military. These data include airspeed, duration of flight, altitudes of flight, distribution of aircraft in the airspace, and frequency of flight activities. Verification of these data comes from training requirements and from thousands of hours of radar data tracking aircraft operations at Nellis Air Force Range, China Lake Naval Air Warfare Center, and White Sands Missile Range.

MR_NMAP is the computer program used to model baseline and projected noise in affected MTRs and MOAs.

Noise generated by a particular aircraft type used in these models represents actual noise measurements regularly updated by the DoD for all aircraft. These measurements are made by flying aircraft under controlled conditions over a microphone array. The measurements are then incorporated into the noise model as the noise file database. Using this data set, the formulae driving the noise models account for spherical spreading, atmospheric absorption, and lateral attenuation. Spherical spreading is, in essence, the reduction in noise due to the spreading of sound energy away from its source. Sound energy decreases by approximately 6 dB every time the distance between the source and receiver is doubled (Figure 4.1-5). Daily and hourly variations in atmospheric conditions (e.g., humidity, clouds) can alter the amount of sound energy at a given location. The noise models use annual average temperature and humidity conditions to account for the influence of atmospheric conditions. Lateral attenuation, or the loss of sound energy due to reflection of sound by the ground, depends upon the altitude of the aircraft and the distance to the receiver.



Noise Levels Diminish With Distance

Figure 4.1-5

Studies by Lucas (1995) and Page *et al.* (1994) have validated the reliability of aircraft noise models down to 55 DNL. Predicted noise from models varies +/- 2 dB relative to noise levels measured under controlled conditions. Below 55 DNL, greater variation may occur. When there is a large number of aircraft, the time average sound levels below 55 DNL will occur at relatively long distances from the aircraft, thus allowing atmospheric effects a greater opportunity to cause noise level variability at a receiver's position. When there are a few sortie-operations, the time average sound levels are generated by only a few individual aircraft noise events that may not be a statistically representative sample of a given model of aircraft.

Assessing Aircraft Noise Effects. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on a perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health.

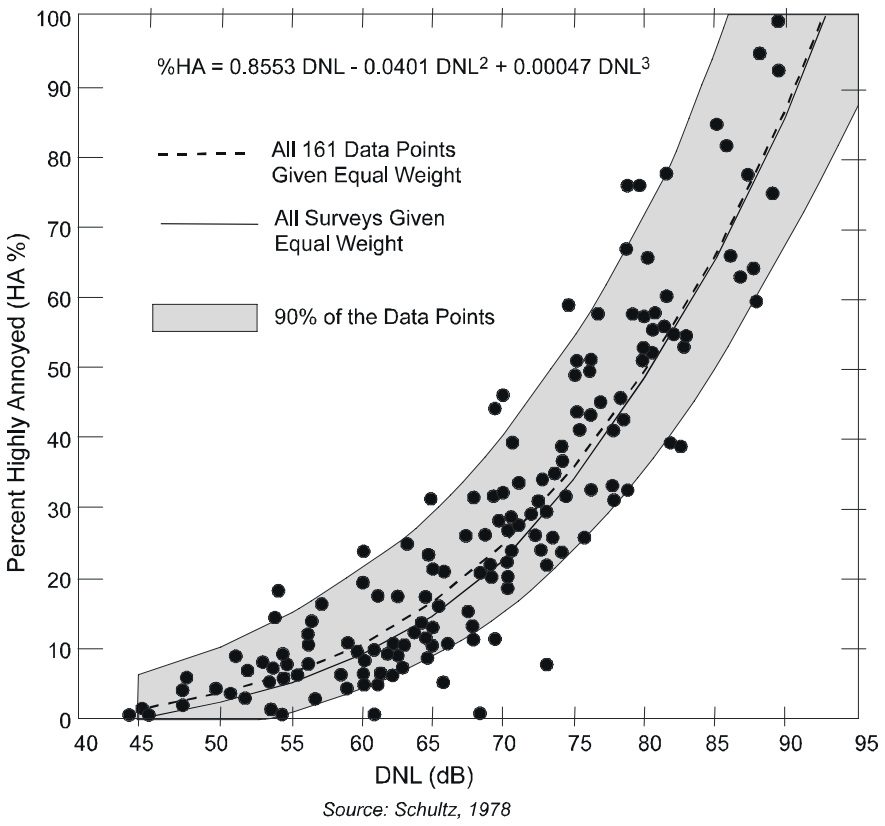
Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects. Schultz (1978) showed a consistent relationship between noise levels and annoyance (Figure 4.1-6a). A more recent study reaffirmed this relationship (Fidell *et al.* 1991). Figure 4.1-6b shows an updated form of the curve fit (Finegold *et al.* 1994) in comparison with the original Schultz curve. The updated fit, which does not differ substantially from the original, is the current preferred form (see Appendix G, Noise).

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

In addition to annoyance, the effect of noise on human health was raised during the public involvement process for this EIS. Other factors that can be used to evaluate a noise environment are noise-induced hearing loss, speech interference, and sleep disturbance. Effects on the speech and sleep also contribute to annoyance.

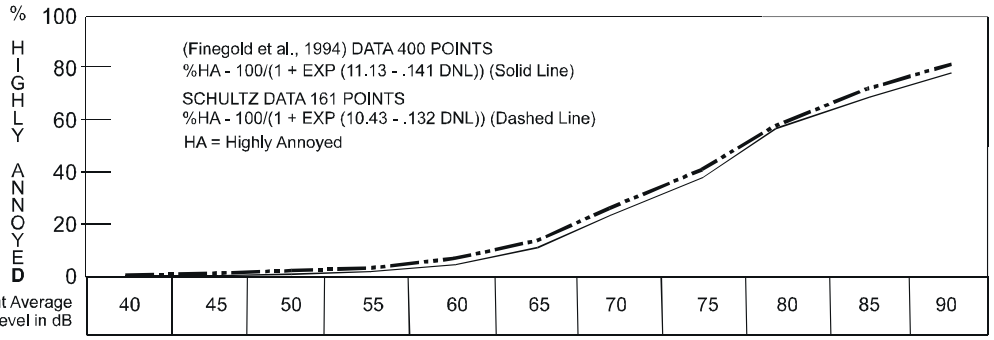
A considerable amount of data on hearing loss has been collected and analyzed. It has been well established that continuous exposure to high noise levels (like in a factory) will damage human hearing (USEPA 1978). Hearing loss is generally interpreted as the shifting to a higher sound level of the ear's sensitivity to perceive or hear sound (sound must be louder to be heard). This change can be either temporary or permanent. Federal workplace standards for protection from hearing loss allow an A-weighted time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. As shown later in this section, noise levels associated with RBTI would be more than 20 dB below these standards.

Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Bettie 1985). Airport traffic is much more continuous, frequent, and commonly lower in altitude than flights in MTRs or MOAs. In MTRs and MOAs, military aircraft fly at varied altitudes, rarely fly over the same point on the ground repeatedly during a short period, and occur sporadically over a day. These factors make it unlikely that an increase in hearing loss would occur (Thompson 1997). The conclusion of no risk to hearing loss as a result of low-altitude flight noise is also supported by a recent laboratory study that measured



Source: Schultz, 1978

Community Surveys of Noise Annoyance **Figure 4.1-6a**



Calculated % HA Points

	40	45	50	55	60	65	70	75	80	85	90
FINEGOLD	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Comparison of original (Schultz, 1978) and current (Finegold et al., 1994) curve fits.

Relationship Between Annoyance and Day-Night Average Sound Level **Figure 4.1-6b**

changes in human hearing from noise representative of low-flying aircraft on MTRs (Nixon *et al.* 1993). In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. One-half of the subjects showed no change in hearing levels, one-fourth had a temporary 5-dB increase in sensitivity (the people could hear a 5-dB wider range of sound than before exposure) and a temporary 5-dB decrease in sensitivity (the people could hear a 5-dB narrower range of sound than before exposure) applied to one-fourth. In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts resulted in the participants hearing a wider range of sound, but within 10 dB of their original range. For RBTI, no overflights would generate noise levels of 130 dB.

Another nonauditory effect of noise is disruption of conversations. Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. Aircraft noise can also disrupt routine activities, such as radio listening or television watching and telephone use. Due to the sporadic nature of flights along MTRs and MOAs, the disruption generally lasts only a few seconds, and almost always less than 10 seconds. It is difficult to predict speech intelligibility during an individual event, such as a flyover, because people automatically raise their voices as background noise increases. A study (Pearsons *et al.* 1977) suggests that people can communicate acceptably in background A-weighted noise levels of 80 dB. The study further indicates that people begin to raise their voices when noise levels exceed 45 dB and some speech interference occurs when background noise levels exceed 65 dB. Typical home insulation reduces the noise levels experienced by 20 dB or more and decreases speech interference. However, it is recognized that some aircraft flyovers can interrupt speech communication momentarily.

Noise-related awakenings form another issue associated with aircraft noise. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors including age, gender, sleep stage, noise level, frequency of noise occurrences, noise quality, and presleep activity. Quality sleep is recognized as a factor in good health. Although considerable progress has been made in understanding and quantifying noise-induced annoyance in communities, quantitative understanding of noise-induced sleep disturbance is less advanced. A recent study of the effects of nighttime noise exposure on the in-home sleep of residents near one military airbase, near one civil airport, and in several households with negligible nighttime aircraft noise exposure, revealed SEL as the best noise metric predicting noise-related awakenings. It also determined that out of 930 subject nights, the average spontaneous (not noise-related) awakenings per night was 2.07 compared to the average number of noise-related awakenings per night of 0.24 (Fidell *et al.* 1994). Additionally, a 1995 analysis of sleep disturbance studies conducted both in the laboratory environment and in the field (in the sleeping quarters of homes) showed that when measuring awakening to noise, a 10 dB increase in SEL was associated with only an 8 percent increase in the probability of awakening in the laboratory studies, but only a 1 percent increase in the field (Pearsons *et al.* 1995). Pearsons *et al.* (1995) reports that even SEL values as high as 85 dB produced no awakenings or arousals in at least one study. This observation suggests a strong influence of habituation on susceptibility to noise-induced sleep disturbance. A 1984 study (Kryter 1984) indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of exposed individuals.

To date, no exact quantitative dose-response relationship exists for noise-related sleep interference; yet, based on studies conducted to date and the USEPA guideline of a 45 DNL to protect sleep interference, useful ways to assess sleep interference have emerged. If homes are conservatively estimated to have a 20-dB noise

insulation, an average of 65 DNL would produce an indoor level of 45 DNL and would form a reasonable guideline for evaluating sleep interference. This also corresponds well to the general guideline for assessing speech interference. Annoyance that may result from sleep disturbance is accounted for in the calculation of DNL, which includes a 10-dB penalty for each sortie occurring after 10:00 PM or before 7:00 AM. No RBTI alternative generates a noise level of 65 DNL, so all noise levels would fall below the USEPA guideline of 45 DNL. This factor, along with low amounts of night operations and the use of a varied altitude, would reasonably be assumed to limit the number of noise-related awakenings.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additionally, claims about flyover noise producing increased mortality rates and increases in cardiovascular death, adverse effects on the learning ability of middle- and low-aptitude students, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus are similarly unsupported (Harris 1997).

AIRCRAFT EMISSIONS AND AIR QUALITY

Because military aircraft are mobile and cover very long distances over many different areas, they commonly contribute little to the total emissions in a region. This is especially true since they fly at altitudes where emissions would tend to be dispersed and not result in effects on human health or visibility. Despite these factors, federal actions such as RBTI must be assessed for their potential effects on air quality.

Under the Clean Air Act (CAA), the USEPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS). Table 4.1-2 outlines the standards for "criteria" pollutants, as defined by the USEPA. These standards represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect human health and welfare. These standards are presented in terms of concentration (e.g., parts per million) averaged over periods of time ranging from 1 hour to annually according to the degree of potential health effects. States, as well as local agencies, may set their own standards as long as they are at least as stringent as the NAAQS. While Texas adopted the NAAQS as its standard, New Mexico established its own standard in 1995. Pollutants considered in this EIS analysis include volatile organic compounds, which are indicators of ozone; nitrogen oxides, which are precursors to ozone and include nitrogen dioxide and other compounds; carbon monoxide; and particulate matter. Airborne emissions of lead and sulfides of hydrogen are not addressed because the affected areas contain no significant sources of emissions of these criteria pollutants, and RBTI activities would not materially contribute to increased levels in the region.

Military aircraft exhaust consists of the criteria pollutants listed in the NAAQS and water vapor. The water vapor mixes with other water vapor in the atmosphere. With the exception of some heavier particulate matter, none of these criteria pollutants enter soils or water. The particulate matter would not be hazardous or toxic.

Table 4.1-2
National and State Ambient Air Quality Standards

Air Pollutant	*Averaging time*	*Federal NAAQS and Texas AAQS*		*New Mexico AAQS*	
		Primary	*Secondary*	*Primary*	*Secondary*
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm 35 ppm	-- --	8.7 ppm 13.1 ppm	-- --
Nitrogen Dioxide (NO_2)	AAM 24-hour	0.053 ppm --	0.052 ppm --	0.05 ppm 0.10 ppm	0.053 ppm --
Sulfur Dioxide (SO_2)	AAM 24-hour 3-hour	0.03 ppm 0.14 ppm --	-- -- 0.5 ppm	0.02 ppm 0.10 ppm --	-- -- 0.5 ppm
Particulate Matter (PM_{10})	AAM 24-hour	50 $\mu g/m^3$ 150 $\mu g/m^3$	50 $\mu g/m^3$ 150 $\mu g/m^3$	-- --	50 $\mu g/m^3$ 150 $\mu g/m^3$
Total Suspended Particulates (TSP)	AGM 30-day 7-day 24-hour	-- -- -- --	-- -- -- --	60 µg/m3 90 µg/m3 110 µg/m3 150 µg/m3	-- -- -- --
Ozone (O_3)	1-hour	0.12 ppm	0.12 ppm	0.12 ppm	0.12 ppm
Lead (Pb)	Calendar Quarter	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

Notes: AAM = Annual Arithmetic Mean; AGM = Annual Geometric Mean; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

All areas affected by RBTI are in attainment with federal air quality standards.

Individual states are required to establish a State Implementation Plan designed to eliminate or reduce emissions exceeding the NAAQS and to ensure state air quality conditions consistently comply with the NAAQS. The CAA prohibits federal agencies from supporting any activities that do not conform to a State Implementation Plan approved by the USEPA. Regulations under the CAA, known as the General Conformity Rule, state that activities must not: (a) cause or contribute to any new violation of any standard; (b) increase the frequency or severity of an existing violation; or (c) delay timely attainment of any standards, interim emission reductions, or milestones as stated in the State Implementation Plan. This General Conformity Rule applies only to those areas in nonattainment with NAAQS. All of the affected areas under RBTI are in attainment with the NAAQS and state standards.

The CAA also establishes a national goal of preventing degradation or impairment in federally designated Class I attainment areas. As part of the Prevention of Significant Deterioration (PSD) program, mandatory Class I status was assigned by Congress to all international parks, national wilderness areas (not wilderness study areas or wild and scenic rivers), memorial (e.g., battlefield) parks larger than 5,000 acres, and national parks larger than 6,000 acres. In Class I areas, visibility impairment is defined as a reduction in regional visual range and atmospheric discoloration (such as from an industrial smokestack). This program also sets standards for a project's effect on PSD Class I areas (Table 4.1-3). Stationary sources, such as industrial areas, are typically the issue with impairment of visibility in PSD I areas. Mobile sources, including aircraft, are generally exempt from review under this regulation.

Determining the effects of existing and proposed aircraft operations on air quality and visibility involved two basic steps. First, aircraft emissions were calculated for the affected MTRs and MOAs in each alternative (in tons per year) to determine increases or decreases relative to the baseline conditions and to qualitatively assess the potential for exceedences of the NAAQS. Sortie-operations by all aircraft using or proposing to use the affected airspace were included. Second, more detailed analyses then assessed the potential change in ambient pollutant concentrations resulting from the alternatives. These analyses employed the Multiple-Aircraft Instantaneous Line Source (MAILS) dispersion model (Leibsch 1992). For each alternative, the analysis looked at the airspace unit where the highest concentrations of emissions would be expected to occur. In each alternative, the airspace used in the MAILS model consisted of segments of the proposed MTR (see Appendix F). By evaluating these conditions, projections of the emissions were made relative to the NAAQS and PSD Class I standards. If these conditions did not cause emissions to exceed the standards, then the less intensive remainder of flight operations elsewhere would not either.

Table 4.1-3
Maximum Allowable Incremental Increases Under PSD Regulations

Pollutant	*Averaging time*	*PSD Increments ($\mu g/m^3$)* *Class I*
Nitrogen Dioxide (NO_2)	Annual	2.5
Particulate Matter (PM_{10})	Annual	4
	24-hour	8
Sulfur Dioxide (SO_2)	Annual	2
	24-hour	5
	3-hour	25

Note: All particulates reported as PM_{10}

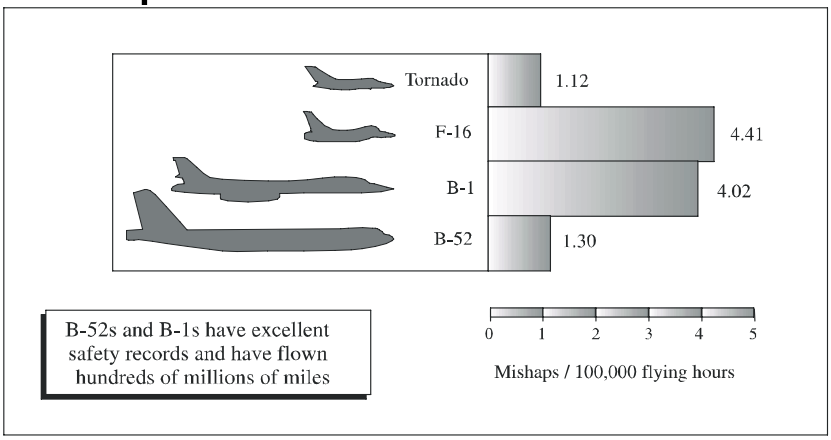
AIRCRAFT SAFETY

Flight safety is of paramount concern to the Air Force. Safe flying procedures, adherence to flight rules, and knowledge of emergency procedures form consistent and repeated aspects of training for all aircrews, including those at Barksdale and Dyess AFBs. Since the inception of the Air Force in 1947, aircraft accidents have steadily declined each year.

Starting in the early 1980s, the Air Force has averaged fewer than two major accidents (Class A mishaps) per 100,000 flying hours for all aircraft worldwide. The Air Force defines a Class A mishap as an accident that results in a loss of life, permanent total disability, total cost of more than $1 million, or destruction of the aircraft beyond repair. Class A mishaps include those accidents where aircraft crash, as well as on-the-ground incidents.

In 44 years of service, B-52s have flown 2.7 billion miles with 97 Class A mishaps. In 15 years, B-1s have flown 160 million miles with 11 Class A mishaps.

Class A mishap rates are calculated by aircraft type. For the major aircraft types using the primary and secondary airspace (B-1, B-52, F-16, and Tornado), Class A mishap rates are quite low (Figure 4.1-7). Based on the flying hours for the different major aircraft types under each alternative, these mishap rates are used to compute a projection of the estimated years between Class A mishaps in each affected MTR and MOA. These data are only statistically predictive and actual mishaps result from many factors, not merely the amount of flight time by an aircraft.



Class A Aircraft Mishap Rates **Figure 4.1-7**

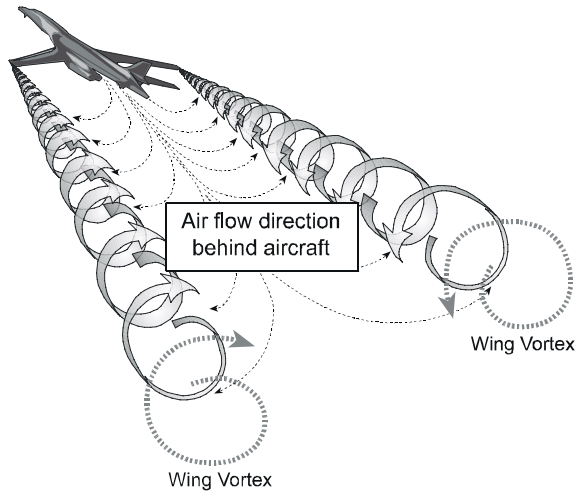
In addition to the direct effects from aircraft crashes (i.e., damage to aircraft and points of impact), there may also be secondary effects, such as fire and environmental contamination. The extent of these secondary effects is situationally dependent and difficult to quantify. For example, there would be a higher risk of fire for aircraft crashes in highly vegetated areas during a hot, dry summer than would be the case if the mishap occurred in a rocky, barren area during the winter.

Flight safety considerations also include bird-aircraft strikes. Bird-aircraft strikes can represent a hazard to aircraft and, in extreme cases, can result in accidents. Over 95 percent of bird-aircraft strikes occur below 3,000 feet AGL, although in extremely rare circumstances aircraft may encounter birds at 30,000 feet MSL or higher. Approximately 50 percent of bird strikes happen at airfields, with 25 percent occurring during low-altitude flight. Migration corridors and other areas where birds congregate (e.g., water bodies) represent the locations with the greatest hazard when birds are present.

Because of these potential effects, the Air Force devotes considerable attention to avoiding the possibility of bird-aircraft strikes. It has conducted a worldwide program for decades to study bird migrations, bird flight patterns, and past strikes to develop predictions of where and when bird-aircraft strikes might occur. This program, which consistently updates the data, also defines avoidance procedures through a Bird Avoidance Model. Each time an aircrew plans a training sortie, they use the Bird Avoidance Model to define altitudes and locations to avoid. Use of this model has minimized bird-aircraft strikes. Each base or flying unit also develops and maintains a bird-aircraft strike avoidance plan that dictates the location and timing of avoidance measures within the airspace used by the base or unit.

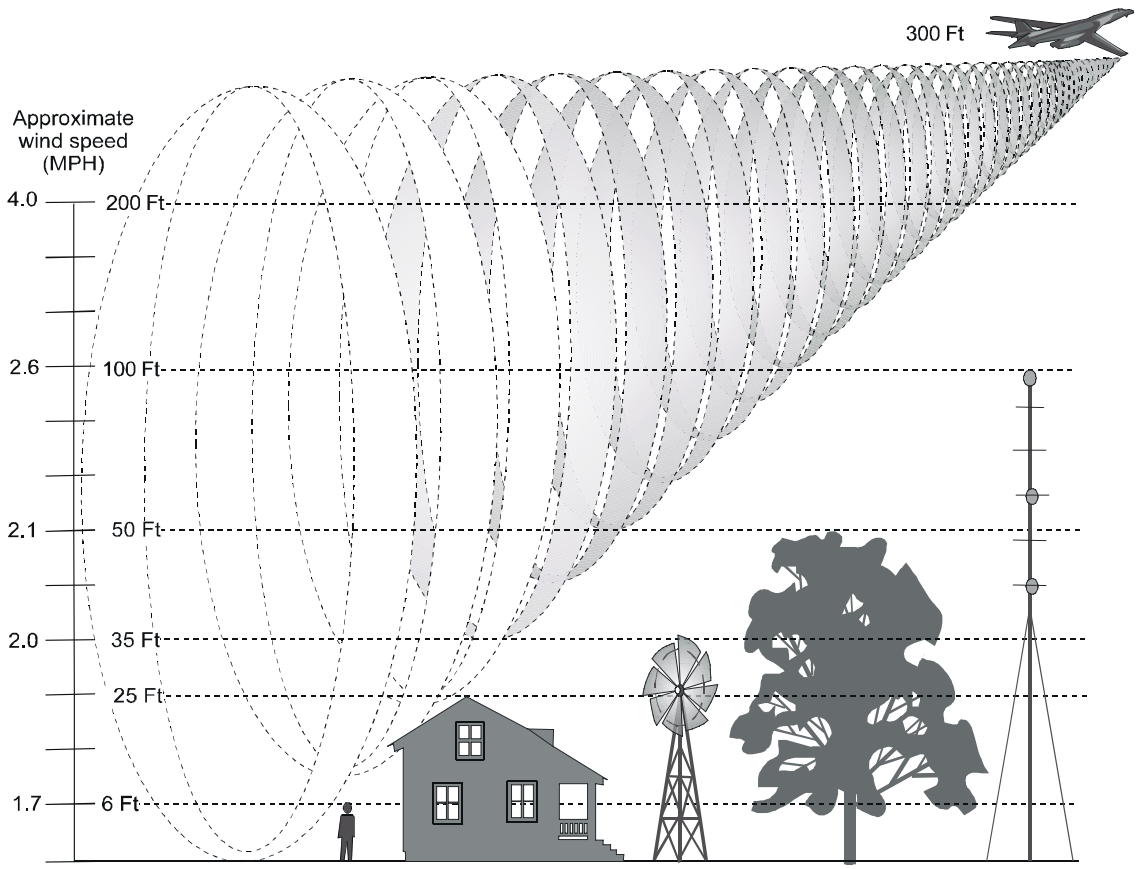
Historical bird strikes reported within an MTR or MOA also provide an indicator as to the potential for flying bird-aircraft strikes. The Air Force maintains an extensive database on all bird-aircraft strikes, where they occurred, and the aircraft involved.

Aircraft vortices represent a safety issue raised during scoping. As aircraft move through the air, they create vortices from their wing tips. These vortices, collectively called wake turbulence (Figure 4.1-8), trail immediately behind the aircraft for thousands of feet while diminishing in strength farther from the aircraft. The strength of wing tip vortices depends upon the amount of lifting force an aircraft is required to generate in order to fly. The heavier the aircraft, the more lifting force required, and, therefore the stronger the vortices. At cruising altitudes, wake turbulence directly behind the aircraft can cause handling difficulties for following aircraft, especially when a small aircraft trails a larger aircraft. FAA regulations dictate safe following distances and procedures to avoid wake turbulence, both in flight and during landing or takeoff.



Anatomy of a Vortex **Figure 4.1-8**

Aircraft flying closer to the ground also create wake turbulence, which trails behind the aircraft generally moving downward and lessening in intensity (Figure 4.1-9). By the time it reaches the ground, or the tops of structures, the turbulence causes no more than a light breeze. The actual windspeed of the wake turbulence for a B-52 flying at 300 feet AGL would be less than 4 miles per hour. B-1s, which are lighter, produce similar low windspeeds at ground level. Wake turbulence from aircraft at higher altitudes would be even less at ground level. Average daily wind speeds in the areas of Texas and New Mexico that could be affected by B-52 and B-1 overflights exceed that generated by wake turbulence. For these reasons, wake turbulence would not be expected to affect the safety of people, vehicles, or structures.



Beaufort (wind force) Scale		
Wind Force	**Wind Speed**	**Effects**
Calm	0 MPH	Smoke rises, leaves still
Light Air	1-3 MPH	Leaves move, smoke drifts
Light breeze	4-7 MPH	Leaves rustle, wind felt on face

Effect of Vortex Winds Upon Various Objects **Figure 4.1-9**

4.1.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

Airspace Management. Under Alternative A: No-Action, aircrews from Barksdale and Dyess AFBs would continue to use the same MTRs and MOAs they use today at baseline levels. These include primary airspace such as IR-178 and secondary airspace. Section 2.2 details the affected airspace and the sortie-operations in that airspace. It also outlines the nature, altitudes, and pattern of operations in the airspace affected under the No-Action Alternative.

Military and civil airspace use currently occurs throughout west Texas and New Mexico. Such use has occurred for many decades.

For airspace management purposes and to inform all pilots (civil, military, and commercial), the FAA charts all MTRs and publishes the altitudes, widths, and hours of availability for each MTR. The military units manage and schedule the use of the MTRs. Use of each MTR is scheduled daily by the base responsible for its management so that conflicts among the users do not occur. Flying units from the managing base, as well as any other units wishing to fly the MTR, must schedule appropriate blocks of time for use. In this way, the one to two aircraft scheduling a specific time block are assured that no other aircraft will be in the same segment of the MTR at the same time. Coordination of scheduling among managing bases for MTRs that overlap or intersect other MTRs follows similar procedures. Through this coordination, the Air Force avoids the possibility of aircraft flying on two separate MTRs in the same place (i.e., intersection), at the same time.

Numerous federal airways, jet routes, and civil aviation airports occur within the study area, including the affected area for Alternative A. Ranchers, crop dusters, and other local VFR pilots may operate at lower altitudes equivalent to those of MTRs. FAA charts, publications, and procedures provide the means for VFR pilots to plan for and safely transit an MTR. The rarity of sortie-operations (average of fewer than 1 to 6 daily) in the primary and secondary MTRs suggests that the potential for conflicts between local VFR traffic and MTR sortie-operations is negligible.

Neither the FAA nor the states maintain records of the amount of VFR flight activity by civil aviation in the affected areas. It is known, however, that ranchers, cloud seeding pilots, and other local VFR pilots frequently fly in these areas. Air traffic control procedures, charting of MTRs and MOAs for pilot awareness, pilot compliance with FAA flight procedures, and required see-and-avoid techniques collectively make MTR and MOA use compatible with civil aviation activities.

Airfields ranging from responsible municipal airports to small airstrips on ranches are located within the affected area for Alternative A. By design, MTRs and MOAs have little effect on such airports and airfields since they avoid busier airports altogether or employ specific avoidance procedures for smaller airfields. For the affected area in western Texas and northeastern New Mexico, approximately 30 small airports and airstrips lie under or near primary MTR and MOA airspace. Traffic at these airfields ranges from under 10 to almost 8,000 operations per year. For the affected area associated with the Harrison and La Junta Electronic Scoring Sites, available data show three small airfields.

Aircraft Noise. Sortie-operations in the primary and secondary MTRs and MOAs generate noise. Baseline noise levels for all primary and secondary MTRs and MOAs in the study area range from less than 45 to 59 DNL (Table 4.1-4). These noise levels not only reflect the noise generated by the aircraft using the airspace, but also account for the additive noise from operations in overlapping or intersecting MTRs and MOAs (refer to Figure 2.3-1). In this way, these data present combined noise levels.

Table 4.1-4
Average Daily Sortie-Operations and Noise Levels
Alternative A: No-Action

Airspace Units	*Class*	*Total Sortie-Operations*	*Average Daily Sortie-Operations*	*Baseline Noise Level (DNL)*
MTRs				
VR-100/125	S	1,265	5	49
VR-108	S	143	1	<45
VR-114	S	1,014	4	<45
VR-143	S	620	2	49
VR-186	S	1,175	5	50
VR-196/197	S	512	2	<45
VR-1107/1195	S	1,050	4	<45
VR-1116	S	30	<1	<45
VR-1175/1176	S	50	<1	46
IR-107	S	104	<1	<45
IR-109	S	310	1	<45
IR-110	S	0	0	NA
IR-111	S	130	1	<45
IR-113	S	300	1	<45
IR-123	S	50	<1	<45
IR-124	S	140	1	<45
IR-128/180	**P**	**200**	**1**	**46**
IR-150	**P**	**280**	**1**	**55**
IR-154	S	70	<1	<45
IR-169	S	465	2	<45
IR-174	**P**	**186**	**1**	**51**
IR-177/501	**P**	**425**	**2**	**56**
IR-178	**P**	**1,560**	**6**	**61**[1]
IR-192/194	S	658	3	49
IR-592	**P**	**510**	**2**	**50**
MOAs				
Reese 4	**P**	**3**	<1	**<45**
Reese 5	**P**	**3**	<1	**<45**
Roby	**P**	**100**	<1	**<45**
Texon	S	100	<1	<45
Mt. Dora	**P**	**379**	**1**	**<45**

Class P = Primary airspace used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

Class S = Secondary airspace unit intersects with primary airspace unit used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

[1] Noise level represents the highest DNL for any segment of the route; all other segments are lower.

Currently, Barksdale and Dyess AFBs use six primary MTRs, with IR-178 receiving the most use.

Baseline noise levels on existing IR-178 range from less than 45 to 61 DNL.

As the primary MTR used by the Barksdale and Dyess AFBs in the affected area, IR-178 was analyzed by segment (Table 4.1-5 and Figure 4.1-10). Due to variations in the number of sortie-operations, floor altitude, and mix of aircraft for different segments, noise levels on IR-178 range from less than 45 to 61 DNL, with 41 of 71 segments subject to combined noise levels less than 55 DNL. Combined baseline noise levels reflect a range for the segments (i.e., 47 to 49 DNL in Table 4.1-5) based on the two altitude regimes potentially used by B-52s. Lower noise levels in a

Table 4.1-5
Existing Noise Levels on IR-178
Alternative A: No-Action

IR-178 Segment	*Baseline Noise Level Range (DNL)*	*IR-178 Segment*	*Baseline Noise Level Range (DNL)*
AB	56	AKAL	49-50
BC	58	ALAM	49-50
CD	58-59	AMAN	48-50
DE	58-59	ANAO	48-50
EF	58-59	AOAP	48-51
FG	58-59	APAQ	48-51
GH	58-59	AQAR	49-50
HI	58	ARAS	50
IJ	57	ASAT	47-49
JK	57	AI1XX	46
KL	57	AE1BA	51
LM	55-56	BABB	51
MN	56	BBBC	51
NO	57	BCBD	51
OP	54-55	BDBE	51
PQ	55	BEBF	51
QR	56-57	BFBG	50
RS	56-57	BGBH	61
ST	58	BHBI	61
TU	57	BIBJ	59
UV	54	BJBK	59
VW	54	BKBG1	46
WX	57	AIXW	46
XY	58	XWXX	<45
YZ	58	OCA	49
ZAA	58	CACB	51
AAAB	52	CBCC	50
ABAC	57	CCCD	48
ACAD	57	CDCE	54
ADAE	57	CECF	51
AEAF	47-50	CFCG	51
AFAG	49-50	CGCH	53
AGAH	49-50	CHCI	50
AHAI	49-50	CICJ	<45
AIAJ	49-50	CJCK	<45
AJAK	49-50		

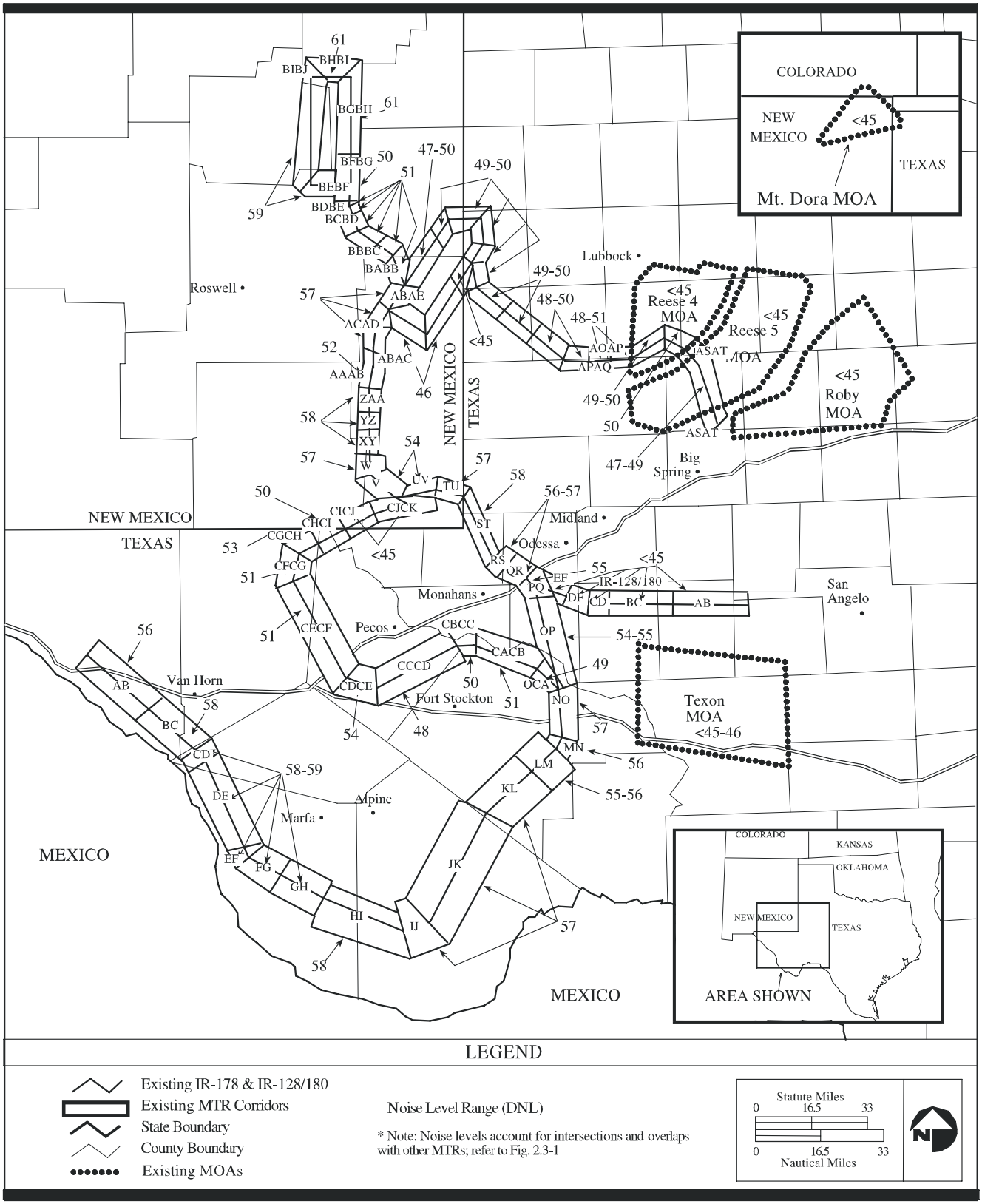
Refer to Figure 2.3-1 for segment locations.

Noise levels reflect the noise generated on IR-178 combined with the noise produced by sortie-operations on MTRs that overlap and intersect with IR-178. These noise levels account for sortie-operations by all aircraft.

Aircrews from Barksdale and Dyess AFBs fly 260 days per year, Monday through Friday, but not on holidays.

range result when the B-52s fly over 1,000 feet AGL 100 percent of the time; higher noise levels correspond to the altitude regime where B-52s fly between 300 and 1,000 feet AGL. A single DNL listed in the table indicates that the noise levels are the same for both regimes.

The highest noise levels (59-61 DNL) on IR-178 apply to segments BGBH-BJBK due to overlapping and intersecting activities on several MTRs associated with Melrose Range, not sortie-operations on IR-178 and IR-128/180. Segments CD-GH



Alternative A: No-Action Noise Level Range **Figure 4.1-10**

have noise levels of 58 to 59 DNL because they support the most sortie-operations on IR-178 proper. Noise levels in segments AAAB-ASAT reflect overlaps of IR-178 with IR-128/180 (with a total of 200 sortie-operations) in this portion of the route.

Based on the annoyance factors correlated to aircraft noise (refer to Figure 4.1-6), approximately less than 1 to 7 percent of people living under IR-178 could be expected to be highly annoyed (Table 4.1-6). For the other primary MTRs, the percent of the population highly annoyed would range from less than 1 percent to about 4 percent. Noise levels at 14 of 20 secondary MTRs correlate to highly annoyed factors of less than 1 percent. Similarly, less than 1 percent of the population under all primary and secondary MOAs could be expected to be highly annoyed.

Individuals are often interested in what they might personally experience from an overflight above or in the vicinity of their location. Ambient noise levels without aircraft operations can range from 34 to 45 DNL in rural areas and 32 to 54 DNL in wilderness areas (USAF 1988, U.S. Forest Service 1992). Individual A-weighted sound levels can vary widely depending upon the location, season, and weather. Levels can range from 20 dB up to 60 dB. Background or ambient noise levels can be influenced not only by man-made sounds, but also by the sound of nature such as inclement weather conditions (e.g., thunderstorms, rain, hailstorms), animals (e.g., near continuous, such as insects; or intermittent, such as coyotes, etc.), water (e.g.,

Table 4.1-6
Percent Population Potentially Highly Annoyed Under
Alternative A: IR-178 and Primary MOAs

IR-178 Segment and MOAS	*Baseline Percentage (average)*	
	Range [1]	
AB	5	5
BC	6	6
CD-GH	6	7
HI	6	6
IJ-KL	5	5
LM	3	4
MN-NO	4	4
OP-PQ	3	3
QR-RS	4	4
ST	5	5
TU	4	4
UV-VW	3	3
WX	4	4
XY-ZAA	5	5
AAAB	2	2
ABAC-ADAE	4	4
AEAF-ASAT	1	2
BABB-BFBG	2	2
BGBH-BJBK	6	7
OCA-CCCO	1	2
CDCE	4	4
CECF-GFCG	2	2
CGCH-CHCI	2	3
CICJ-CJCK	<1	<1
Reese 4, Reese 5, Roby, and Mt. Dora MOAs	1	1

[1] Based on differences associated with two altitude regimes for B-52s.

Ambient noise levels in wilderness areas can range from 20 to 60 DNL and are influenced by the sounds of nature such as thunderstorms, insects chirping, storms, and wind.

Studies of community response to various types of environmental noise show DNL correlates well with annoyance.

movement in streams, falls, or wave action), as well as wind (e.g., its interaction with foliage or irregular terrain) (NPS 1994). When aircraft operations occur in an area, either from existing or proposed operations, it is important to understand that individual aircraft noise events are typically heard for a period of only seconds. The instantaneous noise level is very low at the beginning and end of this period. As the aircraft approaches, the sound level increases to some maximum level depending on how close the aircraft comes to the receiver or individual on the ground (refer to Figure 4.1-2).

If an aircraft passes directly overhead at low altitude, the maximum instantaneous A-weighted level can exceed 100 dB. Noise would be near that maximum for only a few seconds, with most of the event being much less noisy. If an aircraft passes to the side of a person (or any receiver) at some distance, the maximum noise level experience would be lower, but the levels would be near that maximum for a longer period of time. For example, if a person were half a mile to the side, the noise level would be 10 to 15 dB lower than if the overflight were directly overhead. An aircraft 2 to 3 miles away may not be heard at all (refer to Figure 4.1-5). The potential for low-altitude sortie-operations in the primary and secondary MTRs range from an average of less than one per day to six per day (Appendix B). Less than one sortie-operation per day characterizes average activity in the MOAs. These averages reflect total annual sortie-operations divided by 260 flying days. Weather, maintenance, mission requirements, and other factors can cause variations in daily activities.

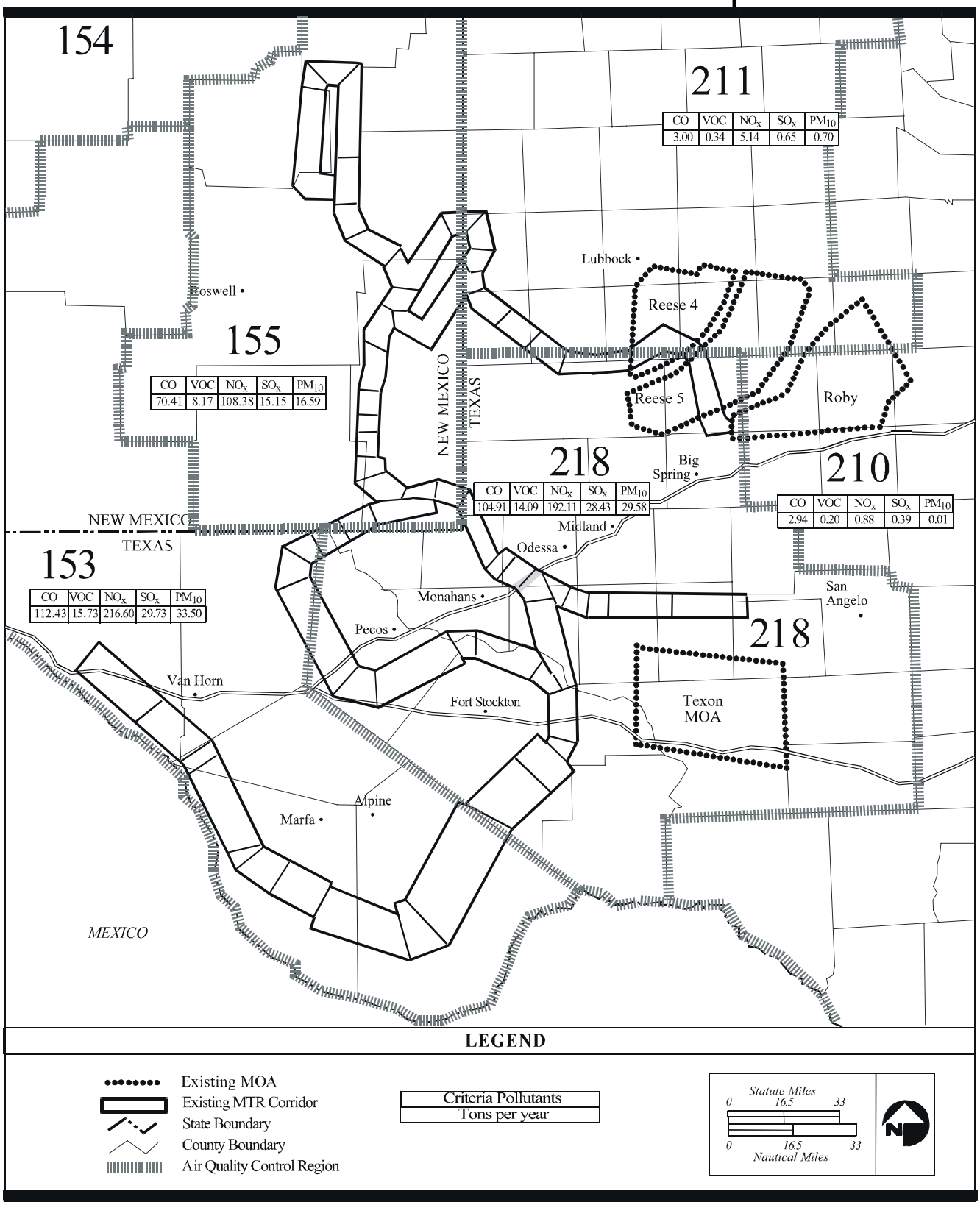
The likelihood of being overflown varies depending upon the type of airspace being flown in. In a MOA (a three-dimensional "box" of airspace), the operations are random and widely dispersed. In other words, no established tracks exist. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown. Also, the higher floor activities of the primary and secondary MOAs eliminate the potential for low-altitude overflights. In MTRs, flights are dispersed within the corridor, both horizontally and vertically. Studies have shown that the horizontal dispersion of flights across an MTR varies according to the route width (Wyle 1996). The wider the corridor, the lower probability that any given spot would be overflown. Of the 71 segments in IR-178, 5 traverse through the Restricted Area for Melrose Range, 3 have widths of 6 nm, 37 are 7 to 9 nm wide, and 36 are 10 to 20 nm wide. The widest segments support the most sortie-operations, thereby reducing the probability of overflight.

Flights and their associated noise are dispersed throughout MTR corridors ranging from 6 to 20 nm wide.

Aircraft Emissions. Federal regulations have defined air quality control regions (AQCRs) designated originally according to population and closely approximating air basins. Effects on air quality from aircraft emissions would typically be confined to the air basin in which the emissions occur, so aircraft emissions for the primary MTRs and MOAs were summed by AQCR rather than by individual airspace unit. Figure 4.1-11 depicts the AQCRs associated with the primary MTRs (IR-178, IR-128/180) and MOAs (Reese 4 and 5, Roby, and Texon) in the affected area in Texas and New Mexico. The Mt. Dora MOA, located well north of the area depicted in the figure, is discussed separately below, as are the areas associated with the Harrison and La Junta ESSs.

Emissions from military aircraft are dispersed and low in quantity.

The affected area for Alternative A includes portions of six AQCRs in Texas and New Mexico: 153, 154, 155, 210, 211, and 218. All of these AQCRs are currently in attainment with the NAAQS and state standards, where applicable. Emissions generated by baseline sortie-operations in these primary MTRs and MOAs (see Appendix F) are dispersed over large areas. Because these emissions are dispersed horizontally and vertically over millions of acres, they do not measurably affect air quality. For example, emission in AQCR 218 are spread over a minimum of more than 700,000 acres.



Alternative A: No-Action Aircraft Emissions

Figure 4.1-11

. . . Alternative A: No-Action

The Mt. Dora MOA is located mostly (97 percent) over AQCR 154, with a minor (about 3 percent) portion extending into AQCR 211. For the criteria pollutants, only nitrogen oxide emissions exceed 1 ton per year (1.7 tons/year). Limited annual sortie-operations (379) and use of altitudes above 3,000 feet account for these low quantities.

Quantities of emissions under Alternative A for the four primary MTRs associated with the Harrison and La Junta ESSs (IR-150, IR-174, IR-177/501, and IR-592) are low (Appendix F) and dispersed along hundreds of miles of MTRs. The areas overlain by these four MTRs are in attainment for the NAAQS.

A MAILS model, run for the most used segments of IR-178 (Appendix F), demonstrates that aircraft emissions in the primary airspace units do not result in ground-level concentrations of pollutants sufficient to affect potential exceedences of the NAAQS or PSD Class I standards. This analysis established that baseline activities on IR-178 generate only fractions of the NAAQS concentrations and PSD Class I increments (Table 4.1-7) and do not impact air quality. With such low concentrations, these emissions do not affect visibility in the one PSD Class I area overlain by any of the airspace units: a corner of Big Bend National Park which underlies the margin of IR-178's corridor near the Texas/Mexico border. No other primary airspace supports as many sortie-operations as IR-178, so it can be inferred that pollutant concentrations in those other routes are less than negligible amounts noted for IR-178.

Aircraft Safety. Many different aircraft fly in the primary airspace, but with the exception of the Mt. Dora MOA, B-52s and B-1s fly the most sortie-operations.

Table 4.1-7
Criteria Pollutant Concentrations for IR-178 Alternative A: No-Action

		Concentration ($\mu g/m^3$)				
Criteria Pollutant	*Averaging Period*	*PSD Class I Increments* [1]	*NAAQS*	*Affected Airspace*	*Percentage of PSD Class I Increment (%)*	*Percentage of the NAAQS (%)*
Nitrogen Dioxide (NO_2)	Annual	2.5	100	0.0614	2.456	0.061
Particulate Matter (PM_{10})[2]	24-hour	10 [3]	150 [3]	0.0407	0.407	0.027
	Annual	5	50	0.009	0.182	0.018
Sulfur Dioxide (SO_2)	3-hour	25 [3]	1,300 [3]	0.1907	0.763	0.015
	24-hour	5 [3]	365 [3]	0.0372	0.744	0.01
	Annual	2	80	0.0085	0.425	0.011
Carbon Monoxide (CO)	1-hour	--	40,000 [3]	3.7747	0.009 [4]	0.009
	8-hour	--	10,000 [3]	0.2547	0.0003 [4]	0.003

[1] The PSD Class I increments for particulates are for TSP.
[2] The NAAQS for particulates is for PM_{10}.
[3] Not to be exceeded more than once per year.
[4] As a percentage of NAAQS.

4.0 Affected Environment and Environmental Consequences: Airspace and Aircraft Operations

Table 4.1-8 presents the statistically estimated time between Class A mishaps for B-52s and B-1s. As these data show, the potential for such mishaps is low in all the primary airspace units. The fewest estimated years between Class A mishaps applies to IR-178, with 39 years for B-52s and 14 years for B-1s. These estimated years

Table 4.1-8
Estimated Class A Mishaps for Primary Airspace for Alternative A: No-Action

Airspace Unit	*Estimated Years Between Class A Mishaps*	
	B-1	*B-52*
IR-128/180	938	1,847
IR-150	177	879
IR 174	194	2,454
IR-177/501	96	345
IR-178	14	39
IR-592	532	103
Reese 4/5 MOAs	NA[1]	NA[2]
Roby MOA	497	NA[2]
Mt. Dora MOA	8,292	22,900

[1] Only three annual sortie-operations in each MOA.

[2] B-52s do not use MOAs.

equate to a probability of 0.03 percent that a B-52 Class A mishap would occur per year; for B-1s, the probability is 0.07 percent.

Although bird-aircraft strike potential is greater in the MTRs than in the MOAs due to the emphasis on flying at lower altitudes, bird-aircraft strikes are relatively infrequent. Databases maintained by the Air Force and Barksdale and Dyess AFBs themselves indicate an average of about 8 to 10 bird-aircraft strikes per year by B-52s and B-1s on all primary MTRs. Over the 11 years of these records, more than 14 million miles have been flown on these routes. Use of the Bird Avoidance Model for planning and executing each training sortie contributes to this low rate of bird-aircraft strikes.

No bird-aircraft strikes have been recorded during the past 11 years in the primary MOAs. This low rate may be the result of two factors. First, aircraft in MOAs predominantly operate at altitudes above which most bird-strikes occur (e.g., 3,000 feet AGL). Second, the lands underlying the MOAs lack areas that attract large concentrations of birds.

ENVIRONMENTAL CONSEQUENCES

Selection of Alternative A: No-Action would not alter airspace management or use, noise levels, air quality, or risks to aircraft from baseline conditions. As a result, no additional effects on these resources would be expected.

4.1.3 Alternative B: IR-178/Lancer MOA

Proposed airspace modifications would not adversely affect airspace management.

Affected Environment

The affected environment for airspace and air operations in Alternative B (refer to Figure 2.4-3) would closely mirror that described for Alternative A: No-Action. It would include the same six primary MTRs, and would involve the four primary or redesignated MOAs (refer to Section 2.4.2). Changes to airspace structure would affect IR-178 and the Reese 4, Reese 5, and Roby MOAs; changes in airspace use would occur on IR-178 and the other five primary MTRs, as well as the Mt. Dora MOA and the abovementioned MOAs. Since no structural or operational changes would apply to the other secondary airspace and airspace management, noise, air quality, and safety conditions would not vary from baseline, these airspace units are not discussed further under Alternative B.

With the exception of the re-entry route and a portion of one exit route to the MOA, the corridor for IR-178 would correspond to existing primary or secondary airspace. About 85 percent of the route would coincide with the existing IR-178 corridor or other overlapping or intersecting MTRs, such as IR 128/180 and VR-1116. Under Alternative A: No-Action, VR-1116 is simply a secondary MTR not associated with bomber training. For Alternative B, the portion of VR-1116 overlapped by the proposed IR-178 becomes part of the affected area. The affected environment also includes the area covered by the proposed Lancer MOA/ATCAA. This area encompasses most of the existing Reese 4, Reese 5, and Roby MOAs.
Baseline conditions for airspace management, noise, aircraft safety, and air quality in the affected area for Alternative B have been presented in the discussion of Alternative A: No-Action. These conditions are compared below to the changes potentially resulting from implementing Alternative B.

Environmental Consequences

Airspace Management. Modification of IR-178 and establishment of the proposed Lancer MOA/ATCAA would have little effect on airspace management. Proposed IR-178 segments VAVB-VBR, the re-entry route, would comprise new low-altitude airspace. However, existing IR-178 airspace surrounds the re-entry route. It would not overlie any airfields nor would it interfere with any federal airways or jet routes. Management of this airspace would follow the same FAA and Air Force procedures that apply to existing IR-178. Scheduling of use would ensure no conflicts between military aircraft in the main IR-178 corridor and aircraft using the re-entry route. Although a change to IR-178, the proposed exit to the Lancer MOA/ATCAA overlaps with portions of existing IR-128/180 and VR-1116. Additional scheduling coordination by the Air Force to avoid conflicts between users of the three MTRs may be needed, but no other changes to current airspace management would occur. Elimination of existing IR-178 segments VW-ASAT would represent a formal airspace change on FAA charts. To the public, no difference in the airspace structure would be noticeable, although annual sortie-operations would decrease. Segments of IR-128/180 would still occupy the same corridor, and military aircraft would still fly in the corridor.

Because the proposed Lancer MOA/ATCAA would overlie an area mostly (90 percent) covered by existing airspace, management of the airspace would not be expected to change noticeably. Elimination of existing Reese 4, Reese 5, and Roby MOA airspace would have a similar lack of effect. From a civil aviation perspective, the boundaries of the charted airspace would fall within the outer limits of the three existing MOAs. The proposed MOA/ATCAA would not overlie additional airfields. Six airfields, with annual use ranging from less than 50 to 2,500 operations, underlie the current MOAs and would underlie the proposed Lancer

MOA/ATCAA. Lowering the floor of the MOA to 3,000 feet AGL would not interfere with operations at these airfields, although additional avoidance procedures may be implemented to accommodate civil aviation activities like cloud seeding and crop dusting.

The area of the proposed MOA/ATCAA includes two jet routes and three federal airways. The FAA would control the airspace when the MOA/ATCAA is activated, ensuring that there are no conflicts with the use of the jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts.

Aircraft Noise. Table 4.1-9 presents noise levels resulting from aircraft operations in the primary and secondary MTRs and MOAs under Alternative B. Compared with baseline conditions, noise levels would change only in the six primary MTRs and in the proposed Lancer MOA/ATCAA. No secondary MTRs or other MOAs would experience a change in noise conditions.

Proposed reductions in bomber sortie-operations would result in a decrease in noise levels for IR-128/180 to below 45 DNL. For the MTRs associated with the Harrison and La Junta Electronic Scoring Sites, decreases of 2 to 7 dB would occur.

Noise levels on IR-178 would change under Alternative B. A segment-by-segment analysis of proposed IR-178 revealed variations in noise levels (Figure 4.1-12 and Table 4.1-10) based on variations in the number of sortie-operations, the floor altitude, and mix of aircraft for different segments (refer to Figure 2.4-3 for segment locations). Noise levels on IR-178 would range from 46 to 61 DNL. Baseline conditions in the affected area of proposed IR-178 generate noise levels ranging from less than 45 to 61 DNL. Existing segments VW-ASAT for IR-178 would be eliminated, but decreased aircraft noise would still occur along IR-128/180, which follows the same corridor. Of the 41 segments in proposed IR-178, noise levels would increase in 37 and decrease in 4. The highest noise levels (60-61 DNL) would occur in segments AB-KL at the start of the MTR where the number of sortie-operations would be greatest. The amount of change (2 to 5 dB) in noise would be less than in other segments such as XY-YZ (13 dB) and AE-AF (12 dB). Segments VAVB-VBR, as new airspace not currently exposed to aircraft noise, would be subject to 53 DNL. A 5 to 12 dB decrease in noise levels would occur in segments ZAA-ACAD. In the more than 20 segments where a greater than 3 dB increase in noise would occur, the change would be noticeable. Noise levels in the proposed Lancer MOA/ATCAA would increase from less than 45 to 46 DNL in response to added sortie-operations. Small areas would be newly exposed to aircraft noise, while airspace (and aircraft noise) would be eliminated over a larger area due to the change in MOA shape. With flight activities restricted to above 3,000 feet AGL, cumulative and single overflight noise levels would remain low.

The percentage of people who may be highly annoyed by aircraft noise could increase under most segments of IR-178 and decrease under a few (Table 4.1-11). Percentages of people who could be highly annoyed would vary from 1 to 8 percent. Increases of 1 to 2 percent in potential numbers of people annoyed would characterize most of the segments. Due to added sortie-operations, segments WX-YZ and AEAF-AFAG would have the largest increase (4 percent). These segments account for less than 5 percent of the entire route corridor. Another 5 percent of the route (segments ZAA-ADAE) would show decreases in the percentage of people who could be highly annoyed. Under the proposed Lancer MOA/ATCAA, the percentage of highly annoyed people would remain very close to that for the existing Reese 4, Reese 5, and Roby MOAs (less than 1 percent).

Noise levels on proposed IR-178 would not increase along four segments but would increase by 2 to 13 dB on the others.

Table 4.1-9
Projected Average Daily Sortie-Operations and Noise Levels Alternative B: IR-178/Lancer MOA

Airspace Units	*Class*	Alternative B			*Baseline Noise Level (DNL)*	*Change from Baseline*
		Total Sortie-Operations	*Average Daily Sortie Operations*	*Noise Level (DNL)*		
MTRs						
VR-100/125	S	1,265	5	49	49	0
VR-108	S	143	1	<45	<45	0
VR-114	S	1,014	4	<45	<45	0
VR-143	S	620	2	49	49	0
VR-186	S	1,175	5	50	50	0
VR-196/197	S	512	2	<45	<45	0
VR-1107/1195	S	1,050	4	<45	<45	0
VR-1116	S	30	<1	<45	<45	0
VR-1175/1176	S	50	<1	46	46	0
IR-107	S	104	<1	<45	<45	0
IR-109	S	310	1	<45	<45	0
IR-110	S	0	0	NA	NA	0
IR-111	S	130	1	<45	<45	0
IR-113	S	300	1	<45	<45	0
IR-123	S	50	<1	<45	<45	0
IR-124	S	140	1	<45	<45	0
IR-128/180	**P**	**150**	**1**	**<45**	**46**	-1
IR-150	**P**	**100**	**<1**	**51**	**55**	-4
IR-154	S	70	<1	<45	<45	0
IR-169	S	465	2	<45	<45	0
IR-174	**P**	**121**	**<1**	**48**	**51**	-3
IR-177/501	**P**	**75**	**<1**	**49**	**56**	-7
IR-178	**P**	**2,660**	**10**	**62**[1]	**61**[1]	10
IR-192/194	S	658	3	49	49	0
IR-592	**P**	**340**	**1**	**48**	**50**	-2
MOAs						0
Reese 4	R	0	0	NA[2]	<45	0
Reese 5	R	0	0	NA[2]	<45	0
Roby	R	0	0	NA[2]	<45	0
Proposed Lancer	**P**	**2,350**	**9**	**46**	**<45**[2]	1
Texon	S	100	<1	<45	<45	0
Mt. Dora	S	368	1	<45	<45	0

Class P = Primary airspace used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

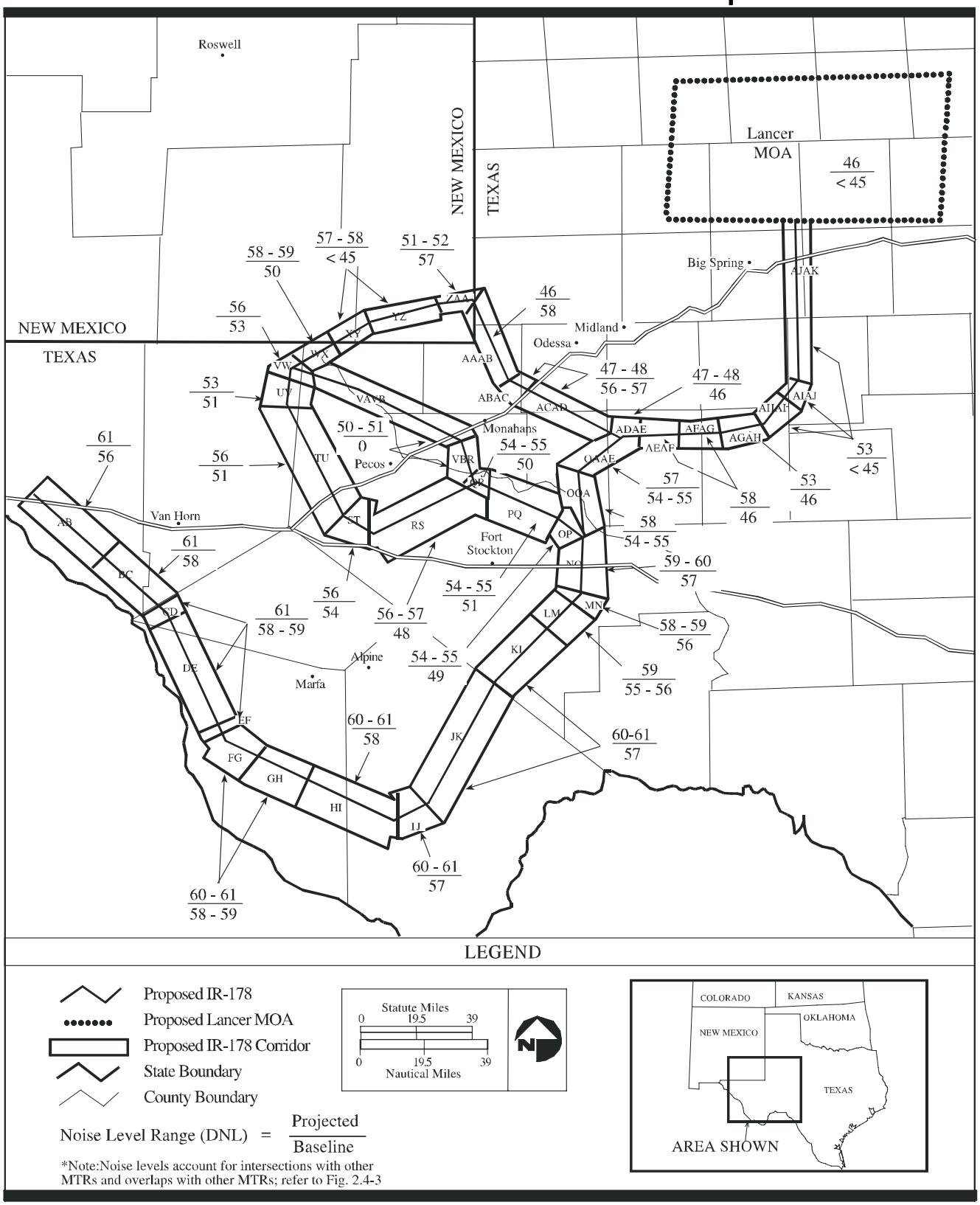
Class S = Secondary airspace unit intersects with primary airspace unit used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

Class R = Redesignated airspace to form the Proposed Lancer MOA.

[1] Noise level represents the highest DNL for any segment of the route; all other segments are equal to or lower.

[2] Based on existing noise levels for Reese 4/5 and Roby MOAs.

With the exception of IR-178, noise levels in the six primary MTRs decrease under Alternative B.



Alternative B: IR-178/Lancer MOA Noise Level Range

Figure 4.1-12

4.0 Affected Environment and Environmental Consequences: Airspace and Aircraft Operations

Table 4.1-10
Projected Noise Levels for Alternative B: IR-178

Proposed IR-178 Segment	*Projected Noise Level Range (DNL)*	*Existing IR-178 Segment*	*Baseline Noise Level Range (DNL)*
AB	61	AB	56
BC	61	BC	58
CD	61	CD	58-59
DE	61	DE	58-59
EF	61	EF	58-59
FG	60-61	FG	58-59
GH	60-61	GH	58-59
HI	60-61	HI	58
IJ	60-61	IJ	57
JK	60-61	JK	57
KL	60-61	KL	57
LM	59	LM	55-56
MN	58-59	MN	56
NO	59-60	NO	57
OP	54-55	OCA	49
PQ	54-55	CACB	51
QR	54-55	CBCC	50
RS	56-57	CCCD	48
ST	56	CDCE	54
TU	56	CECF	51
UV	53	CFCG	51
VW	56	CGCH	53
WX	58-59	CHCI	50
XY	57-58	CICJ	<45
YZ	57-58	CJCK	<45
ZAA	51-52	TU	57
AAAB	46	ST	58
ABAC	47-48	RS	56-57
ACAD	47-48	QR	56-57
ADAE	47-48	not applicable*	46
AEAF	58	not applicable*	46
AFAG	58	not applicable*	46
AGAH	53	not applicable*	46
AHAI	53	not applicable*	<45
AIAJ	53	not applicable*	<45
AJAK	53	not applicable*	<45
VVA	50-51	not applicable	
VAVB	50-51	not applicable	
VBR	50-51	not applicable	
OOA	58	OP	54-55
OAAE	57	OP	54-55

Refer to Figures 2.3-1 and 2.4-3 for segment locations.
* Proposed IR-178 segments overlap with existing segments of IR-128/180 or VR-1116.

Noise levels on segments of proposed IR-178 include aircraft noise generated by use of IR-178 itself, combined with noise from sortie-operations on MTRs that overlap or intersect with IR-178. Noise levels account for sortie-operations by all aircraft.

Table 4.1-11
Percent Population Potentially Highly Annoyed Under Alternative B: IR-178 and Proposed Lancer MOA/ATCAA

IR-178 Segment and MOA	*Projected Percentage (Average)*		*Percentage Change from Baseline*	
	Range [1]		*Range* [1]	
AB	8	8	3	3
BC	8	8	2	2
CD-EF	8	8	1	2
FG-GH	8	8	1	2
HI	8	8	2	2
IJ-KL	8	8	3	3
LM-NO	6	6	2	2
OP-QR	3	3	1	1
RS	4	4	1	1
TU	5	5	1	1
UV-VW	3	3	1	1
WX-YZ	5	5	4	4
ZAA	2	2	-2	-2
AAAB-ADAE	1	1	-3	-2
AEAF-AFAG	5	5	4	4
AGAH-AJAK	3	3	2	2
VAVB-VBR[2]	2	2	2	2
OOA	5	5	2	2
OAAE	4	4	1	1
Lancer MOA/ATCAA[3]	1	1	<1	<1

[1] Based on differences associated with two altitude regimes for B-52s.

[2] Currently not overflown by military aircraft; new airspace.

[3] Existing Reese 4, Reese 5, and Roby MOAs. (Refer to discussion in 4.1.3)

Studies of community response to various types of environmental noise show DNL correlates well with annoyance.

For the other five primary MTRs affected under Alternative B, decreased sortie-operations would mean a lower potential for annoyance. The percentage of people who could be highly annoyed would range from less than 1 percent to 2 percent, in comparison with a range of 1 to 4 percent under baseline conditions.

The likelihood of being overflown varies depending upon the type of airspace. In the proposed Lancer MOA/ATCAA, the random nature of operations and the wide span of altitudes in which to fly make it unlikely that any one location would be repeatedly overflown. Sortie-operations in the proposed Lancer MOA/ATCAA would average nine per day as compared with less than one per day under baseline conditions (based on 260 flying days/year). These operations would be dispersed randomly throughout the almost 18,000 cubic nm of the proposed MOA/ATCAA, with most activity occurring above 20,000 feet AGL. At that altitude, the noise for an individual bomber overflight would be low (refer to Figure 4.1-3).

Dispersal of additional overflights on IR-178 would be aided by the fact that the segments of IR-178 with the most projected sortie-operations are also the widest.

Average daily sortie-operations would increase on all but five segments of proposed IR-178 (Appendix B). Increases would range from one to six more bomber sortie-operations per day, on average, compared with baseline. These sortie-operations could generate noise levels (SELs) ranging from 86 dB at 3,000 feet AGL to 116 dB at 300 feet AGL, the same as under baseline conditions. Such events could last from 7 to 10 seconds for a person directly under the flight path.

Proposed IR-178 flights are dispersed both horizontally and vertically within the corridor. They would also be spread throughout the day. Research has shown that the dispersion of flights across an MTR like IR-178 increases with route width (Wyle 1996). Proposed IR-178 segments would vary in width from 6 to 14 miles with 40

(out of a total of 41 segments) being 8 to 14 miles wide, respectively (Appendix C, Table C-2). Dispersal of the additional overflights would be aided by the fact that the segments of proposed IR-178 with the most daily sortie-operations are also the widest segments.

Required avoidance procedures would help reduce noise levels in some areas. FAA Regulation Part 91.119 (FAA 1992) and Air Force Instruction 11-202 (USAF 1998) require aircraft to avoid congested areas by 1,000 feet AGL above the highest obstacle within 2,000 feet of the aircraft. Outside congested areas, aircraft must avoid isolated persons, structures, or vessels by 500 feet. Noise levels in such avoidance areas would likely be lower than those presented above.

Aircraft Emissions. Figure 4.1-13 presents the amounts of emissions projected to occur in the affected AQCRs with implementation of Alternative B. Total annual emissions of criteria pollutants would increase in AQCR 153, 210, 211, and 218, with the greatest amount of change in AQCR 218. Decreases in all criteria pollutant emissions would take place in AQCR 155. Both the increases and decreases would result from the proposed airspace modifications and associated shifts in sortie-operations. All of those AQCRs are in attainment for federal and state air quality standards. Added emissions in AQCR 153, 210, 211, and 218 would be dispersed over hundreds of miles and thousands of feet of altitude. For example, in AQCR 153 alone, emissions would be dispersed within more than 3,800 cubic nm. Such dispersal would likely preclude ground-level concentration of criteria pollutants leading to exceedences of the NAAQS.

Emissions from military aircraft would increase, but would not noticeably degrade air quality.

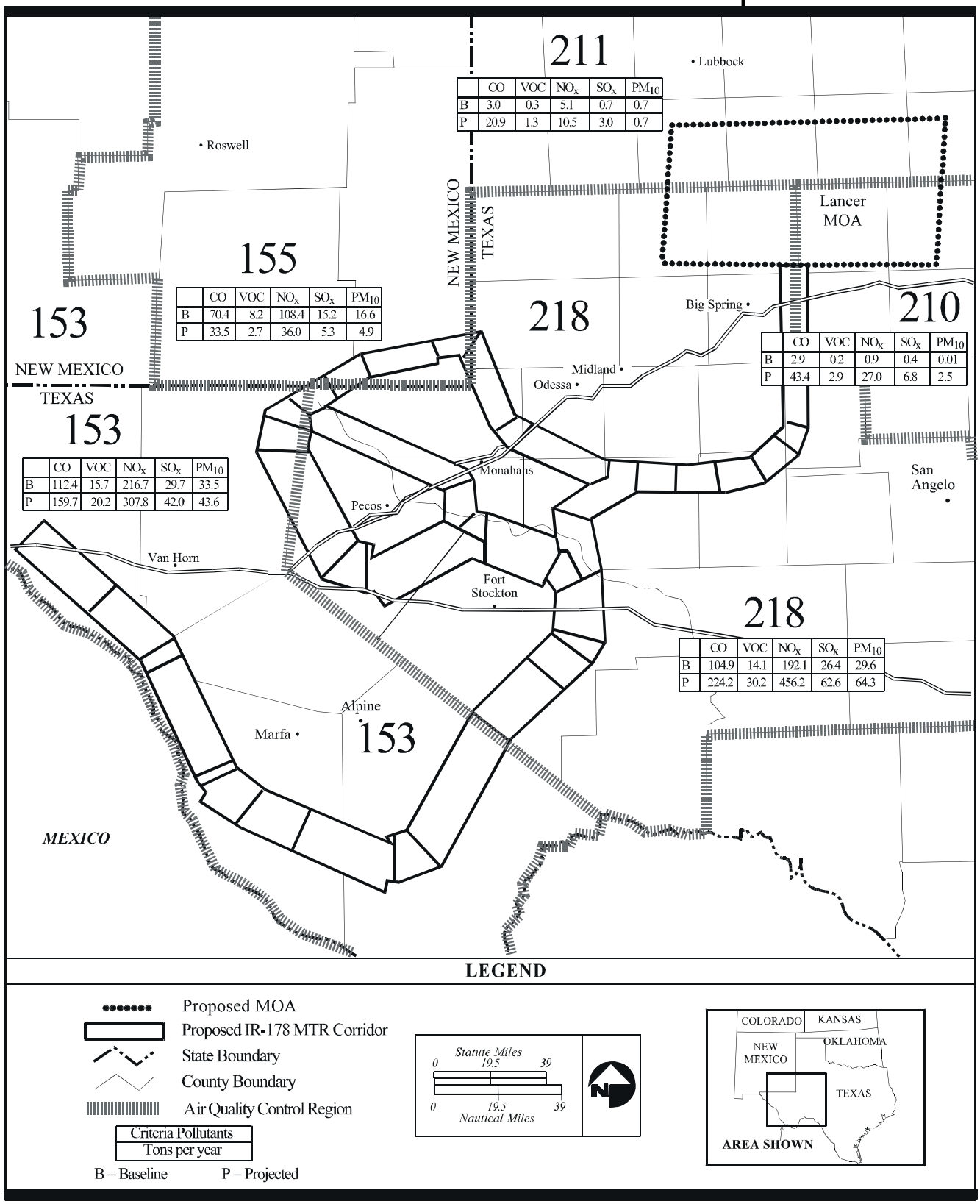
MAILS modeling confirms that Alternative B aircraft operations would not cause potential exceedences of the NAAQS or PSD Class I standards (Table 4.1-12).

Table 4.1-12
Criteria Pollutant Concentrations for Alternative B:
IR-178 and Lancer MOA/ATCAA

		Concentration ($\mu g/m^3$)				
Criteria Pollutant	*Averaging Period*	*PSD Class I Increments*[1]	*NAAQS*	*Affected Airspace*	*Percentage of PSD Class I Increment (%)*	*Percentage of the NAAQS (%)*
Nitrogen Dioxide (NO_2)	Annual	2.5	100	0.059	2.36	0.059
Particulate Matter (PM_{10})[2]	24-hour	10[3]	150[3]	0.032	0.320	0.021
	Annual	5	50	0.008	0.160	0.016
Sulfur Dioxide (SO_2)	3-hour	25[3]	1,300[3]	0.158	0.632	0.012
	24-hour	5[3]	365[3]	0.031	0.618	0.008
	Annual	2	80[3]	0.008	0.400	0.010
Carbon Monoxide (CO)	1-hour	--	40,000[3]	2.26	0.006[4]	0.006
	8-hour	--	10,000[3]	0.0173	0.002[4]	0.002

[1] The PSD Class I increments for particulates are for TSP.
[2] The NAAQS for particulates is for PM_{10}.
[3] Not to be exceeded more than once per year.
[4] As a percentage of the NAAQS.

Projected sortie-operations under Alternative B would generate only fractions of the NAAQS concentrations and PSD Class I increments and would not adversely impact air quality. Since the AQCRs are in attainment and the emissions from Alternative B would not change this situation, no conformity determination is needed. Due to



Alternative B: IR-178/Lancer MOA Aircraft Emissions

Figure 4.1-13

. . . Alternative B: IR-178/Lancer MOA

proposed shifts in the IR-178 corridor away from Big Bend National Park, no PSD Class I areas would be affected under this alternative.

No other segment of a primary or secondary MTR would support as many sortie-operations as IR-178, so concentrations of criteria pollutants would necessarily be less in these airspace units. In addition, quantities of emissions in the six other primary MTRs and the Mt. Dora MOA would decrease in response to reductions in sortie-operations (Appendix F). No changes to emissions associated with secondary MTRs would result from Alternative B.

Since the results of analysis show that emissions from the projected sortie-operations represent a fraction of regulatory standards and all affected areas are in attainment, Alternative B would not lead to nonconformance for any criteria pollutants. Consequently, a conformity analysis is not required.

Aircraft Safety. Under Alternative B, use of primary airspace by B-1s and B-52s would change, and the risks of Class A mishaps would increase and decrease accordingly (Table 4.1-13). In all primary airspace, except for proposed IR-178, the proposed Lancer MOA/ATCAA and IR-592, the estimated years between Class A mishaps would increase. This would further decrease the already miniscule risk of a Class A mishap. A change of only one year between Class A mishaps for B-52s and B-1s would apply to proposed IR-178. The estimated years equate to a probability of 0.03 percent that a B-52 Class A mishap would occur per year and 0.08 percent for B-1s. The probability of a bomber Class A mishap in the Lancer MOA/ATCAA and on IR-592 would be even more insignificant than for IR-178.

Table 4.1-13
Estimated Class A Mishaps for Primary Airspace for Alternative B

Airspace	*Estimated Years Between Mishaps*			
	B-1		*B-52*	
	Baseline	*Alternative B*	*Baseline*	*Alternative B*
IR-128/180	938	NA[2]	1,847	NA[2]
IR-150	177	444	879	3,516
IR 174	194	258	2,454	NA[2]
IR-177/501	96	478	345	2,584
IR-178	14	13	39	38
IR-592	532	532	103	163
Lancer MOA/ATCAA	497 [1]	27	NA[2]	583

[1] Represents B-1 activities from Roby MOA that would be incorporated into Lancer MOA/ATCAA.

[2] No sortie-operations in airspace unit.

Aircraft safety risks would remain low in Alternative B.

Neither the existing nor proposed airspace in Alternative B overlie or intersect any major migration flyways or water bodies where birds congregate. Despite the changes in numbers of sortie-operations, the potential for bird-aircraft strikes in IR-178 and proposed Lancer MOA/ATCAA would remain negligible. Documentation maintained by the Air Force and individual bases indicates that B-52s and B-1s experience 8 to 10 bird-aircraft strikes per year on the six primary MTRs. Continued use of the Bird Avoidance Model to plan and execute training sorties would likely prevent measurable increases in average bird-aircraft strikes. For the other affected MTRs and MOAs, the potential for bird-aircraft strikes would either remain at its current low level or decrease commensurate with projected sortie-operations.

4.1.4 Alternative C: IR-178/Proposed Texon MOA

AFFECTED ENVIRONMENT

The affected environment for airspace and air operations in Alternative C (refer to Figure 2.4-6) would match closely with that of Alternative A: No-Action. It would include the same six primary MTRs (refer to Section 2.4-3). In addition, the Texon MOA would become primary airspace in this alternative. Changes to airspace structure would affect IR-178 and the existing Texon MOA. More than 80 percent of the proposed route matches with existing IR-178 or overlaps with existing IR-128/180. Almost all of the existing Texon MOA would be incorporated into the proposed Texon MOA/ATCAA. Existing secondary MTRs also cover much of the same area as the proposed Texon MOA/ATCAA, so about 75 percent of the area under the proposed MOA/ATCAA is already overlain by existing airspace. Changes in airspace use (i.e., sortie-operations) are projected for IR-178 and IR-128/180 in Texas and New Mexico, as well as for IR-174 and IR-592 (associated with Harrison Electronic Scoring Site) and IR-150 and IR-177/501 (associated with La Junta ESS). Projected use of the proposed Texon MOA/ATCAA would increase, while bomber sortie-operations in the Reese 4, Reese 5, Roby, and Mt. Dora MOAs would decrease to zero. None of the 19 secondary MTRs would be subject to structural or operational changes under Alternative C.

For airspace management, aircraft noise, air quality, and aircraft safety, baseline conditions for the affected environment have been presented in Alternative A: No-Action (refer to Section 4.1.2). These conditions are compared below with changes potentially resulting from implementing Alternative C.

ENVIRONMENTAL CONSEQUENCES

Airspace Management. Modification of IR-178 and expansion of the proposed Texon MOA/ATCAA would affect airspace. Although proposed IR-178 segments VAVB-VBR, the re-entry route, represent new low-altitude airspace, they are surrounded by existing IR-178. This new MTR airspace neither overlies airfields nor intersects any federal airways or jet routes. Management of this airspace would follow FAA and Air Force procedures identical to those used for existing IR-178. To ensure no conflicts between military aircraft in the main IR-178 corridor and aircraft using the re-entry route, the Air Force would employ the strict scheduling process described previously (refer to Section 4.1.1).

The proposed changes to the existing MOA could require changes to airspace management by the FAA.

The short (less than 20 nm) exit route (segment NNA) from IR-178 to the proposed Texon MOA/ATCAA is also new airspace, but it would not noticeably alter civil aviation in the area or require additional airspace management procedures. No airway, jet route, or airfield is affected by this segment. Given its short length and its position right next to IR-178, this new airspace would affect local VFR traffic no more than the current airspace structure.

Elimination of existing IR-178 segments UV-AT would not be noticeable to the public or to local VFR aviation. Segments of IR-128/180 would still occupy the same corridor and military aircraft, albeit fewer would fly on the route.

Expansion of the Texon MOA could result in a change to current airspace management. The proposed MOA/ATCAA is situated in an area currently covered, to a large degree, by existing MOA and MTR airspace. This area, however, includes arrival and departure traffic associated with Abilene, Midland, San Angelo, Houston, and Dallas-Fort Worth airport terminal areas. Normal routes to and from the Houston airport terminal area would cross through the proposed MOA. Approaches and approach procedures at Midland and San Angelo airports could also be affected. Proposed additions to the Texon MOA/ATCAA would also affect two jet routes and

a federal airway. Use of the MOA/ATCAA would require substantial rerouting and possibly restructuring for these jet routes and airways. For local VFR aviation, operating conditions would be similar to today. Local VFR traffic would, however, have to become aware of new airspace in the northeast and west portions of the proposed Texon MOA/ATCAA. See-and-avoid techniques for both military and civil aviation VFR traffic would apply in these areas and the rest of the MOA, so the potential for conflicts should be negligible.

A total of seven airfields would underlie the proposed MOA/ATCAA, as compared to four under the current Texon MOA. Flight operations at these airfields commonly support crop dusting, cloud seeding, ranching, and other short VFR flights. Lowering the floor of the proposed Texon MOA/ATCAA could require development of special operating or avoidance procedures for military aircraft flying over the vicinity of these airfields.

Aircraft Noise. Compared with baseline conditions (Table 4.1-14), noise levels would change only in the six primary MTRs and in the proposed Texon MOA/ATCAA. Proposed reductions in bomber sortie-operations would result in a decrease in noise levels for IR-128/180 to below 45 DNL. For the MTRs associated with the Harrison and La Junta Electronic Scoring Sites, decreases of 2 to 7 dB would occur. No secondary MTRs or other MOAs would not experience a change in noise conditions.

Additional sortie-operations projected for proposed IR-178 would increase noise levels on 30 of 35 segments.

For proposed IR-178, a segment-by-segment analysis shows that noise levels would vary (Figure 4.1-14 and Table 4.1-15) based on variations in the number of sortie-operations, the floor altitude, and mix of aircraft for different segments. Noise levels on IR-178 would range from 46 to 61 DNL. Baseline conditions in the affected area of proposed IR-178 generate noise levels ranging from less than 45 to 61 DNL. Existing segments VW-ASAT for IR-178 would be eliminated, but decreased aircraft noise would still occur along IR-128/180, which follows the same corridor. Of the 35 segments in proposed IR-178, noise levels would increase in 30 and decrease in 5. Segments AB-KL, which would support the most sortie-operations, would have the highest noise levels (60-61 DNL). The amount of increase (2 to 5 dB) in these segments would be less than in others, such as XY-YZ (13 dB) and WX (8 dB). Segments VAVB-VBR, as new airspace not currently exposed to aircraft noise, would be subject to 49 to 50 DNL. A 5 to 11 dB decrease in noise levels would occur in segments ZAA-ACAD. In the 17 segments where a greater than 3 dB increase in noise would occur, the change would be noticeable.

Noise levels in the proposed Texon MOA/ATCAA would increase from less than 45 to 46 DNL, in response to the added sortie-operations. New areas would be exposed to aircraft noise; they would comprise about 25 percent of the area of the proposed MOA/ATCAA. With flight activities restricted to above 3,000 feet AGL, cumulative and single overflight noise would remain low.

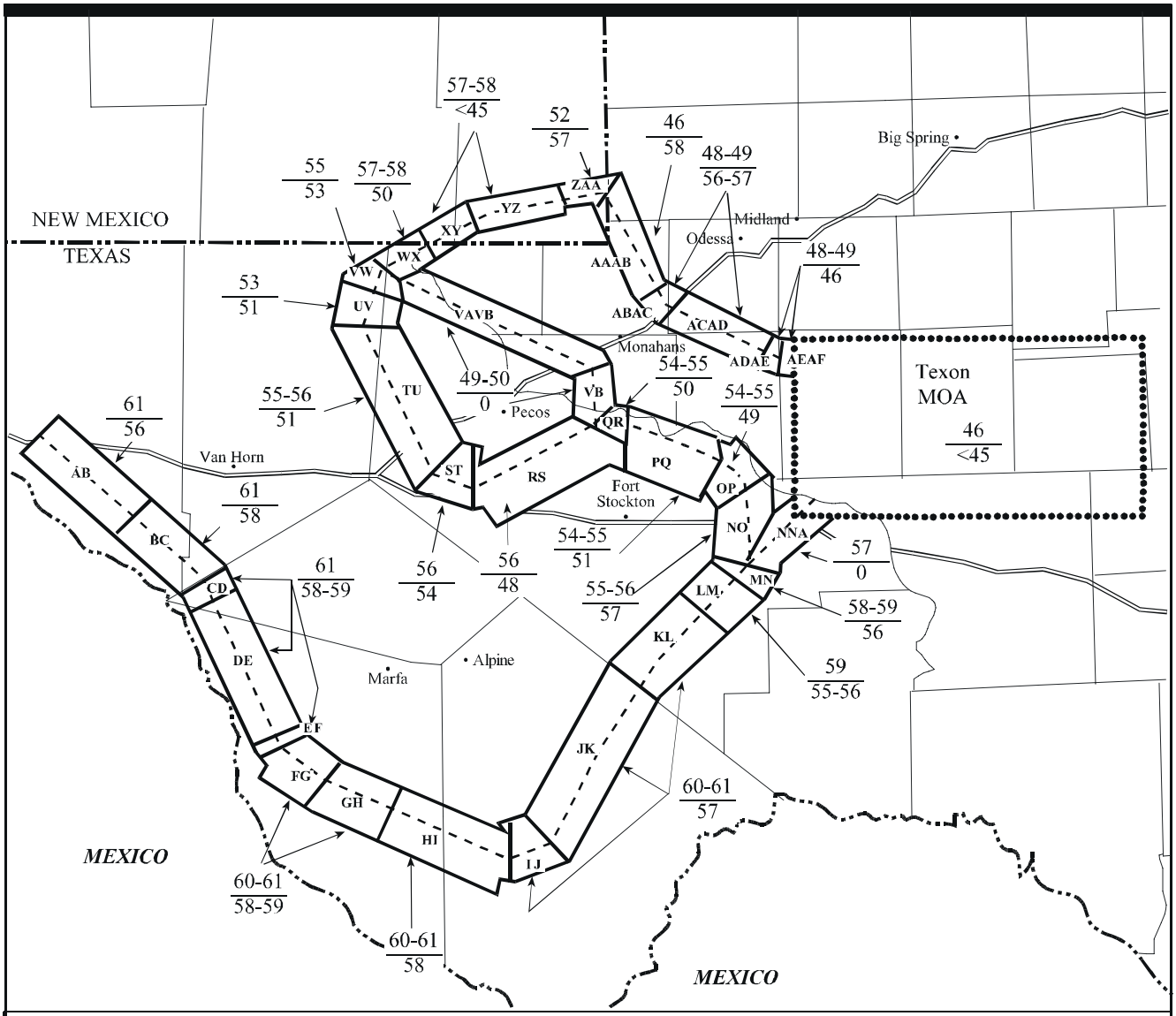
The percentage of people who may be highly annoyed by aircraft noise could increase under most segments of IR-178 and would decrease under a few (Table 4.1-16). Under the proposed Texon MOA/ATCAA, the percent highly annoyed would remain very close to that under the existing Texon MOA (less than 1 percent). Percentages of people that could be highly annoyed would vary from 1 to 8 percent. Increases of 1 to 2 percent in annoyance would characterize most of the segments. As new airspace, segment NNA would have the largest increase (4 percent). This segment accounts for less than 5 percent of the entire route corridor. Another 5 percent of the route would show decreases in the percent of the people who could be highly annoyed.

Table 4.1-14
Projected Average Daily Sortie-Operations and Noise Levels Alternative C: IR-178/Texon MOA

Airspace Units	*Class*	Alternative C			*Baseline Noise Level (DNL)*	*Change from Baseline*
		Total Sortie-Operations	*Average Daily Sortie-Operations*	*Noise Level (DNL)*		
MTRs						
VR-100/125	S	1,265	5	49	49	0
VR-108	S	143	1	<45	<45	0
VR-114	S	1,014	4	<45	<45	0
VR-143	S	620	2	49	49	0
VR-186	S	1,175	5	50	50	0
VR-196/197	S	512	2	<45	<45	0
VR-1107/1195	S	1,050	4	<45	<45	0
VR-1116	S	30	<1	<45	<45	0
VR-1175/1176	S	50	<1	46	46	0
IR-107	S	104	<1	<45	<45	0
IR-109	S	310	1	<45	<45	0
IR-110	S	0	0	NA	NA	0
IR-111	S	130	1	<45	<45	0
IR-113	S	300	1	<45	<45	0
IR-123	S	50	<1	<45	<45	0
IR-124	S	140	1	<45	<45	0
IR-128/180	**P**	**150**	**1**	**<45**	**46**	-1
IR-150	**P**	**105**	**<1**	**51**	**55**	-4
IR-154	S	70	<1	<45	<45	0
IR-169	S	465	2	<45	<45	0
IR-174	**P**	**121**	**<1**	**48**	**51**	-3
IR-177/501	**P**	**75**	**<1**	**49**	**56**	-7
IR-178	**P**	**2,660**	**10**	**62**[1]	**61**[1]	10
IR-192/194	S	658	3	49	49	0
IR-592	**P**	**340**	**1**	**48**	**50**	-2
MOAs						0
Reese 4	S	0	0	NA	<45	0
Reese 5	S	0	0	NA	<45	0
Roby	S	0	0	NA	<45	0
Proposed Texon	**P**	**2,400**	**9**	**46**	**<45**	1
Mt. Dora	S	368	1	<45	<45	0

Class P = Primary airspace used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.
Class S = Secondary airspace unit intersects with primary airspace unit used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.
[1] Noise level represents the highest DNL for any segment of the route; all other segments are equal to or lower.

Noise levels for five of the six primary MTRs decrease under Alternative C.



Alternative C: IR-178/Texon MOA Noise Level Range **Figure 4.1-14**

Table 4.1-15
Projected Noise Levels for Alternative C: IR-178

Proposed IR-178 Segment	*Projected Noise Level Range (DNL)*	*Existing IR-178 Segment*	*Baseline Noise Level Range (DNL)*
AB	61	AB	56
BC	61	BC	58
CD	61	CD	58-59
DE	61	DE	58-59
EF	61	EF	58-59
FG	60-61	FG	58-59
GH	60-61	GH	58-59
HI	60-61	HI	58
IJ	60-61	IJ	57
JK	60-61	JK	57
KL	60-61	KL	57
LM	59	LM	55-56
MN	58-59	MN	56
NO	55-56	NO	57
OP	54-55	OCA	49
PQ	54-55	CACB	51
QR	54-55	CBCC	50
RS	56	CCCD	48
ST	56	CDCE	54
TU	55-56	CECF	51
UV	53	CFCG	51
VW	55	CGCH	53
WX	57-58	CHCI	50
XY	57-58	CICJ	<45
YZ	57-58	CJCK	<45
ZAA	52	TU	57
AAAB	46	ST	58
ABAC	48-49	RS	56-57
ACAD	48-49	QR	56-57
ADAE	48-49	not applicable*	46
AEAF	48-49	not applicable*	46
VVA	49-50	not applicable	not applicable
VAVB	49-50	not applicable	not applicable
VBR	49-50	not applicable	not applicable
NNA	57	not applicable	not applicable

Refer to Figures 2.3-1 and 2.4-6 for segment locations.
* Proposed IR-178 segments overlap with existing IR-128/180

Noise levels on segments of IR-178 include aircraft noise generated by use of IR-178 itself, combined with noise from sortie-operations on MTRs that overlap or intersect with IR-178. Noise levels account for sortie-operations by all aircraft.

For the other five primary MTRs affected under Alternative C, decreased sortie-operations would mean a lower potential for annoyance. The percentage of people who could be highly annoyed would range from less than 1 to 2 percent, in comparison with a range of 1 to 4 percent under baseline conditions.

The likelihood of experiencing overflights in the proposed Texon MOA/ATCAA is similar to that described for the proposed Lancer MOA/ATCAA in Alternative B. Randomness of operations and the varied altitude structure preclude the potential for intensive, repetitive flights over the same location. Daily sortie-operations in the proposed Texon MOA/ATCAA would average about nine per day (compared with

Table 4.1-16
Percent Population Potentially Highly Annoyed Under Alternative C: IR-178 and Proposed Texon MOA/ATCAA

IR-178 Segment and MOA	*Projected Percentage (Average)*		*Percentage Change from Baseline*	
	Range [1]		*Range* [1]	
AB	8	8	3	3
BC	8	8	2	2
CD-EF	8	8	1	2
FG-GH	8	8	1	2
HI	8	8	2	2
IJ-KL	8	8	3	3
LM-MN	5	6	1	2
NO-QR	3	3	1	1
RS	4	4	1	1
ST	5	5	1	1
TU-UV	3	3	1	1
VW	4	4	1	2
WX-YZ	5	6	1	2
YZ-ZAA	2	4	-2	0
AAAB-ACAD	1	1	-4	-3
ADAE-AEAF	1	1	0	0
VAVB-VBR[2]	1	2	1	2
NNA[2]	4	4	4	4
Texon MOA/ATCAA	<1	<1	<1	<1

[1] Based on differences associated with two altitude regimes for B-52s.

[2] Currently not overflown by military aircraft; new airspace.

Studies of community response to various types of environmental noise show DNL correlates well with annoyance.

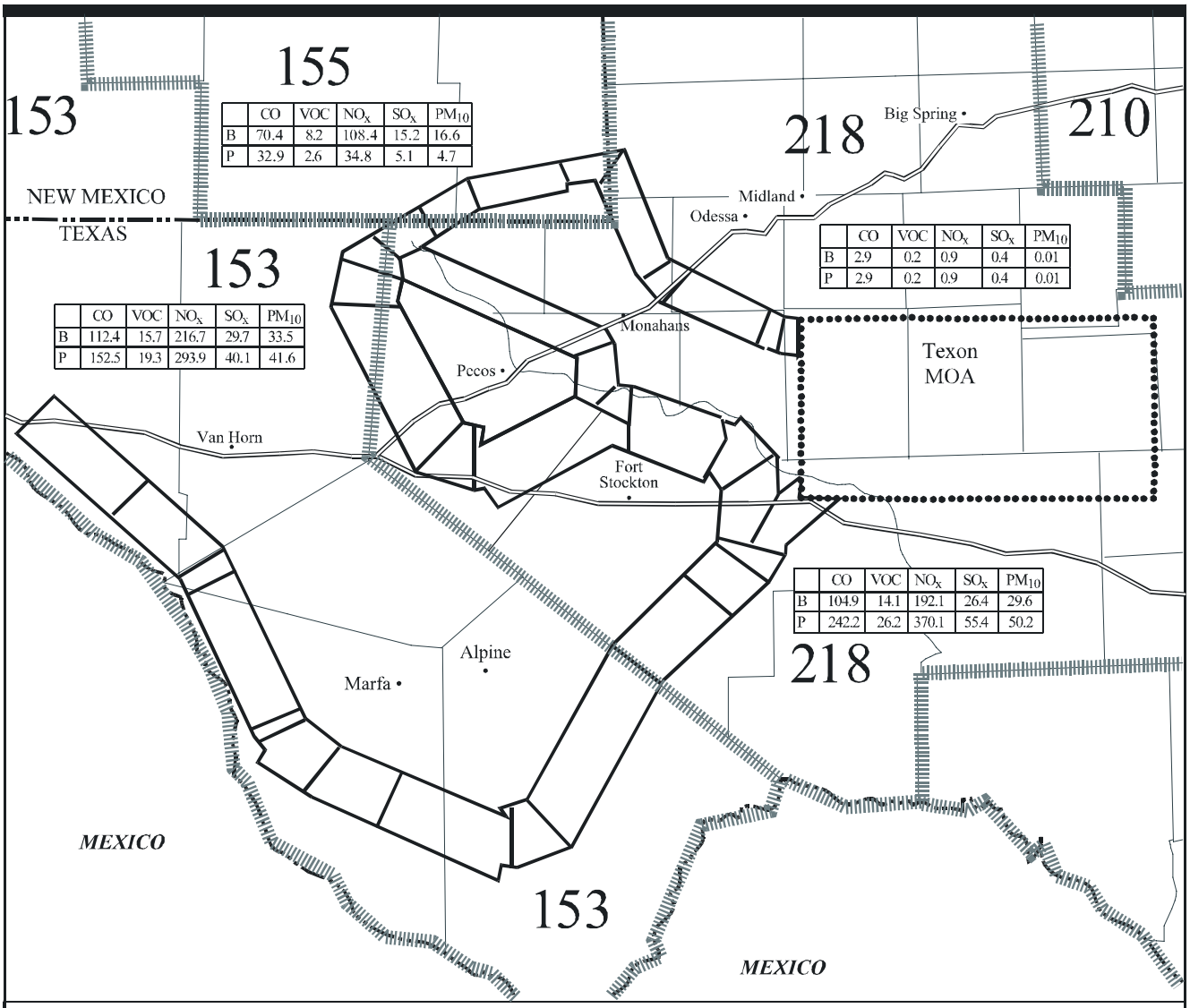
less than one under baseline). These sortie-operations would be dispersed randomly throughout the almost 18,000 cubic nm of the proposed MOA/ATCAA, with most activity occurring above 20,000 feet AGL. At that altitude, the noise from an individual bomber overflight would be low (refer to Figure 4.1-3).

Dispersal of overflights and noise would be enhanced because the segments of proposed IR-178 with the most sortie-operations would also be the widest.

Average daily sortie-operations would increase on all but five segments of proposed IR-178 (Appendix B). Increases would range from one to six more sortie-operations per day, on average. While these sortie-operations could generate noise levels (SELs) ranging from 86 to 116 dB, such events would last from 7 to 10 seconds for a person directly under the flight path. The likelihood of being overflown would vary with the widths of the MTR corridor. In Alternative C, IR-178 contains 35 segments with widths varying from 6 to 14 miles. Dispersal of overflights would be enhanced because the segments of IR-178 with the most sortie-operations would also be the widest (Appendix C, Table C-2).

AIRCRAFT EMISSIONS

Figure 4.1-15 presents the amounts of emissions projected to occur in the affected AQCRs with implementation of Alternative C. Unlike Alternative A: No-Action, AQCR 210 would not be affected in Alternative C. Total annual emissions of criteria pollutants would increase in AQCRs 153 and 218, with the greatest amount of change in the AQCR 218. Decreases in all criteria pollutant emissions would take place in AQCR 155 and 211. All of these AQCRs are in attainment for federal and state standards, and the added emissions in AQCRs 153 and 210 would be dispersed over hundreds of miles and thousands of feet of altitude. In the case of AQCR 153, emissions would be dispersed over more than 3,800 cubic nm. Such dispersal would minimize ground-level concentrations of criteria pollutants.



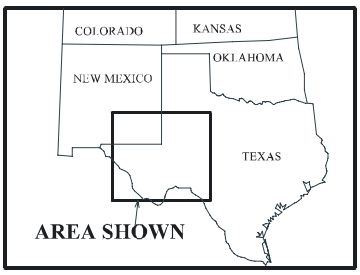
LEGEND

Proposed IR-178 MOA
Proposed IR-178 MTR Corridor
State Boundary
County Boundary
Air Quality Control Region

Statute Miles: 0 19.5 39
Nautical Miles: 0 19.5 39

Criteria Pollutants
Tons per year

B = Baseline P = Projected



Alternative C: IR-178/Texon MOA Aircraft Emissions

Figure 4.1-15

. . . Alternative C: IR-178/Texon MOA

MAILS modeling further demonstrates that Alternative C aircraft operations would not cause potential exceedences of the NAAQS or PSD Class I standards. The same analysis (refer to Table 4.1-13) used for the MAILS model for Alternative B applies to Alternative C. The segments of IR-178 with the greatest number of sortie-operations in the shortest time period and at the lowest altitude would be identical in both alternatives. Projected sortie-operations would generate only fractions of the NAAQS concentrations and PSD Class I increments and would not adversely impact air quality. No conformity determination is needed. Due to proposed shifting of the IR-178 corridor, no PSD Class I areas would be affected under this alternative.

Emissions from military aircraft would be dispersed and low in quantity.

Emissions from projected aircraft operations in the MTRs associated with the Harrison and La Junta Electronic Scoring Sites would decrease relative to current levels. All of the affected AQCRs are in attainment and these decreases in emissions would not alter those conditions. Similarly, emissions in all other primary MTRs would decrease.

The results of analysis show that emissions from the proposed sortie-operations represent a minimal percentage of the regulatory standards and all affected areas are in attainment. Consequently, Alternative C would not lead to nonconformance for any criteria pollutants and a conformity analysis is not required.

Aircraft Safety. Under Alternative C, the risks of Class A mishaps would increase and decrease in relation to changes in the numbers of sortie-operations (Table 4.1-17). In all airspace except the proposed Lancer MOA/ATCAA and IR-592, the estimated years between Class A mishaps would increase and risk would decrease. A slight increase (relative to baseline conditions) in years between Class A mishaps for B-52s and B-1s would apply to IR-178 due to the shorter total length of the MTR. The estimated years equate to 0.02 percent probability of a B-52 Class A mishap per year and a 0.07 percent probability for B-1s. The probability of a bomber Class A mishap in the Texon MOA/ATCAA and on IR-592 would be even more insignificant than for IR-178.

Neither the existing nor proposed airspace in Alternative C overlies or intersects any major migration flyways or water bodies where birds congregate. Although sortie-operations would increase, the potential for bird-aircraft strikes in IR-178 and expanded Texon MOA/ATCAA would remain negligible. Documentation maintained by the Air Force and individual bases indicated that B-52s and B-1s experience one to two bird-aircraft strikes per year on IR-178 MTR and none within the Texon MOA. Continued use of the Bird Avoidance Model to plan and execute training sorties would likely prevent measurable increases in average bird-aircraft strikes. For the other affected MTRs and MOAs, the potential for bird-aircraft strikes would either remain at its current low level or decrease commensurate with projected sortie-operations.

Aircraft safety risks would remain low in Alternative C.

Table 4.1-17
Estimated Class A Mishaps for Primary Airspace for Alternative C

Airspace	*Estimated Years Between Mishaps*			
	B-1		*B-52*	
	Baseline	*Alternative C*	*Baseline*	*Alternative C*
IR-128/180	938	NA[1]	1,847	NA[1]
IR-150	177	444	879	3,516
IR 174	194	258	2,454	NA[1]
IR-177/501	96	478	345	2,584
IR-178	14	15	39	45
IR-592	532	532	103	163
Texon MOA/ATCAA	NA[1]	27	NA[1]	583

[1] No sortie-operations in airspace unit.

4.0 Affected Environment and Environmental Consequences: Airspace and Aircraft Operations

4.1.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

The affected environment for airspace and air operations in Alternative D differs from that described for Alternatives A, B, and C. Alternative D is centered in northeastern New Mexico and interacts with numerous airspace units in that region. At the heart of this alternative is the establishment of a new MTR, IR-153, which extensively overlaps or intersects portions of 11 existing primary and secondary MTRs, including IR-109, IR-111, IR-113, VR-1175/1176, and VR-100/125 (refer to Figure 2.4-9). Collectively, these overlaps and intersections account for 89 percent of the corridor proposed for IR-153. But unlike Alternatives B and C, there is no existing IR-153 to serve as the baseline and compare with the proposed IR-153. Rather, the portions of the overlapping and intersecting MTRs coinciding with proposed IR-153 form the affected area and reflect baseline conditions. Creation of proposed IR-153 would not result in the elimination of any overlapping or intersecting MTRs. These would continue as today, and scheduling would provide the means to avoid airspace conflicts.

The affected environment for airspace and air operations is focused on northeastern New Mexico for Alternative D.

The affected environment also includes areas under new airspace not coinciding with any existing airspace. Only one complete segment (WAWB) represents wholly new airspace, although some parts of 13 other segments would be new.

The Mt. Dora MOA forms another part of the existing affected environment. Under Alternative D, the existing MOA would be reduced in size to form the proposed MOA/ATCAA. The proposed Mt. Dora MOA/ATCAA comprises 95 percent of existing airspace. As such, baseline environmental conditions for the existing Mt. Dora MOA are compared against the changes resulting from establishing the proposed MOA/ATCAA.

The affected environment includes the same six primary MTRs as in Alternatives B and C. In Alternative D, however, the structure of IR-178 does not change from baseline (refer to Figure 2.3-1). None of the secondary MTRs would be subject to structural or operational changes and warrant no detailed discussion here.

Analysis of the other alternatives in this section, including previous discussions, tables, and figures, has presented baseline information on the secondary MTRs and Mt. Dora MOA that form the focus of the affected area for Alternative D. Examples of this include Tables 4.1-4, 4.1-9, and 4.1-14, which each present data on sortie-operations and noise levels in these secondary MTRs and the Mt. Dora MOA. For these reasons, additional description of the affected environment will be presented only as comparison to the potential changes resulting from Alternative D.

ENVIRONMENTAL CONSEQUENCES

Airspace Management. Creation of IR-153 and modification of the Mt. Dora MOA/ATCAA would have little effect on airspace management. The airspace involved in this alternative consists of predominantly existing airspace and is surrounded by military airspace. Established flight procedures would still apply, and since the changes would be few, civil aviation pilots would be able to learn the new airspace quickly. The reconfigured Mt. Dora MOA and its overlying ATCAA would interact with some jet routes. Scheduling of the ATCAA by the FAA would prevent conflicts in use with that of the jet routes. The proposed Mt. Dora MOA/ATCAA would also affect two federal airways. To prevent conflicts, the FAA and Air Force would need to work on procedures to avoid conflicts when charting the MOA/ATCAA. Modification to the Mt. Dora MOA would not change its relationship to the two airfields it overlies. Existing routing and avoidance procedures would be sufficient to avoid conflicts between civil and military aviation

at these airfields. Due to the changes in the airspace structure, special effort may be needed to ensure all civil aviation pilots are aware of the location of the airspace and its schedule for use. With the intersections and overlaps of multiple secondary MTRs, scheduling to prevent conflicts would be complex and challenging. This would represent a change to the current military users of the existing secondary MTRs.

Aircraft Noise. Table 4.1-18 shows the noise levels for all primary and secondary airspace under Alternative D. With the exception of proposed IR-153, noise levels in the other primary MTRs would decrease by 1 to 10 dB. Because proposed IR-153, not IR-178, would receive the bulk of bomber sortie-operations, noise levels in existing IR-178 would decrease by as much as 6 dB below baseline levels. Secondary MTRs would not experience any change in noise outside of where they coincide with proposed IR-153.

Noise levels on proposed IR-153 include aircraft noise generated by use of IR-153 itself, combined with noise from sortie-operations on MTRs that overlap or intersect with IR-153. Noise levels account for sortie-operations by all aircraft.

Noise levels on the 38 segments of IR-153 would range from less than 45 to 64 DNL (Figure 4.1-16 and Table 4.1-19) but would increase by more that 10 dB in 22 segments. Sortie-operations in the secondary MTRs forming most of the affected area for proposed IR-153 currently generate baseline noise levels ranging from less than 45 to 51 DNL. All but two segments of proposed IR-153, which remain below 45 DNL, show an increase in noise compared to current conditions, and the increases range from 1 to 18 dB. The highest noise levels and greatest degree of change would occur in the start of the route (segments AB to GH). The change in noise would be readily noticeable in the segments where a greater than 3 dB increase would occur.

Noise levels in the proposed Mt. Dora MOA/ATCAA would increase from less than 45 to 46 DNL. Minimal (less than 2 percent) new area would be exposed to aircraft noise, while airspace and its associated noise would be eliminated over a much larger area due to the change in MOA shape. With flight activities restricted to above 3,000 feet AGL, cumulative and single overflight noise would remain low.

The percentage of people who may be highly annoyed by aircraft noise could increase under all segments of proposed IR-153, in some areas substantially (Table 4.1-20). The western half of the MTR could experience 4 to 10 percent increases in the percentage of people who may be highly annoyed. Under the proposed Mt. Dora MOA/ATCAA, the percentage of highly annoyed people would remain similar to the existing Mt. Dora MOA (about 1 percent), but the total area and population overflown would be less due to the reduced total acres overlain by proposed airspace as a result of the reconfiguration. New areas would, however, be exposed to noise. Under these new sections, approximately 1 to 8 percent of the population could be highly annoyed.

Dispersal of overflight and noise would be limited on many segments of proposed IR-153 with the most sortie-operations since these segments would often be the narrowest.

The likelihood of being overflown varies depending upon the type of airspace. In the proposed Mt. Dora MOA/ATCAA, the random nature of operations and the wide span of altitudes to fly in make it unlikely that any one location would be repeatedly overflown. Daily sortie-operations in the proposed Mt. Dora MOA/ATCAA would average 10 per day as compared to just more than one per day under baseline conditions. These operations would be dispersed randomly throughout the almost 18,000 cubic nm of the proposed MOA/ATCAA, with most activity occurring above 20,000 feet AGL. At that altitude, the noise from an individual bomber overflight would be low (refer to Figure 4.1-3).

Average daily sortie-operations would increase on all but three segments of proposed IR-153 (Appendix B). Increases would range from one to ten more sortie-operations per day, on average, compared with baseline. These sortie-operations could generate

Table 4.1-18
Projected Average Daily Sortie-Operations and Noise Levels Alternative D: IR-153/Mt. Dora MOA

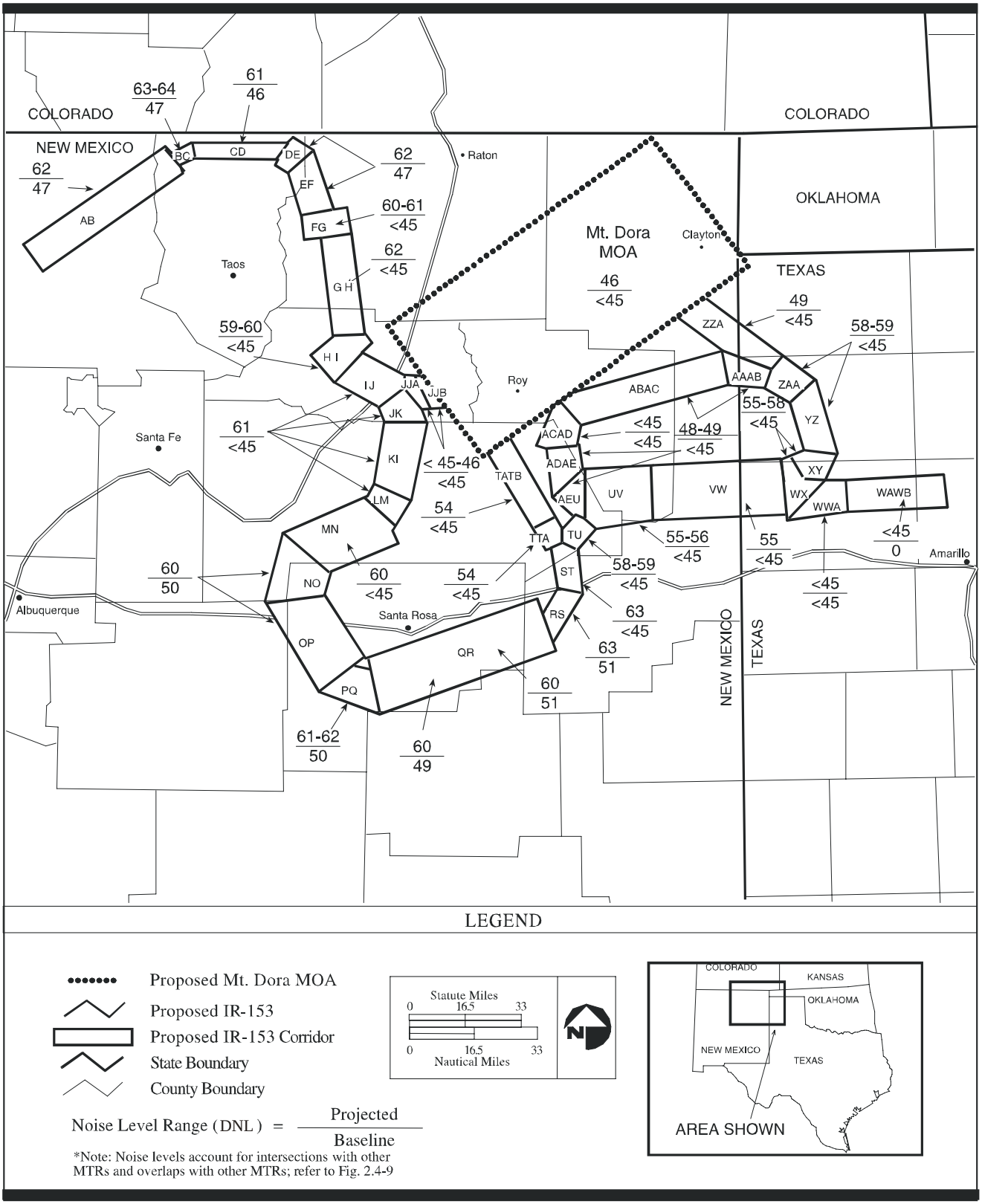
Airspace Units	*Class*	Alternative D			*Baseline Noise Level (DNL)*	*Change from Baseline*
		Annual Sortie-Operations	*Average Daily Sortie-Operations*	*Noise Level (DNL)*		
MTRs						
VR-100/125	S	1,265	5	49	49	0
VR-108	S	143	1	<45	<45	0
VR-114	S	1,014	4	<45	<45	0
VR-143	S	620	2	49	49	0
VR-186	S	1,175	5	50	50	0
VR-196/197	S	512	2	<45	<45	0
VR-1107/1195	S	1,050	4	<45	<45	0
VR-1116	S	30	0	<45	<45	0
VR-1175/1176	S	50	0	46	46	0
IR-107	S	104	0	<45	<45	0
IR-109	S	310	1	<45	<45	0
IR-110	S	0	0	NA	NA	0
IR-111	S	130	1	<45	<45	0
IR-113	S	300	1	<45	<45	0
IR-123	S	50	<1	<45	<45	0
IR-124	S	140	1	<45	<45	0
IR-128/180	**P**	**150**	**1**	**<45**	**46**	-1
IR-150	**P**	**10**	**<1**	**<45**	**55**	-10
Proposed IR-153	**P**	**2,660**	**10**	**64**[1]	**NA**	0
IR-154	S	70	<1	<45	<45	0
IR-169	S	465	2	<45	<45	0
IR-174	**P**	**121**	<1	**48**	**51**	-3
IR-177/501	**P**	**10**	<1	**<45**	**56**	-11
IR-178	**P**	**205**	1	**55**	**61**	-6
IR-192/194	S	658	3	49	49	0
IR-592	**P**	**340**	1	**48**	**50**	-2
MOAs						0
Reese 4	S	0	0	NA	<45	0
Reese 5	S	0	0	NA	<45	0
Roby	S	0	0	<45	<45	0
Texon	S	100	<1	<45	<45	0
Proposed Mt. Dora	**P**	**2,668**	**10**	**46**	**<45**	1

Class P = Primary airspace used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

Class S = Secondary airspace unit intersects with primary airspace unit used by B-1s from Dyess AFB and/or B-52s from Barksdale AFB.

[1] Noise level represents the highest DNL for any segment of the route; all other segments are equal to or lower.

Noise levels on all six existing primary MTRs would decrease under Alternative D.



Alternative D: IR-153/Mt. Dora MOA Noise Level Range **Figure 4.1-16**

Table 4.1-19
Projected Noise Levels for Alternative D: IR-153

Proposed IR-153 Segment	*Projected Noise Level Range (DNL)*	*Baseline Noise Level (DNL)*	*Proposed IR-153 Segment*	*Projected Noise Level Range (DNL)*	*Baseline Noise Level (DNL)*
AB	62	47	TU	58-59	<45
BC	63-64	47	UV	55-56	<45
CD	61	46	VW	55	<45
DE	62	47	WX	55-58	<45
EF	62	47	XY	55-58	<45
FG	60-61	<45	YZ	58-59	<45
GH	62	<45	ZAA	58-59	<45
HI	59-60	<45	AAAB	48-49	<45
IJ	61	<45	ABAC	48-49	<45
JK	61	<45	ACAD	<45	<45
KL	61	<45	ADAE	48-49	<45
LM	61	<45	AEU	48-49	<45
MN	60	<45	TTA	54	<45
NO	60	50	TATB	54	<45
OP	60	50	ZZA	49	<45
PQ	61-62	50	WWA	<45	<45
QR_a	60	49	WAWB	<45	not applicable
QR_b	60	51	JJA	<45-46	<45
RS	63	51	JAJB	<45-46	<45
ST	63	<45			

Refer to Figure 2.4-9 for segment locations. a & b = multiple intersections within the segment

Table 4.1-20
Percent Population Potentially Highly Annoyed Under Alternative D: IR-153 and Proposed Mt. Dora MOA/ATCAA

IR-153 Segment and MOA	*Projected Percentage (Average)*		*Percentage Change from Baseline*	
	Range[2]		*Range*[2]	
AB	8	8	7	7
BC	10	11	9	10
CD	7	7	6	6
DE-EF	8	8	7	7
FG	7	7	6	6
GH	8	8	8	8
HI	6	7	5	6
IJ-QR	7	7	5	6
RS-ST	10	10	8	9
TU	5	6	4	5
UV-XY	3	4	2	3
YZ-ZAA	5	6	4	5
AAAB-AEU	1	1	0	0
TTA-TATB	3	3	2	2
WWA	<1	1	0	0
WWA-WAWB[1]	1	1	1	1
JAJB	<1	<1	0	0
Mt. Dora MOA/ATCAA	<1	1	0	0

[1] Currently not overflown by military aircraft; new airspace.

[2] Based on differences associated with two altitude regimes for B-52s.

Studies of community response to various types of environmental noise show DNL correlates well with annoyance.

noise levels (SELs) ranging from 86 to 116 dB, the same as under baseline conditions. Such events could last from 7 to 10 seconds for a person directly under the flight path.

Proposed IR-153 flights would be dispersed within the MTR corridor, and dispersion of flights across an MTR increases with route width (Wyle 1996). Proposed IR-153 segments would vary in width from 4 to 5 miles with 31 (of 38 segments) being 8 nm wide or wider. Dispersal of the overflights would be limited in many of the segments of proposed IR-153 with the most daily sortie-operations. For example, segments BC to CD would be 4 nm wide and support 2,660 sortie-operations.

Emissions from military aircraft would contribute only fractions of allowable amounts under federal standards.

Aircraft Emissions. Figure 4.1-17 presents the amounts of emissions projected to occur in the affected AQCRs with implementation of Alternative D. Total annual emissions would increase in AQCRs 153, 154, 155, 157, and 210, with the greatest amount of change in AQCR 154. All of these AQCRs are in attainment, and the added emissions, as demonstrated through MAILS modeling, would not alter those conditions.

MAILS modeling demonstrates that Alternative D aircraft operations would not cause potential exceedences of the NAAQS or PSD Class I areas. Rather, the concentrations of pollutants would be negligible to minimal. Segments E-H, with 2,660 B-52 and B-1 sortie-operations was used to model. Although some sortie-operations fly at much higher altitudes, it was assumed that all would fly at 300 feet AGL to yield a conservative estimate. As shown in Table 4.1-21, projected sortie-operations would generate only fractions of the NAAQS concentrations and PSD Class I increments and would not adversely impact air quality. All of the affected AQCRs are in attainment for the NAAQS, and emissions under Alternative D would not change this status. As such, no conformity determination is required. No PSD Class I areas underlie or abut IR-153 or the Mt. Dora MOA, so air emissions from the sortie-operations would not affect visibility in these areas.

Emissions from projected aircraft operations in the other MTRs and MOAs, including the MTRs associated with the Harrison and La Junta Electronic Scoring Sites, would decrease relative to current levels. Since these MTRs overlie areas that are in attainment, the decrease in emissions would not change that condition.

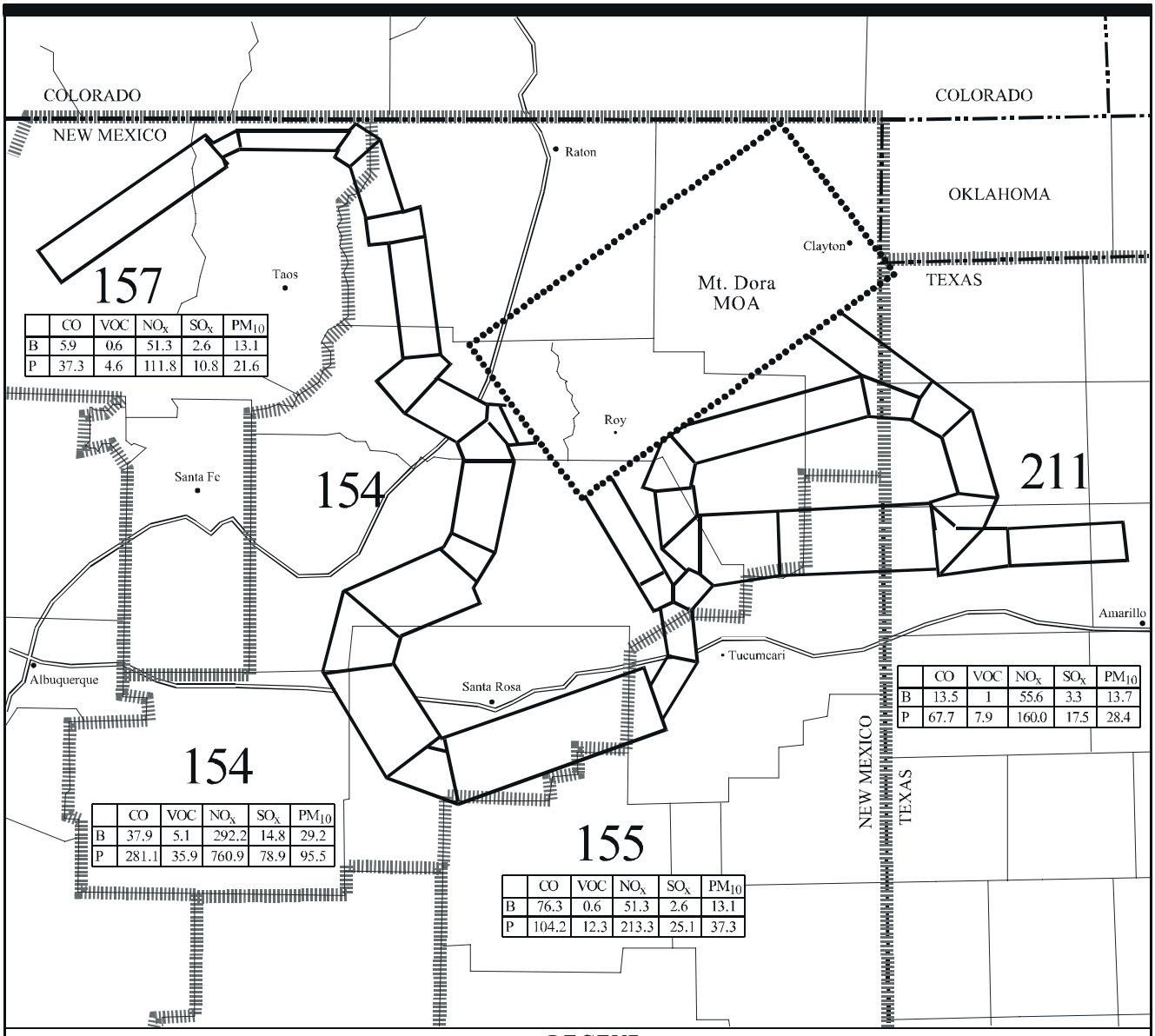
The results of analysis show that emissions from the proposed operations represent a fraction of the NAAQS and all affected areas are in attainment. Consequently, Alternative D would not lead to nonconformance for any criteria pollutants, and a conformity analysis is not required.

Aircraft safety risks would remain low under Alternative D.

Aircraft Safety. Under Alternative D, the potential for Class A mishaps would remain low (Table 4.1-22). Since proposed IR-153 does not currently exist, it is difficult to draw direct comparisons of baseline and projected mishap potential. Secondary MTRs that overlap or intersect segments of proposed IR-153 do provide a rough comparison. Estimated years between Class A mishaps on these routes range from 22 to 2,800. For proposed IR-153, estimated years between Class A mishaps for B-52s would fall into this range, whereas the potential for B-1s would be slightly greater. However, when considered as probabilities, the estimated years equate to a 0.02 probability of a B-52 Class A mishap per year and a 0.07 probability for B-1s. Probabilities in the Mt. Dora MOA and other affected airspace units would be even less.

4.0 Affected Environment and Environmental Consequences: Airspace and Aircraft Operations

Airspace in Alternative D overlies or intersects a migration flyway that follows the Rio Grande River where birds could congregate. But even with increases in sortie-operations, the potential for bird-aircraft strikes in IR-153 and modified Mt. Dora MOA would be negligible. Historical trends for the secondary MTRs that overlap and intersect proposed IR-153 reveal that few bird-aircraft strikes occur. Use of Bird



	CO	VOC	NO_X	SO_X	PM_{10}
B	5.9	0.6	51.3	2.6	13.1
P	37.3	4.6	111.8	10.8	21.6

	CO	VOC	NO_X	SO_X	PM_{10}
B	13.5	1	55.6	3.3	13.7
P	67.7	7.9	160.0	17.5	28.4

	CO	VOC	NO_X	SO_X	PM_{10}
B	37.9	5.1	292.2	14.8	29.2
P	281.1	35.9	760.9	78.9	95.5

	CO	VOC	NO_X	SO_X	PM_{10}
B	76.3	0.6	51.3	2.6	13.1
P	104.2	12.3	213.3	25.1	37.3

Alternative D: IR-153/Mt. Dora MOA Aircraft Emissions

Figure 4.1-17

Table 4.1-21
Criteria Pollutant Concentrations for IR-153 Alternative D: IR-153 and Mt. Dora MOA/ATCAA

		Concentration ($\mu g/m^3$)				
Criteria Pollutant	*Averaging Period*	*PSD Class I Increments*[1]	*NAAQS*	*Affected Airspace*	*Percentage of PSD Class I Increment (%)*	*Percentage of the NAAQS (%)*
Nitrogen Dioxide (NO_2)	Annual	2.5	100	0.059	2.36	0.059
Particulate Matter (PM_{10})[2]	24-hour	10[3]	150[3]	0.032	0.320	0.021
	Annual	5	50	0.008	0.160	0.016
Sulfur Dioxide (SO_2)	3-hour	25[3]	1,300[3]	0.158	0.632	0.012
	24-hour	5[3]	365[3]	0.031	0.618	0.008
	Annual	2	80[3]	0.008	0.400	0.010
Carbon Monoxide (CO)	1-hour	--	40,000[3]	2.26	0.006[4]	0.006
	8-hour	--	10,000[3]	0.173	0.002[4]	0.002

[1] The PSD Class I increments for particulates are for TSP.
[2] The NAAQS for particulates is for PM_{10}.
[3] Not to be exceeded more than once per year.
[4] As a percentage of the NAAQS.

. . .Alternative D: IR-153/Mt. Dora MOA

Table 4.1-22
Estimated Class A Mishaps for Primary Airspace for Alternative D

Airspace	*Estimated Years Between Mishaps*			
	B-1		*B-52*	
	Baseline	*Alternative D*	*Baseline*	*Alternative D*
IR-128/180	938	NA[1]	1,847	NA[1]
IR-150	177	7,100	879	14,000
Proposed IR-153	NA	15	NA	44
IR 174	194	258	2,454	NA[1]
IR-177/501	96	5,250	345	10,800
IR-178	14	93	39	960
IR-592	532	532	103	190
Mt. Dora MOA/ATCAA	8,292	27	22,900	583

[1] No sortie-operations in airspace unit.

Avoidance Model for planning and flying training sorties is expected to keep strikes to a minimum. For the other affected MTRs and MOAs, the potential for bird-aircraft strikes would either remain at its current low level or decrease commensurate with projected sortie-operations.

4.1.6 Summary Comparison of Impacts

Table 4.1-23 compares the impacts for all four alternatives with regard to airspace management, noise, aircraft emissions, and aircraft safety. None of the alternatives would have more than minimal effects on airspace management, air quality, and aircraft safety. Alternative D would result in the greatest amount of change from baseline conditions.

Table 4.1-23
Airspace and Aircraft Operations Comparison of Alternatives

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace Management	No change to airspace structure or management; scheduling and FAA procedures designed to prevent conflicts between military and civil aviation.	Proposed IR-178 would include about 15 percent new airspace and the proposed Lancer MOA/ATCAA would include about 10 percent new airspace. A total of 29 segments of existing IR-178 eliminated in New Mexico, but FAA would need to ensure conflicts between proposed ATCAA and intersecting jet routes are avoided.	Proposed IR-178 would include about 20 percent new airspace and the proposed Texon MOA/ATCAA would include about 25 percent new airspace. A total of 29 segments of existing IR-178 eliminated in New Mexico. Minimal potential for conflicts with VFR civil aviation, but conflicts between proposed MOA/ATCAA and intersecting jet routes and federal airways would require rerouting and possibly airspace restructuring.	Proposed IR-153 would include about 10 percent new airspace and the proposed Mt. Dora MOA/ATCAA would include less than 5 percent new airspace. Minimal potential for conflicts with civil airfields, but the proposed Mt. Dora MOA/ATCAA would intersect jet routes and federal airways, thus requiring increased airspace management. Establishment of proposed IR-153 would affect current military users of existing secondary MTRs it overlaps or intersects.
Noise	Noise levels on existing IR-178 range from less than 45 to 61 DNL. Of a total of 71 IR-178 segments, three have noise levels of less than 45 DNL and 30 have noise levels of 55 DNL or greater. Noise levels in other primary and secondary MTRs range from less than 45 DNL to 56 DNL. Noise levels of less than 45 DNL characterize the MOAs. Average daily sortie-operations on IR-178 combined with activity on segments of overlapping or intersecting MTRs range from 1 to 6, depending upon the segment.	Noise levels on proposed IR-178 would range from 46 to 61 DNL. Of a total of 41 segments on proposed IR-178, none has noise levels of less than 45 DNL and 28 have noise levels of 55 DNL or greater. Noise levels in the proposed Lancer MOA/ATCAA would remain low, but increase to 46 DNL. Noise levels in other primary and secondary MTRs and MOAs either decrease or remain the same. Average daily sortie-operations on proposed IR-178 combined with activity on segments of overlapping or intersecting MTRs would range from 1 to 10, and would increase on all but five segments; increases would range from 1 to 6 daily sortie-operations.	Noise levels on proposed IR-178 would range from 46 to 61 DNL. Of a total of 35 segments on proposed IR-178, none has noise levels of less than 45 DNL and 25 have noise levels of 55 DNL or greater. Noise levels in the proposed Texon MOA/ATCAA would remain low, but increase to 46 DNL. Noise levels in other primary and secondary MTRs and MOAs either decrease or remain the same. Average daily sortie-operations on proposed IR-178 combined with activity on segments of overlapping or intersecting MTRs would range from 1 to 10, and would increase on all but five segments; increases would range from 1 to 6 daily sortie-operations.	Noise levels on proposed IR-153 range from less than 45 to 64 DNL. Of a total of 38 segments on proposed IR-153, 3 have noise levels of less than 45 DNL and 26 have noise levels of 55 DNL or greater. Noise levels in the proposed Mt. Dora MOA/ATCAA would remain low, but increase to 46 DNL. Noise levels in other primary and secondary MTRs and MOAs either decrease or remain the same. Average daily sortie-operations on proposed IR-153 combined with activity on segments of overlapping or intersecting MTRs would range from 1 to 24, and would increase on all but three segments; increases would range from 1 to 10 daily sortie-operations.

Table 4.1-23 (continued)
Airspace and Aircraft Operations Comparison of Alternatives

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Aircraft Emissions	Aircraft emissions produce minimal quantities of criteria pollutants, and ground-level concentrations of pollutants are fractions of federal and state standards.	Aircraft emissions produce minimal quantities of criteria pollutants, and ground-level concentrations of pollutants would be fractions of federal and state standards.	Aircraft emissions produce minimal quantities of criteria pollutants, and ground-level concentrations of pollutants would be fractions of federal and state standards.	Aircraft emissions produce minimal quantities of criteria pollutants, and ground-level concentrations of pollutants would be fractions of federal and state standards.
Aircraft Safety	The probability of a B-1 Class A mishap on IR-178 is 0.07 percent per year and for B-52s, the probability is 0.03 percent. The probabilities of Class A mishaps in all other primary airspace are even lower.	The probability of a B-1 Class A mishap on proposed IR-178 would be 0.08 percent per year and for B-52s, the probability would be 0.03 percent. The probabilities of Class A mishaps in all other primary airspace would be even lower.	The probability of a B-1 Class A mishap on proposed IR-178 would be 0.07 percent per year and for B-52s, the probability would be 0.02 percent. The probabilities of Class A mishaps in all other primary airspace would be even lower.	The probability of a B-1 Class A mishap on proposed IR-153 would be 0.07 percent per year and for B-52s, the probability would be 0.02 percent. The probabilities of Class A mishaps in all other primary airspace would be even lower.
Construction	No Effect	No Effect	No Effect	No Effect
Ground Operations	No Effect	No Effect	No Effect	No Effect
Decommissioning	No Effect	No Effect	No Effect	No Effect

4.2 LAND MANAGEMENT AND USE

Land management and use considers a spectrum of linked characteristics of the land, both actual and perceived. Lands have different values for different people. To some, lands and the resources they contain have an economic value; to others, lands have spiritual or psychological value. When considering long-term traditional lifestyles, people ascribe both types of values to lands. Because different people have different opinions on the values of the same lands, it is not possible to capture, describe, and analyze all of these different viewpoints in this EIS. Rather, it considers available standard definitions of land uses to permit comparison among alternatives.

4.2.1 Methods and Approach

Land use generally refers to human modification of land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, unique features, or for recreational pursuits. The attributes of land use include general land use and ownership, special use land areas, and land management plans. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Special use land management areas require greater protection (e.g., wild and scenic rivers, wilderness areas).

Another aspect of the land is its visual setting. Visual resources are defined as the natural and manufactured features that make up the aesthetic qualities of an area. These features form the overall impressions that an observer receives of an area or its landscape character. Landforms, water surfaces, vegetation, and man-made features are considered characteristic of an area if they are inherent to the structure and function of the landscape. What a change in visual character means is influenced by social considerations, including public value placed on the resource, public awareness of the area, and general community concern for visual resources in the area. These social considerations equate to visual sensitivity, which is defined as the degree of public interest in a visual resource and concern over potential adverse changes in the quality of that resource.

The affected area for land use, recreation, and visual resources for the four alternatives consists of the vicinity of the candidate emitters and Electronic Scoring Sites, as well as the land under affected airspace. For the candidate emitters and Electronic Scoring Sites, analysis focuses on land ownership, human-modified land use, and the visual environment. The primary potential effects of aircraft overflights on adjacent or underlying land uses are the noise and visual presence associated with aircraft operations. For the areas under affected airspace, the effects on communities and special use land management areas are examined.

An adverse impact on land use, including recreation, occurs when a proposed action precludes an existing land use activity; preempts a recreational use; precludes continued use or occupation of an area; is incompatible with adjacent or vicinity land use to the extent that public health or safety is threatened; or is inconsistent or in noncompliance with applicable land use plans or policies. An adverse visual impact occurs when an action perceptibly changes features of the physical environment so that they no longer appear characteristic of the region or an action blocks or removes aesthetic features of the landscape from view. The visual resource impact analysis focuses on identifying changes to the visual qualities of the landscape as a result of construction of the emitters and Electronic Scoring Sites and determining alteration of the visual setting under the airspace resulting from aircraft overflight.

Proposed increases in bomber flight activities represent the primary element of the three action alternatives (Alternatives B, C, and D) for RBTI. Increased aircraft noise would accompany the changes in flight activities. For this reason, a brief discussion of ways to evaluate the effects of noise on land use is presented below.

Noise Effects on Communities and Land Use

The effects of noise on people result from a complex interrelationship among numerous factors, including social/cultural effects; heath effects; and economic effects. As more fully discussed in Section 4.1 and Appendix G, the primary effect of aircraft noise on exposed communities is one of annoyance.

The Federal Interagency Committee on Noise (FICON) offers recommendations regarding noise and land use.

In June 1980, the Federal Interagency Committee on Urban Noise published guidelines (FICUN 1980) relating DNL values to compatible land uses. This committee was composed of representatives from the U.S. Departments of Defense, Transportation, and Housing and Urban Development; the USEPA; and the Veterans Administration. Since their issuance, federal agencies have generally adopted these guidelines for noise analyses. Most agencies have identified 65 DNL as a criterion that protects those most affected by noise and that can often be achieved on a practical basis. At this noise level, about 12 percent of the exposed population could be highly annoyed by noise. In general, noise exposure greater than 65 DNL over residential, recreational, cultural, and entertainment areas, as well as public services, is considered unacceptable (FICON 1992). While these FICON recommendations are most often applied to areas around airports, they can be helpful in understanding the potential effects of aircraft noise in MTRs and MOAs.

Another way to evaluate noise effects on land use is to assess the amount of change in noise levels that would occur as a result of an action. As explained in Section 4.1 and Appendix G, human perception of noise can vary greatly. However, in general, most people can clearly notice a change of 3 dB. Changes of 3 dB or more, even below 65 DNL, can be perceived by people as a degradation of their noise environment (FICON 1992) or negatively affecting their quality of life.

Noise Effects on Recreation

A Forest Service study found that visitors to wilderness areas generally did not notice aircraft noise.

Individuals experience aircraft-generated noise interference with recreational activities (including camping, hiking, and hunting) in many ways. Reactions vary depending upon individual expectations and the context in which the overflight occurs. A study conducted by the U.S. Forest Service (USFS 1992) indicates that aircraft noise intrusions were not generally noticed by wilderness area visitors. However, if noticed, low-altitude, high-speed aircraft were reported as the most annoying types of aircraft to hear or see. This finding was largely attributable to the "startle effect." The startle effect occurs when a very loud noise is experienced in a setting where it is not expected and when there is no visual or audible warning. In primitive back-country areas, the startle effect can negatively affect wilderness and solitude experiences. Conversely, observation of aircraft overflights can appeal to some members of the public and be considered a positive experience.

There is little evidence that hunting leases and the hunting experience would be negatively impacted by military overflights (Trail and Rollins, personal communication 1999; USAF 1980). While individual game animals may be startled by aircraft noise, especially those unaccustomed to the overflights, results of numerous studies suggest (see section 4.3 and Appendix G) that populations of animals would not be significantly affected. The behavior of game animals would not be expected to change in a way that hunting would be affected. While individual hunters may be startled and annoyed by intermittent aircraft overflights, there is little evidence to suggest that hunters as a group would modify or cease their hunting activities as a result of the RBTI alternatives.

For example, a MOA and several MTRs overfly Sutton County. Laughlin MOA had over 9,500 sortie-operations in 1997 and over 4,000 sortie-operations in 1998. The MTRs include portions of IR-123, VR-143, and SR-282 and account for 1,002 sortie-operations in 1997 and 2,226 sortie-operations in 1998. The MOA and MTRs overlie most of Sutton County; a county that has historically received revenues from hunting leases (Ward 1985). Hunting, therefore, has existed at the same time as thousands of sortie-operations have occurred, and these operations have neither frightened wildlife away nor dissuaded hunters from visiting the area.

4.2.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

The affected environment includes the primary MTR and MOA airspace used by bombers from Barksdale and Dyess AFBs (see section 2.3.1). The analysis of Alternative A focuses on existing IR-178 and to a lesser degree, IR-128/180, which overlaps substantially with IR-178. MOAs considered include the Reese 4, Reese 5, Roby, and Mt. Dora. Secondary airspace is considered only to the extent it overlaps or intersects primary airspace. The affected environment also includes the existing Harrison and La Junta Electronic Scoring Sites.

Airspace and Flight Operations. Airspace primarily used by bombers from Barksdale and Dyess AFBs is located in western Texas and southeastern and east central New Mexico. The existing airspace is discussed in detail and shown in Sections 2.2 and 4.1. The land under the affected airspace is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and ranches. Land in the area is owned and managed by a variety of entities, including private owners, the states of Texas and New Mexico, and federal agencies. In Texas, private ownership predominates. The primary land uses outside population centers are livestock grazing and crop production.

Airspace associated with Alternative A overlies portions of western Texas and southeastern and east central New Mexico. This area encompasses parts of four visually related regions: High Plains; Llano Estacado; Edwards Plateau; Trans-Pecos; and Big Bend Country that are described in detail in Chapter 3. Alternative A airspace overlies the scenic Davis Mountains and portions of the Texas Mountain Trail, a designated State Scenic Route through western Texas. The trail follows portions of Interstate 10, U.S. Highways 54, 90, 67, and State Route 118. Alternative A airspace also overlies the five special use land management areas mentioned above.

Approximately 77 percent of the land under the affected primary airspace in Texas and New Mexico is privately owned rangeland used for livestock grazing (Figure 4.2-1). Agricultural crop production makes up about 22 percent of land use. Forest, surface water/wetland, and urban/built-up areas make up less than 1 percent each.

The majority of the area under the airspace is in private ownership with a variety of state and federal interests overseeing the remainder. Table 4.2-1 lists the communities underlying existing IR-178 and the primary MOAs. Communities included in this analysis consist of those denoted as incorporated or as county seats and those as large as a county seat. For Sierra Blanca, baseline noise levels are 56 DNL. All other communities under IR-178 are subject to noise levels of less than 55 DNL. Under the MOAs, noise levels are less than 45 DNL. FAA regulations and Air Force instructions require all aircraft to avoid congested areas such as these by 1,000 feet above the obstruction and within 2,000 feet horizontal radius of the aircraft. These avoidance procedures reduce the noise levels from overflights (refer to Section 4.1).

Communities included in this analysis consist of incorporated towns and cities, county seats, or towns as large as county seats.

Table 4.2-1
Communities Under Alternative A: IR-178 and Primary MOAs

MTR/MOA	*Community*
IR-178	Texas: Sierra Blanca, Grandfalls, Balmorhea, Plains, Imperial
Reese 4 MOA	Texas: Post, Slaton, Tahoka, O'Donnell, Wilson
Reese 5 and Roby MOAs	Texas: Gail, Roby, Rotan, Lamesa, Hermleigh
Texon MOA	Texas: Big Lake, Texon, Best, Rankin
Mt. Dora MOA	New Mexico: Clayton, Roy, Wagon Mound, Capulin, Mt. Dora, Abbott

Minimum flight altitude for B-52s and B-1s is 300 feet AGL.

Three special use land management areas underlie IR-178 and the MOAs in Texas under Alternative A (Table 4.2-2 and Figure 4.2-2). These areas offer a wide range of recreational opportunities including hiking, camping, boating, picnicking, wildlife viewing, and others. Recreational use tends to be greatest from the spring to fall months. Two special use land management areas underlie the existing Mt. Dora MOA: Capulin Volcano National Monument and segments of the Santa Fe National Historic Trail.

Table 4.2-2
Special Use Land Management Areas Under Alternative A: IR-178 and Primary MOAs

MTR Segment	*Minimum Flight (feet AGL)*	*Minimum Flight Altitude Area*	*Acreage Under Airspace*	*Noise Levels (DNL)*
IR-178, FG	300	Chinati Mountains Property[1]	795	58-59
IR-178, HI	300	Big Bend Ranch State Park	39	58
IR-178, JK	300	Big Bend National Park	3,702	57
		Total	4,536	

Refer to Figure 2.3-1 for segment locations.

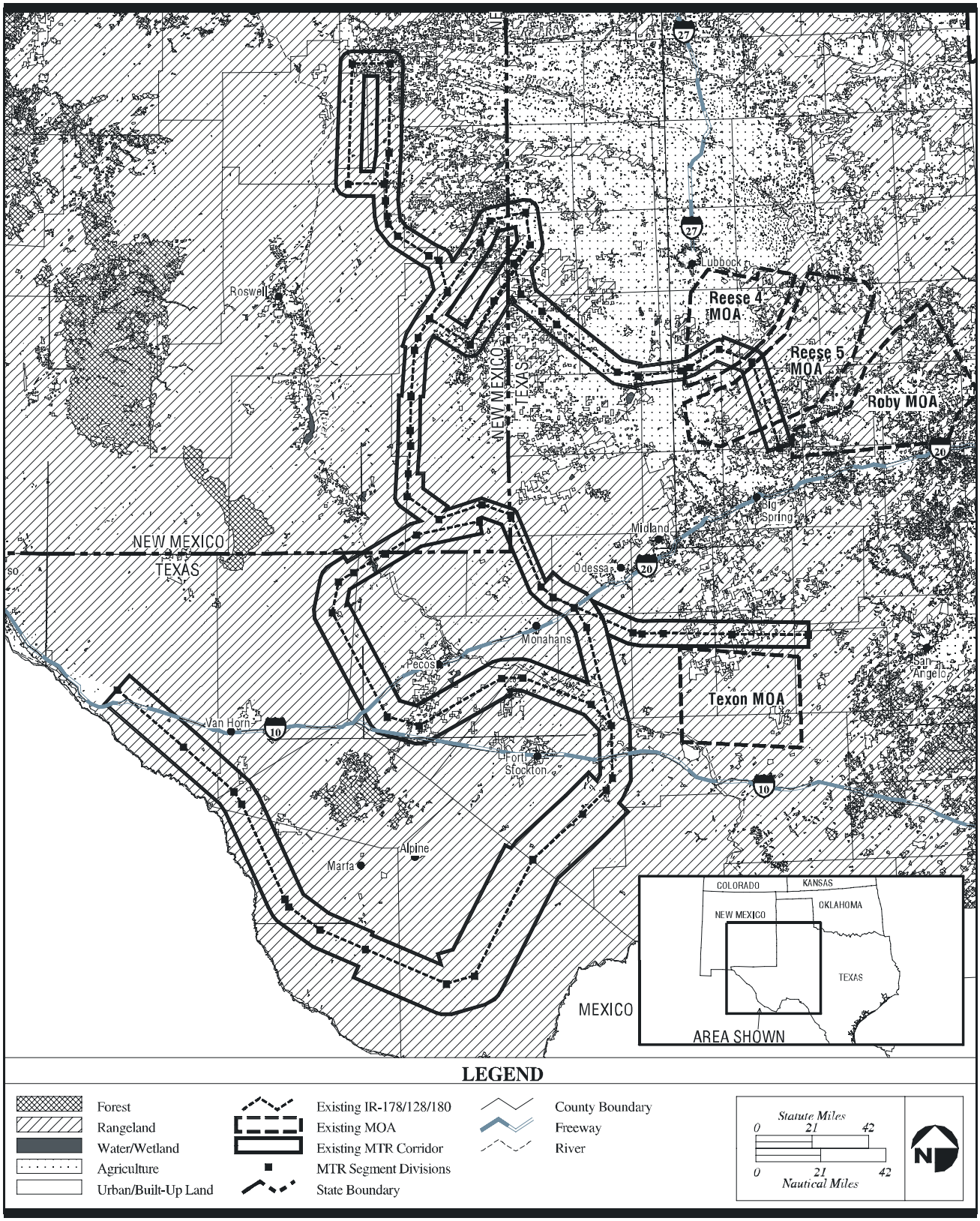
[1]Currently not accessible to the public.

Source: UCSB 1996.

MTRs associated with the Harrison (IR-174, IR-592) and La Junta (IR-150, IR-177/501) Electronic Scoring Sites predominantly overlie rural lands. As mentioned in Section 4.1, military jet aircraft have been flying in the affected area for more than four decades. Low-level, high speed aircraft are part of the existing environment. Over the years, the Air Force has established special operating procedures to avoid overflight of specific locations considered to be sensitive to aircraft noise. These procedures are published in *AP/1B, Area Planning for Military Training Routes, North and South America*.

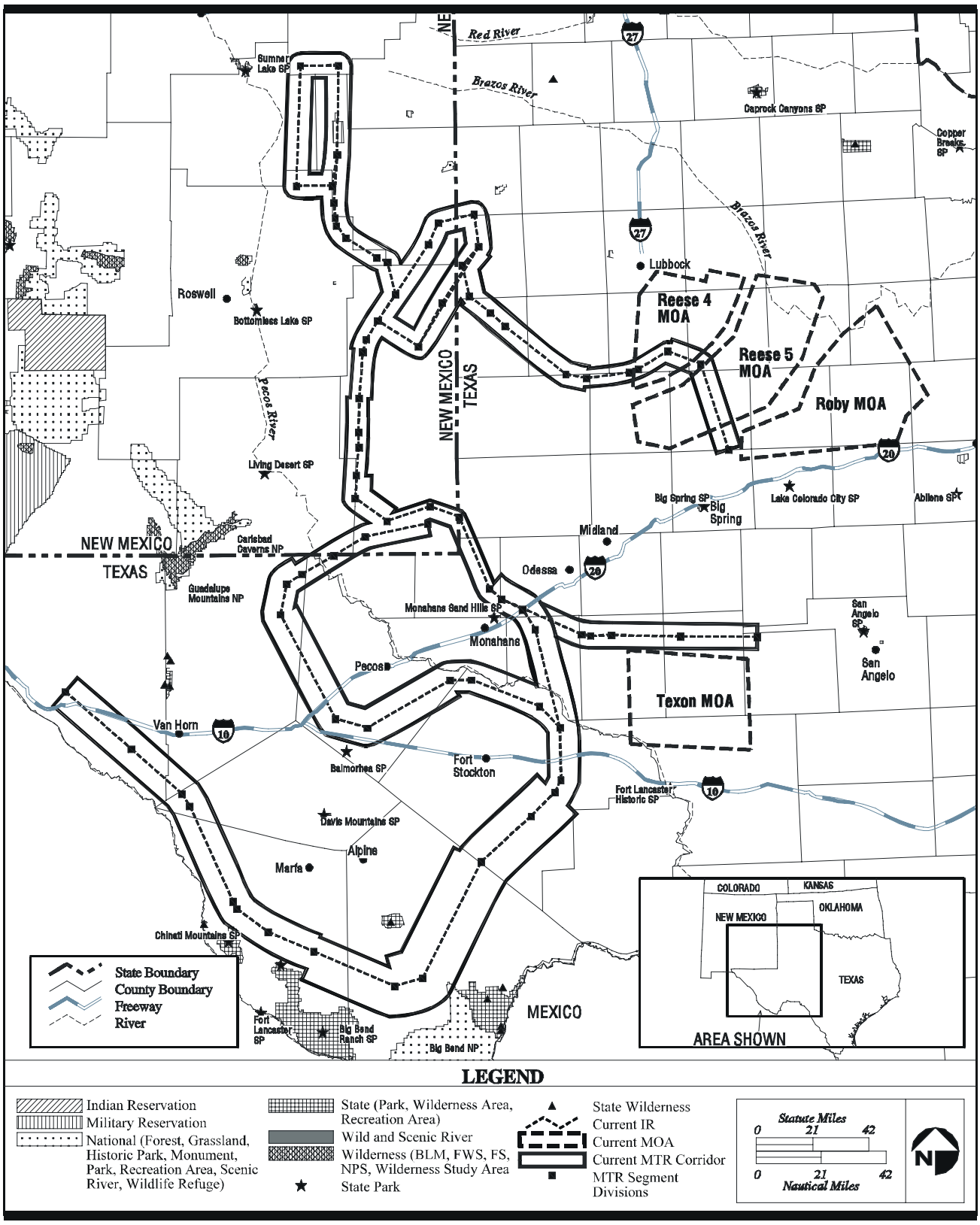
Noise levels vary from 46 DNL for IR-128/180 to 61 DNL for IR-178. Current average daily sortie-operations in the most heavily used MTR, IR-178, range from 1 to 6 (refer to Appendix B, Table B-5). Analysis of existing aircraft-related noise indicates that current noise levels along IR-178 range from less than 45 to 61 DNL (refer to Figure 4.1-10), depending on the number of sortie-operations, segment width, and altitude regimes flown. Noise levels below the primary MOAs associated with this alternative are less than 45 DNL. Based on the analysis presented in Section 4.1, noise levels under existing IR-178 could result in approximately 1 to 7 percent of the population being highly annoyed, and about 1 percent of the population under the MOAs being highly annoyed.

The effect of aircraft overflights on the visual environment of an area is difficult to quantify. In most instances, aircraft are not noticed because of visual cues, rather, they are noticed after being heard. The nature of the impact depends on the sensitivity of the resource affected, the distance from which it is viewed, and the



Existing Land Use Under Alternative A: No-Action

Figure 4.2-1



Special Use Land Management Areas Under Alternative A: No-Action

Figure 4.2-2

length of time it is visible. Altitude and screening relative to the viewer also play a key role in determining impacts from aircraft overflights. For example, in the level plains characterizing some of the land under Alternative A airspace, aircraft are more visible than in heavily wooded or mountainous areas. However, it should be noted that observations of aircraft are not exclusively considered negative regardless of an individual's location and/or activity.

Electronic Scoring Sites. Two existing Electronic Scoring Sites would continue to be used under the No-Action Alternative: Harrison, Arkansas and La Junta, Colorado. The Harrison site is located in Boone County, outside the city limits of Harrison, Arkansas. This privately owned site is leased and managed by the Air Force. The site contains a one-story facility and radar equipment trailers. The facility is located on a small hill in an area of gently rolling hills. Adjacent land use is primarily agricultural and consists of small farms used for the production of forage crops and cattle. Grasslands make up the dominant vegetation in the area. Associated with this facility are four emitter sites located in Baxter and Marion Counties, Arkansas, and Howell and Taney Counties, Missouri. These sites are located in rural rangeland, agricultural, and residential areas. No recreational activities take place at any of the sites since they are fenced and not accessible to the public.

The La Junta site is located in Otero County, Colorado, owned by DoD, and managed by the Air Force. The site contains a one-story brick building and radar equipment trailers. The site is located adjacent to an airport in an area of light industrial uses. Land uses beyond the light industrial area are primarily agricultural. The topography surrounding the La Junta site is primarily flat, and the visual environment is typical of light industrial areas, including warehouses and office buildings. Associated with this facility are four emitter sites located on private land leased by the Air Force in Bent and Las Animas Counties, Colorado. These sites are located in rural rangeland, agricultural, and residential areas. No recreational activities take place at any of the sites since they are fenced and not accessible to the public.

Environmental Consequences

Airspace and Flight Operations. Under the No-Action Alternative, the existing aircraft operations would continue at current levels in the affected airspace. There would be no change in existing land ownership or use underlying the airspace. Therefore, no new impacts to land use, recreation resources, or visual settings would occur.

Alternative A: No-Action would not result in changes to current conditions for land use.

Electronic Scoring Sites. Under the No-Action Alternative, the existing operations at the Harrison and La Junta Electronic Scoring Sites would continue at current levels. There would be no new construction or changes to existing activities. Therefore, no changes to land use, recreation resources, or visual settings would occur.

4.2.3 Alternative B: IR-178/Lancer MOA

AFFECTED ENVIRONMENT

The affected environment includes the primary MTRs and MOAs, especially IR-178 and the Reese 4, Reese 5, and Roby MOAs. These airspace units form the focus of this analysis. The candidate sites for emitters and Electronic Scoring Sites, as well as the Harrison and La Junta Electronic Scoring Sites, make up the ground-based affected environment.

Airspace and Flight Operations. In Alternative B, proposed IR-178 and the proposed Lancer MOA/ATCAA form the focus of the affected area and analysis. The other primary MTRs and MOAs would not be structurally altered and use would decrease. As such, the effects of Alternative B on the other primary airspace would be less than under baseline conditions. They receive no further discussion below.

The area underlying the airspace associated with Alternative B is located almost wholly in western Texas with the exception of a small portion that extends into southeastern New Mexico. The area is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Land in the area is owned and managed by a variety of private and public entities. The primary land use outside population centers is livestock grazing.

Approximately 86 percent of the land under the airspace associated with this alternative is privately owned rangeland used for grazing livestock (Figure 4.2-3). Approximately 11 percent of the remaining land is used for agricultural production. Urban/built-up areas make up about 2 percent and surface water/wetland and forest areas make up less than 1 percent each. The majority of the land under the airspace is in private ownership with a variety of state and federal interests overseeing the remainder. Table 4.2-3 presents the communities underlying proposed IR-178 and the Lancer MOA/ATCAA. As noted in Alternative A, FAA regulations require aircraft to avoid congested areas by 1,000 feet above the highest obstacle and by a horizontal radius of 2,000 feet of the aircraft. Such avoidance reduces noise levels. Based on the 1990 census, an estimated 50,300 people live under the proposed IR-178 and the Lancer MOA. Most of this population underlies the proposed MOA.

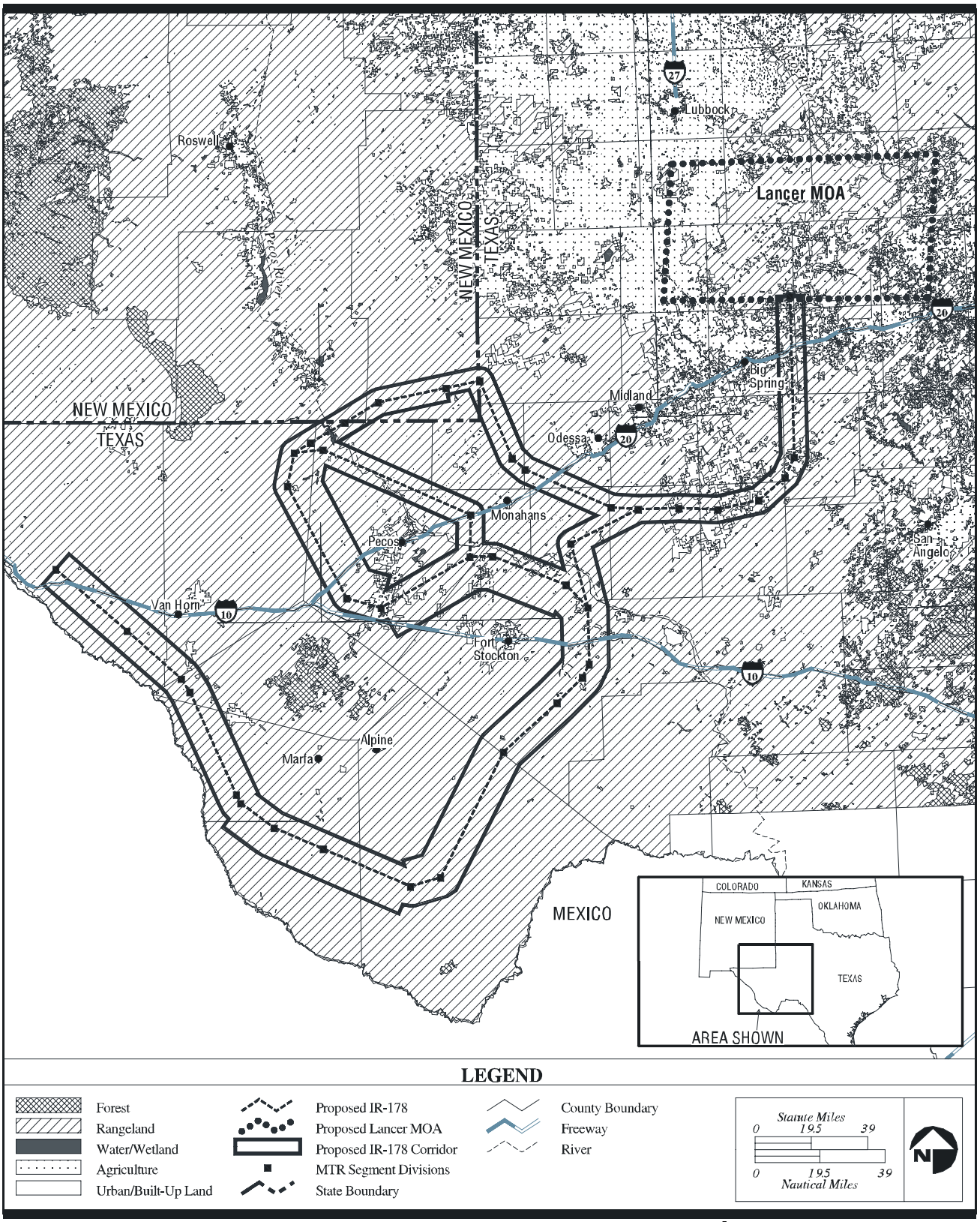
Incorporated communities or those serving as county seats or equivalent in size are included in the analysis.

Table 4.2-3
Communities Under Alternative B:
IR-178 and Lancer MOA/ATCAA

MTR/MOA	*Texas Communities*
Proposed IR-178	Sierra Blanca, Grandfalls, Pyote, Toyah, Crane, Imperial
Proposed Lancer MOA/ATCAA	Jayton, Post, Rotan, Snyder, Roby, Tahoka, O'Donnell, Gail, Hermleigh, Lamesa

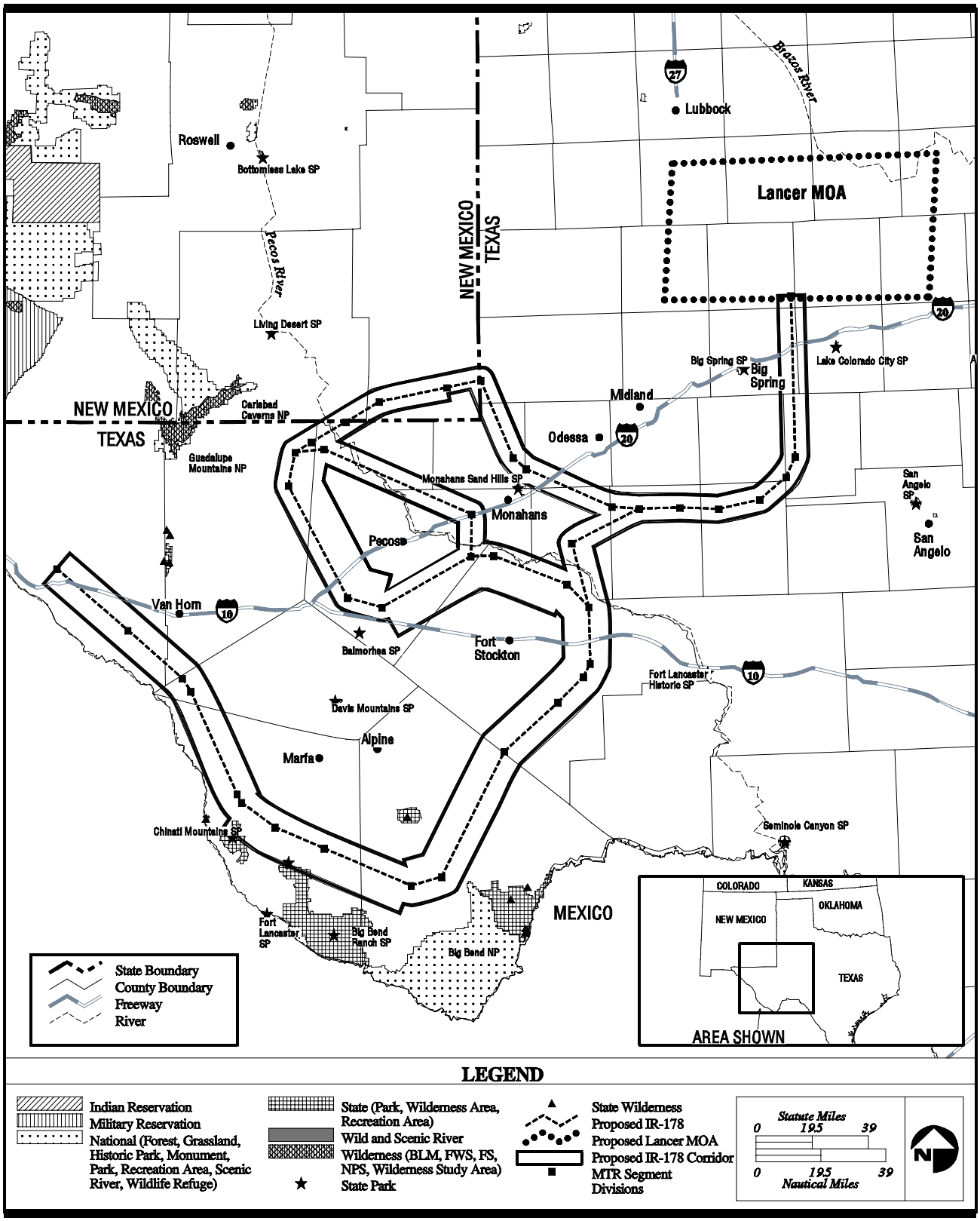
Two special use land management areas underlie Alternative B airspace (Table 4.2-4 and Figure 4.2-4). The Chinati Mountains property is owned by the State of Texas and Wildlife Department and not open to the public at this time. Future plans for the property include wildlife management and public recreation. Big Bend Ranch State Park offers a wide range of recreational opportunities, including hiking, camping, boating, picnicking, and wildlife viewing. Recreational use tends to be greatest from the spring to fall months. The Air Force purposely modified the IR-178 corridor to eliminate airspace over Big Bend National Park.

The visual environment of the area under Alternative B airspace is the same as that described for Alternative A, with the exception that Alternative B airspace overlies fewer special use land management areas.



Existing Land Use Under Alternative B: IR-178/Lancer MOA

Figure 4.2-3



Special Use Land Management Areas Under Alternative B: IR-178/Lancer MOA **Figure 4.2-4**

Table 4.2-4
Special Use Land Management Areas Under Alternative B

IR-178 Segment	Minimum Flight Altitude (Feet AGL)	Area	Acreage Under Airspace	Noise Levels	
				Projected (DNL)	Change from Baseline (dB)
FG	300	Chinati Mountains Property[1]	10,104	60-61	2-3
HI	300	Big Bend Ranch State Park	5,553	60-61	2-3
		Total	15,657		

Refer to Figure 2.4-3 for segment locations.

[1] Currently not accessible to the public.

Source: UCSB 1996.

IR-178 under Alternative B was designed to avoid Big Bend National Park.

Emitters and Electronic Scoring Sites. All candidate sites are located in Texas and are privately owned with the exception of sites 61 and 62 (for en route Electronic Scoring Site) that are owned by DoD (Table 4.2-5). Sites 61 and 62 consist of existing, unused Air Force facilities. All the emitter sites are located in remote, rural areas and the majority are part of larger acreages used for grazing livestock.

Table 4.2-5
Emitter and Electronic Scoring Site Land Use Under Alternative B

Site Number	Site Type	Texas County	Ownership	Current Land Use	Distance to Nearest Occupied Land Use Category (Approximate)	Current Visual Environment
54	MTR Emitter	Brewster	Private	Grazing	5 miles to residential	Flat/gently rolling, rural grassland/scrub
55	MTR Emitter	Presidio	Private	Grazing	1 mile to residential	Flat, rural grassland
59	MTR Electronic Scoring Site	Reeves	Private	Grazing	5 miles to commercial	Flat/gently rolling, rural grassland/scrub
60	MTR Electronic Scoring Site	Reeves	Private	Fallow field[1]	0.5 mile to residential	Flat, rural hard-baked scrub
61	En Route Electronic Scoring Site	Taylor	DoD	Existing unused Air Force facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland
62	En Route Electronic Scoring Site	Taylor	DoD	Existing unused Air Force facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland
64	MOA Emitter	Scurry	Private	Fallow field[1,2]	0.5 mile to residential	Flat, rural grassland
65	MOA Emitter	Borden	Private	Fallow field[2]	1 mile to residential	Existing oil well; flat, rural grassland
66	MOA Emitter	Borden	Private	Grazing[1]	0.5 mile to residential	Flat, rural grassland
67	MOA Emitter	Borden	Private	Grazing	1 mile to residential	Flat/gently rolling, rural grassland/scrub
72	MOA Emitter	Garza	Private	Grazing	5 miles to residential	Flat/gently rolling, rural grassland/scrub
81	MTR Emitter	Brewster	Private	Grazing	5 miles to commercial	Flat, gently rolling, rural grassland/scrub
82	MTR Emitter	Pecos	Private	Cropland	0.5 mile to residential	Flat, rural grassland
91	MTR Emitter	Pecos	Private	Grazing	5 miles to residential	Gently rolling, rural grassland/scrub
93	MTR Emitter	Pecos	Private	Grazing	5 miles to residential	Gently rolling, rural grassland/scrub
95	MOA Emitter	Scurry	Private	Cropland[1]	0.5 mile to Town of Camp Springs	Gently rolling, rural grassland

[1] Prime farmland.

[2] Conservation Reserve Program.

Four of the candidate sites (60, 64, 66, and 95) are considered prime farmland. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Under the Farmland Protection Policy Act, federal programs that contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses should be minimized (USGS 1998).

Two of the candidate sites (64 and 65) are currently enrolled in the Conservation Reserve Program (CRP). CRP is a national program administered by the U.S. Department of Agriculture to reduce soil erosion on highly erodible cropland, improve water quality, foster wildlife habitat, curb the production of surplus commodities, and provide income support for farmers. As a voluntary long-term cropland retirement program, CRP provides participants with an annual per-acre rent plus half the cost of establishing a permanent land cover. In exchange, the participant retires highly erodible or environmentally sensitive cropland from production for 10 to 15 years. If the participant wishes to withdraw a parcel from CRP before the end of the agreement, any prior payments, interest, and damages would have to be repaid (USDA 1998).

Ten of the candidate sites are located within 1 mile of a residence (refer to Table 4.2-5). None of the sites are located in or adjacent to identified recreation areas. While recreational uses, such as horseback riding, may occur on the parcels, the sites are privately owned and not generally available for public use.

The visual environment of the areas surrounding the candidate sites is typical of the western Texas region. The sites are located in remote, rural areas used primarily for livestock grazing. The topography is generally flat or gently rolling and the predominant vegetative cover is grassland and desert scrub. There are no identified scenic resources or vistas within visual range of any site. All of the sites are within approximately 5 miles of residential or commercial use areas and would be compatible with views from surrounding occupied land uses, depending on topography and intervening structures (refer to Table 4.2-5).

Environmental Consequences

Airspace and Flight Operations. Flight operations would not likely affect land use, recreation resources, or visual settings in the areas under the airspace. Flight operations would not be expected to preclude existing land uses or continued use or occupation of an area, preempt recreational uses, threaten public health and safety, or be inconsistent with applicable regulations. Flight operations would not change features of the physical environment or block aesthetic landscape features from view. Flight operations could, however, be perceived by the affected public as negatively affecting their quality of life.

As detailed in Chapter 2, proposed changes to IR-178 and proposed Lancer MOA/ATCAA would reduce the total amount of land under the airspace in comparison to current conditions (refer to Table 2.4-3). A reduction of about 2,300 square nm would result from changes to IR-178. Consolidation of the Reese 4, Reese 5, and Roby MOAs would expose about 300 square nm of land to new airspace.

The current one to six average daily sortie-operations on existing IR-178 generate noise levels ranging from less than 45 to 61 DNL. The additional one to six average (for a maximum total of ten) daily sortie-operations associated with proposed IR-178 would result in noise levels of 46 to 61 DNL (Appendix B, Table B-6), depending on the number or sortie-operations, segment width, and altitude regimes flown. Noise

levels below the proposed Lancer MOA/ATCAA would be 46 DNL. Alternative B would not generate levels of 65 DNL or higher in any airspace unit.

Six communities in Texas underlie proposed IR-178. Three of these communities, Sierra Blanca, Imperial, and Grandfalls, occur under existing IR-178; Sierra Blanca would experience noise levels of 61 DNL and Imperial and Grandfalls a noise level of 55 DNL. These represent 5-dB increases above baseline levels. Two other Texas communities, Toyah and Crane, would underlie proposed IR-178, and currently underlie other existing secondary MTRs that overlap or intersect with proposed IR-178. Noise levels on the segments over these communities would increase between 1 to more than 8 dB. The community of Pyote would fall under new airspace (Segment VBR) and would experience noise levels of 50 to 51 DNL. For comparison, levels of 50 to 51 DNL would be typical of small towns and quiet suburban areas (FICON 1992). Given that these changes would be greater than 3 dB, the population of these communities could be expected to notice the change in noise levels due to aircraft. The communities underlying the proposed Lancer MOA/ATCAA (refer to Table 4.2-3) would experience noise levels of 46 DNL, 1 dB greater than baseline. FAA avoidance procedures would make noise levels affecting these communities less than those reported above. Required FAA avoidance procedures (i.e., 1,000 feet above the highest obstacle and within a horizontal radius of 2,000 feet of the aircraft) would still apply under Alternative B.

Required FAA avoidance procedures reduce noise levels over communities.

The two special use land management areas underlying Alternative B airspace would experience noise levels of 60 to 61 DNL, about 2 to 3 dB greater than existing conditions. At these projected noise levels, most people would not notice the change from baseline conditions. The startle effect of sudden aircraft noise could also affect people under Alternative B airspace. The startle effect would be more likely to occur under MTR airspace than MOA/ATCAA airspace due to the lower altitudes flown. However, FAA avoidance regulations described previously would minimize the potential for this to occur over communities.

Impacts of aircraft overflights on the visual environment of an area are difficult to quantify. In most instances, aircraft are not noticed because of visual cues; rather they are noticed after being heard. The nature of the impact depends on the sensitivity of the resource affected, the distance from which it is viewed, and the length of time it is visible. Altitude and screening relative to the viewer also play 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. In addition, military aircraft are painted a muted gray and are often difficult to pick out against a blue or gray sky.

Visual intrusion of military aircraft could adversely affect the recreational experiences of visitors to the areas of Big Bend Ranch State Park underlying the airspace. While the public is not currently allowed at the Chinati Mountains property, future plans provide for public recreation. The estimated time it would take for the aircraft to pass these areas located under low-altitude segments of the MTR ranges from about 0.7 to 1.6 minutes (Table 4.2-6). Where the terrain is hilly or mountainous, as in the northernmost area of Big Bend Ranch State Park, views of aircraft would be of shorter duration. In areas of flat terrain, the views would be more expansive and aircraft could remain in sight longer. The visual intrusion of military aircraft in these areas could negatively affect the solitude expected by some recreational users. Others may view the occasional overflight as a unique and positive experience. Overall, as discussed above, it would be the noise generated by aircraft that would most affect recreational use in the area.

Table 4.2-6
Visual Intrusion of Aircraft on Special Use Land Management Areas Under Alternative B

Area	*Minimum Flight Altitude (feet AGL)*	*Approximate Horizontal Distance Overflown (nm)*	*Estimated Time For B-1 Aircraft To Pass (minutes)* [1]	*Estimated Time For B-52 Aircraft To Pass (minutes)* [1]
Big Bend Ranch State Park	300	9.6	1.1	1.6
Chinati Mountains Property	300	6.5	0.7	1.1

[1] Based on an average speed of 550 nautical miles per hour for B-1 aircraft and 360 nautical miles per hour for B-52 aircraft.

Land under most of the affected airspace has been subject to military jet overflights for more than 40 years. Low-level military aircraft are part of the existing environment. The Air Force's special operating procedures avoid overflight of specific locations considered to be sensitive to aircraft noise. These avoidance procedures form part of the information used by military aircrews to plan missions. Noise levels in these defined avoidance areas would likely be less than those presented in this EIS.

The likelihood of being overflown varies depending upon the type of airspace (refer to section 4.1). In MTRs, flights are dispersed within the corridor both horizontally and vertically. The wider the MTR, the less likely that a person or specific location would be repeatedly overflown. The special use land management areas both lie on the outside edge of the widest segments of IR-178. In addition, avoidance procedures for populated areas and sensitive locations reduce noise exposure to the greatest degree possible. In a MOA, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown over a short duration.

The effects of noise generated by military overflights on quality of life and traditional lifestyles were frequently raised during the public scoping meetings. Both of these issues are hard to define and extremely subjective, meaning different things to different individuals. However, noise levels of 65 DNL have been identified by various public agencies as a guideline above which significant negative impacts may occur in residential areas (FICUN 1980, FICON 1992). At 65 DNL, approximately 12 percent of people would be highly annoyed by noise. Alternative B operations would not result in noise levels of 65 DNL or higher in any airspace unit. The highest levels would be approximately 61 DNL in portions of IR-178; other portions would be subject to noise levels ranging down to 46 DNL. The noise associated with Alternative B could detract from the quality of life for some individuals but barely disturb that of others. Since traditional lifestyles in the region can be interpreted to include wilderness and solitary experiences, as well as petroleum exploration, noise associated with Alternative B would be expected to negatively affect some traditional lifestyles and not affect others. Further, some people may enjoy watching military aircraft train and may consider the noise associated with aircraft overflights part of the experience.

Neither construction nor operation of emitter sites and Electronic Scoring Sites would preclude or alter surrounding land uses.

Construction. There would be no adverse impacts to land use, recreation resources, or visual settings due to construction under Alternative B. While the presence of construction crews and activities may disrupt the usual setting of the areas, short-duration construction activities would not preclude existing surrounding land uses or continued use or occupation of an area, preempt recreational uses, threaten public health and safety, or be inconsistent with applicable regulations. Nor would construction activities change the terrain or block aesthetic landscape features from view. Further, any impacts generated by construction activities would be short-term and would cease once construction is complete.

Ground Operations. Operation of the emitter sites would not adversely affect land use or recreational resources in the vicinity of the sites. Selected emitter sites would be leased or purchased from private landowners. The lease or purchase arrangements would address any payments needed to remove a parcel from CRP for the duration of the lease or as required to purchase the site. The emitter sites would no longer be available for their previous uses, primarily livestock grazing. While three of the candidate emitter sites are considered prime farmland, the change in land use would not be irreversible and would last only as long as the emitters were needed. Land use change of the parcels would not be expected to generate an adverse impact to ranching lands due to the abundance of this type of land use in the area, nor would it affect the overall land use patterns in the vicinity of the sites.

Operation of the emitter sites would generate noise associated with the electrical equipment and the warning horn. The horn would sound like the warning buzzer before the airport baggage carousel moves. The noise from the warning horn would not adversely affect surrounding land uses since the sound would be of short duration and would not be expected to carry over the distance to the nearest residences (about 0.5 mile).

The change in land use associated with the emitter sites would not be expected to preclude other, ongoing uses on surrounding parcels, be incompatible with adjacent or vicinity land use, or be inconsistent with local zoning or ordinances. As mentioned above, there are no identified public recreation areas in the vicinity of the sites. No adverse impacts to land use or recreation would be associated with operation of the emitter sites.

Operation of the scoring site near Abilene in Taylor County would not affect land use or recreational resources since both candidate sites are owned by DoD and have existing facilities. Operation of the scoring site near Pecos in Reeves County would not be inconsistent with local ordinances or expected to preclude other, ongoing uses on surrounding parcels (Reeves County 1998). One candidate parcel in Reeves County is considered prime farmland and its use for a scoring facility would likely constitute a long-term, but not irreversible, use of the land for nonagricultural purposes. The change to a nonagricultural use, while not of great magnitude compared to the abundance of this type of land use in the area, could be considered an adverse impact on traditional ranching and agricultural lifestyles. Since there are no recreational areas in the vicinity of these sites, operation of the scoring facility in Reeves County would not affect recreational resources.

The presence of the electronic equipment at the emitter sites and the building and equipment associated with the scoring facilities would not result in adverse visual impacts due to the existing structures in the vicinity (e.g., houses, barns, windmills, fences, telephone poles, power lines, etc.). While long-term additions to the visual environment, the equipment and facilities would not introduce features to the environment that are perceptibly uncharacteristic of the region or that would block aesthetic landscape features from view.

Decommissioning. Under Alternative B, the Harrison and La Junta Electronic Scoring Sites and associated emitter sites would be decommissioned. All equipment would be removed from the Electronic Scoring Sites, leaving the buildings intact. At Harrison, where the Air Force leases the land, the Air force would end its lease through agreement with the property owner. At La Junta, where the property is owned by DoD, the site would be disposed of through standard procedures for excess property. For each of the emitter sites, if the land is leased, it would be returned to the owner through ending the lease agreement. If the emitter site is owned by the Air Force, it would be disposed of through standard procedures for excess property.

4.2.4 Alternative C: IR-178/Texon MOA

AFFECTED ENVIRONMENT

The affected environment includes the primary MTRs and MOAs, especially IR-178 and the Texon MOA. The candidate sites for emitters and Electronic Scoring Sites, as well as the Harrison and La Junta Electronic Scoring Sites, make up the ground-based affected environment.

Airspace and Flight Operations. In Alternative C, proposed IR-178 and the proposed Texon MOA/ATCAA form the focus of the affected area. The other primary MTRs and MOAs would not be structurally altered but would be used less. As such, the effects of Alternative C on the other primary airspace would be less than under baseline conditions. They receive no further discussion below. Airspace associated with Alternative C is located almost wholly in west Texas. Only a small portion of airspace extends into New Mexico. The area potentially affected by this alternative is similar to that for Alternative B.

Land use under the airspace is very similar to that described for Alternative B (Figure 4.2-5). Approximately 95 percent of the land under the MTR and MOA airspace associated with this alternative is mostly privately owned rangeland used for grazing livestock. Agriculture and urban/built-up areas make up about 2 percent each. Forest and surface water/wetland areas are less than 1 percent each. Land ownership patterns are the same as for Alternative B.

Eleven communities occur under proposed IR-178 and the Texon MOA/ATCAA (Table 4.2-7). With the exception of Pyote and Toyah, Texas, the other three communities under proposed IR-178 currently underlie an existing MTR. Four (Big Lake, Texon, Best, and Rankin) of the six communities under the proposed Texon MOA/ATCAA are under the existing Texon MOA. In total, approximately 22,800 people (based on 1990 census) live under proposed IR-178 and the Texon MOA.

Table 4.2-7
Communities Under Alternative C:
IR-178 and Proposed Texon MOA/ATCAA

MTR/MOA	*Texas Communities*
Proposed IR-178	Grandfalls, Sierra Blanca, Pyote, Toyah, Imperial
Proposed Texon MOA/ATCAA	Big Lake, McCamey, Mertzon, Rankin, Texon, Best

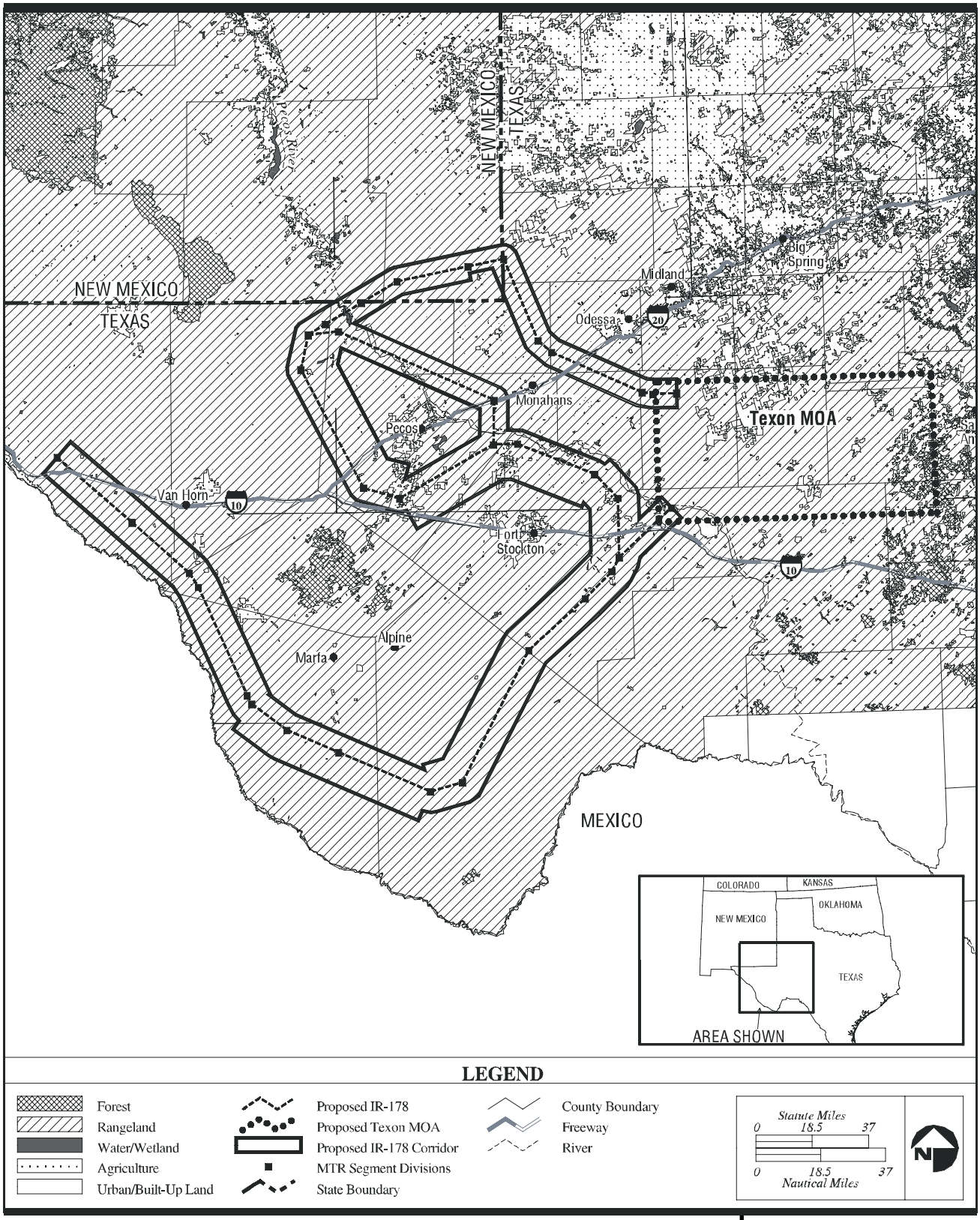
As with Alternative B, Alternative C airspace overlies Big Bend Ranch State Park and Chinati Mountains property (Figure 4.2-6 and refer to Table 4.2-4). The visual environment for land overflown by Alternative C airspace is the same as that described for Alternative B.

Emitter and Electronic Scoring Sites. All candidate sites are located in Texas and privately owned, with the exception of sites 61 and 62, which are owned by DoD (Table 4.2-8). The sites are located in remote, rural areas and the majority are part of larger acreages used for grazing livestock. Three candidate sites (60, 88, and 89) are considered prime farmland. None of the sites are currently enrolled in the CRP.

Impacts of Alternative C on land use would match those identified for Alternative B.

Five of the candidate sites (55, 60, 61, 62, and 82) are located within 1 mile of residences. None of the sites are located in or adjacent to identified recreation areas. While recreational uses such as horseback riding may occur on the parcels, the sites are privately owned and not generally available for public use.

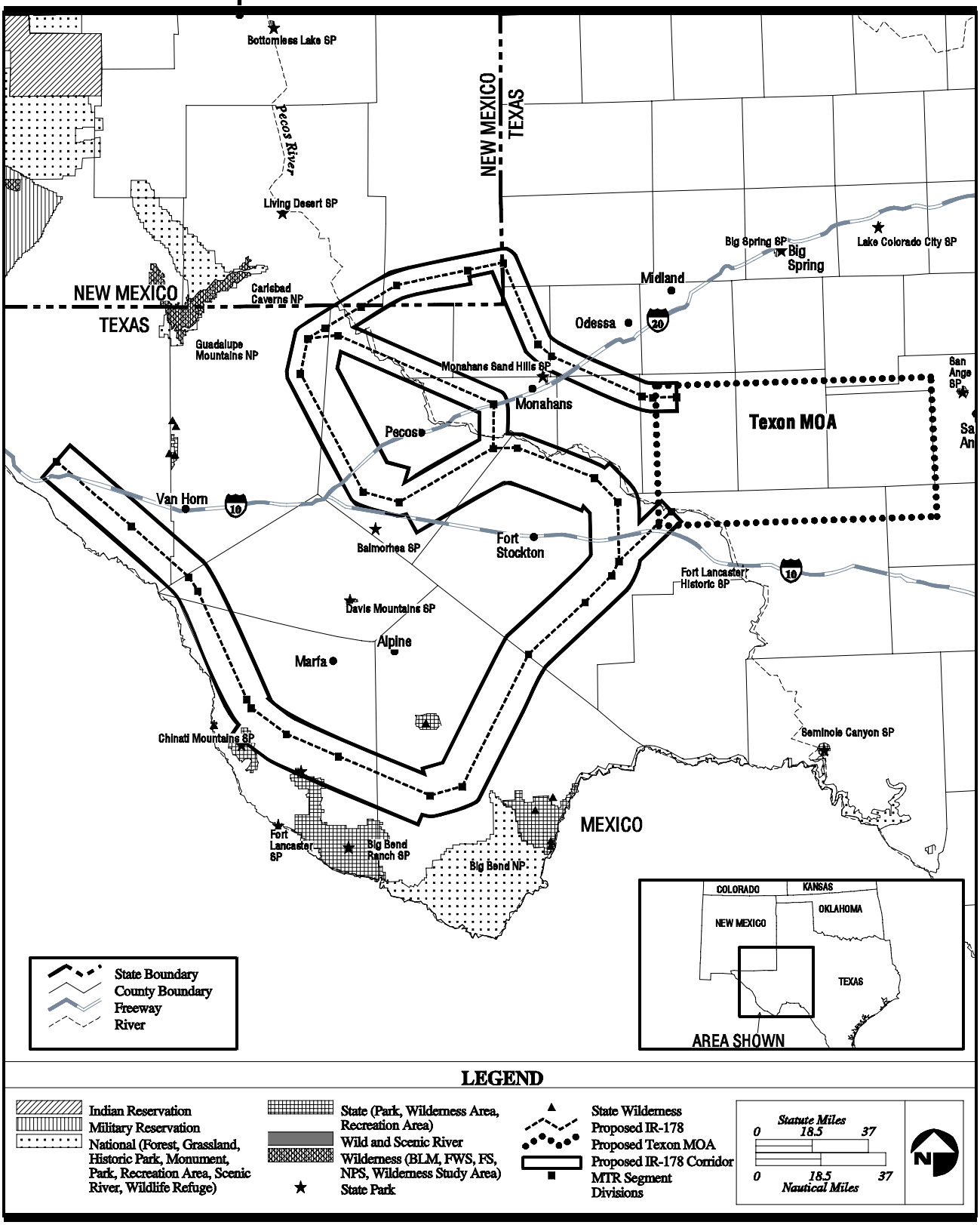
The visual environment of the areas surrounding the candidate sites is typical of the western Texas region and similar to that described in Alternative B. All of the sites



Existing Land Use Under Alternative C: IR-178/Texon MOA

Figure 4.2-5

4.0 Affected Environment and Environmental Consequences: Land Management and Use



Special Use Land Management Areas Under Alternative C: IR-178/Texon MOA **Figure 4.2-6**

Table 4.2-8
Emitter and Electronic Scoring Site Land Use Under Alternative C

Site Number	*Site Type*	*Texas County*	*Ownership*	*Current Land Use*	*Distance to Nearest Occupied Land Use Category (Approximate)*	*Current Visual Environment*
54	MTR Emitter	Brewster	Private	Grazing	5 miles to residential	Flat/gently rolling, rural grassland/scrub
55	MTR Emitter	Presidio	Private	Grazing	1 mile to residential	Flat, rural grassland
59	MTR Electronic Scoring Site	Reeves	Private	Grazing	5 miles to commercial	Flat/gently rolling, rural grassland/scrub
60	MTR Electronic Scoring Site	Reeves	Private	Fallow field[1]	0.5 mile to residential	Flat, rural hard-baked scrub
61	En Route Electronic Scoring Site	Taylor	DoD	Existing unused Air Force facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland
62	En Route Electronic Scoring Site	Taylor	DoD	Existing unused Air Force facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland
78	MOA Emitter	Upton	Private	Grazing	5 miles to residential	Flat, rural hard-baked scrub
79	MOA Emitter	Schleicher	Private	Grazing	5 miles to residential	Flat, rural grassland/scrub
80	MOA Emitter	Upton	Private	Grazing	5 miles to residential	Flat/gently rolling, rural, hard-baked scrub, rocky outcropping
81	MTR Emitter	Brewster	Private	Grazing	5 miles to residential	Flat, gently rolling, rural grassland/scrub
82	MTR Emitter	Pecos	Private	Cropland	0.5 mile to residential	Flat, rural grassland
88	MOA Emitter	Regan	Private	Grazing[1]	5 miles to Town of Big Lake	Flat, rural grassland/scrub
89	MOA Emitter	Regan	Private	Grazing[1]	5 miles to Town of Big Lake	Flat, rural grassland/scrub
91	MTR Emitter	Pecos	Private	Grazing	5 miles to residential	Gently rolling, rural grassland/scrub
93	MTR Emitter	Pecos	Private	Grazing	5 miles to residential	Gently rolling, rural grassland/scrub
94	MOA Emitter	Irion	Private	Grazing	5 miles to residential	Gently rolling, rural grassland/scrub

[1] Prime farmland.

are within approximately 5 miles of residential or commercial use areas and would be considered to be generally compatible with views from surrounding occupied land uses, depending on topography and intervening structures (refer to Table 4.2-8).

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Impacts related to flight operations would be similar to those described for Alternative B. Flight operations would not likely affect land use, recreation resources, or visual settings in the areas under the airspace. Flight operations would not be expected to preclude existing land uses or continued use or occupation of an area, preempt recreational uses, threaten public health and safety, or be inconsistent with applicable regulations. Nor would flight operations change features of the physical environment or block aesthetic landscape features from view. Flight operations could, however, be perceived by the public as negatively affecting their quality of life.

Proposed changes to IR-178 would reduce the total amount of land underlying this MTR by about 3,000 square nm (refer to Table 2.4-7). Expansion of the proposed Texon MOA/ATCAA would increase the affected area by more than 2,000 square nm, including about 800 square nm of new airspace.

Baseline average daily sortie-operations on existing IR-178 generate noise levels ranging from less than 45 to 61 DNL. The additional one to six (with a maximum total of ten) sortie-operations associated with proposed IR-178 would generate noise levels from 46 to 61 DNL (Appendix B, Table B-7, and Table 4.1-15), depending on the number of sortie-operations, segment width, and altitude regimes flown. Noise levels below the proposed Texon MOA/ATCAA would be 46 DNL.

Proposed IR-178 would overlie five communities in Texas: Grandfalls, Sierra Blanca, Toyah, Imperial, and Pyote. Aircraft noise levels in the first four listed communities would increase by 4 to 5 dB. Pyote would be under new airspace where noise levels would range from 50 to 51 DNL. Required FAA avoidance procedures would be used for these communities, and noise levels would be less than projected. Given that these changes would be greater than 3 dB, the population of these communities would be expected to notice the change in noise levels due to aircraft. The six communities underlying the proposed Texon MOA/ATCAA (refer to Table 4.2-7) would experience noise levels of 46 DNL. This would represent an increase of 1 dB greater than baseline in Big Lake, Rankin, Texon, and Best. McCamey and Merzton would experience increased noise levels to 46 DNL.

The two special use land management areas affected by Alternative C lie on the edge of IR-178 where noise levels would generally be reduced.

The two special use land management areas underlying Alternative C airspace would experience noise levels of 60 to 61 DNL, about 2 to 3 dB greater than existing conditions (Table 4.2-9). At these projected noise levels, most people would not notice the change from baseline conditions.

Table 4.2-9
Special Use Land Management Areas Under Alternative C

				Noise Levels	
IR-178 Segment	*Minimum Flight Altitude (Feet AGL)*	*Area*	*Acreage Under Airspace*	*Projected (DNL)*	*Change from Baseline (dB)*
FG	300	Chinati Mountains Property[1]	10,104	60-61	2-3
HI	300	Big Bend Ranch State Park	5,553	60-61	2-3
		Total	15,657		

Refer to Figure 2.4-6 for segment locations.

[1] Currently not accessible to the public.

Source: UCSB 1996.

As described previously, the startle effect of sudden aircraft noise could also affect people under Alternative C airspace. The startle effect would be more likely to occur under MTR airspace than under MOA/ATCAA airspace due to the lower altitudes flown. However, the FAA and Air Force avoidance regulations described previously would minimize the potential for this to occur over communities.

Visual intrusion of military aircraft could adversely affect the recreational experiences of visitors to the areas of Big Bend Ranch State Park underlying the airspace. While the public is not currently allowed at the Chinati Mountains property, future plans provide for public recreation. The estimated time it would take for the aircraft to pass these areas located under low-altitude segments of the MTR ranges from about 0.7 to 1.6 minutes (Table 4.2-10). Where the terrain is hilly or mountainous, as in the northernmost area of Big Bend Ranch State Park, views of aircraft would be of shorter duration. In areas of flat terrain, the views would be more expansive and aircraft could remain in sight longer. The visual intrusion of military aircraft in these areas could negatively affect the solitude expected by some recreational users. Others may view the occasional overflight as a unique and positive experience. Overall, as discussed above, it would be the noise generated by aircraft that would most affect recreational use in the area.

Table 4.2-10
Visual Intrusion of Aircraft on Special Use Land Management Areas Under Alternative C

Area	*Minimum Flight Altitude (feet AGL)*	*Approximate Horizontal Distance Overflown (nm)*	*Estimated Time For B-1 Aircraft To Pass (minutes)* [1]	*Estimated Time For B-52 Aircraft To Pass (minutes)* [1]
Big Bend Ranch State Park	300	9.6	1.1	1.6
Chinati Mountains Property	300	6.5	0.7	1.1

[1] Based on an average speed of 550 nautical miles per hour for B-1 aircraft and 360 nautical miles per hour for B-52 aircraft.

The likelihood of being overflown varies depending upon the type of airspace (refer to Section 4.1). In MTRs, flights are dispersed within the corridor both horizontally and vertically. The wider the MTR, the less likely that a person or specific location would be repeatedly overflown. The special use land management areas both lie on the outside edge of the widest segments of IR-178. In addition, avoidance procedures for populated areas and sensitive locations reduce noise exposure to the degree possible. In a MOA, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown over a short duration.

Construction. Impacts related to construction of emitter and Electronic Scoring Sites under this alternative would be similar to those described for Alternative B. There would be no adverse impacts to land use, recreation resources, or visual settings under Alternative C.

Ground Operations. Impacts related to operation of the Electronic Scoring Sites under this alternative would be similar to those described for Alternative B. Operation of the Electronic Scoring Sites would not adversely affect land use, recreation resources, or visual settings.

Decommissioning. Impacts related to decommissioning the Electronic Scoring Sites under this alternative would be similar to those described for Alternative B. Decommissioning the Electronic Scoring Sites would not adversely affect land use, recreation resources, or visual setting.

4.2.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

The affected environment focuses on the proposed IR-153 and the Mt. Dora MOA/ATCAA. The candidate sites for emitters and Electronic Scoring Sites, as well as the Harrison and La Junta Electronic Scoring Sites, make up the ground-based affected environment.

Airspace and Flight Operations. In Alternative D, proposed IR-153 and the proposed Mt. Dora MOA/ATCAA form the focus of the affected area. The other primary MTRs and MOAs would not be structurally altered but would be used less. As such, the effects of Alternative D on the other primary airspace would be less than under baseline conditions. They receive no further discussion below.

The area underlying the airspace associated with Alternative D is located almost wholly in New Mexico with a small portion extending into northwestern Texas. In general, this area is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Land in the area is owned and managed by a variety of entities, including private owners, the states of New Mexico and Texas, and various federal agencies. The primary land use outside population centers is livestock grazing.

Proposed IR-153 overlies 17 special use land management areas like the Rio Grande Wild and Scenic River.

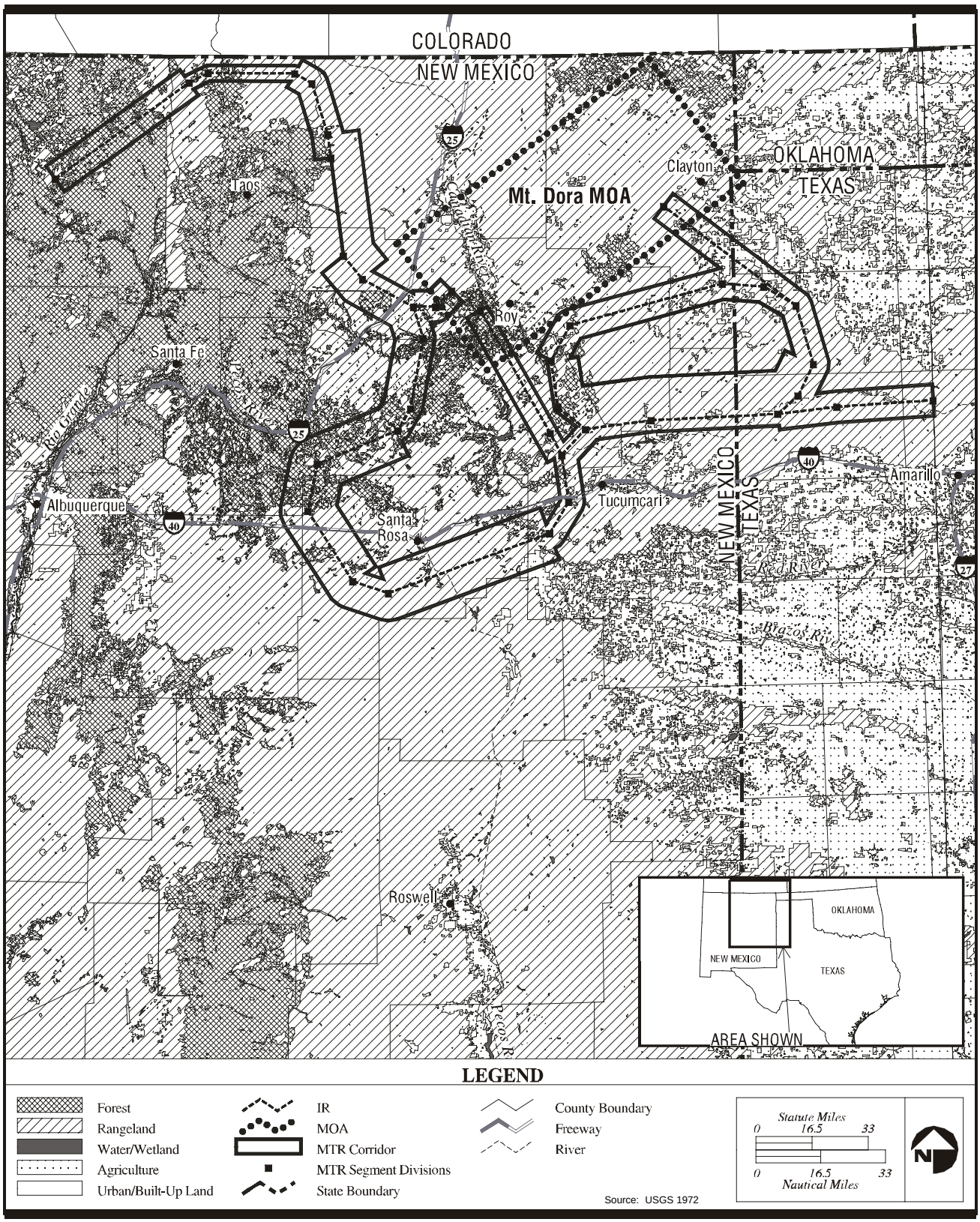
Approximately 84 percent of the land under the MTR and MOA airspace associated with this alternative is public and privately owned rangeland used for livestock grazing (Figure 4.2-7). Approximately 12 percent of the remaining land is forested. Agricultural uses make up approximately 4 percent; surface water/wetland and urban/built-up areas make up less than 1 percent each. Private ownership accounts for approximately 78 percent of the land underlying the affected airspace with a variety of state, U.S. Forest Service, and other federal interests overseeing the remainder of the land below the airspace (New Mexico Cooperative Fish and Wildlife Research Unit 1997).

Alternative D airspace overlies the communities shown in Table 4.2-11. Of the four communities under proposed IR-153, all currently underlie secondary MTRs. The existing Mt. Dora MOA overlies Clayton, Roy, Abbott, and Mt. Dora. Using 1990 census data, it is estimated that about 11,900 people live under proposed IR-153 and Mt. Dora MOA. Almost 90 percent of the affected area underlies existing airspace.

Table 4.2-11
Communities Under Alternative D:
IR-153 and Proposed Mt. Dora MOA/ATCAA

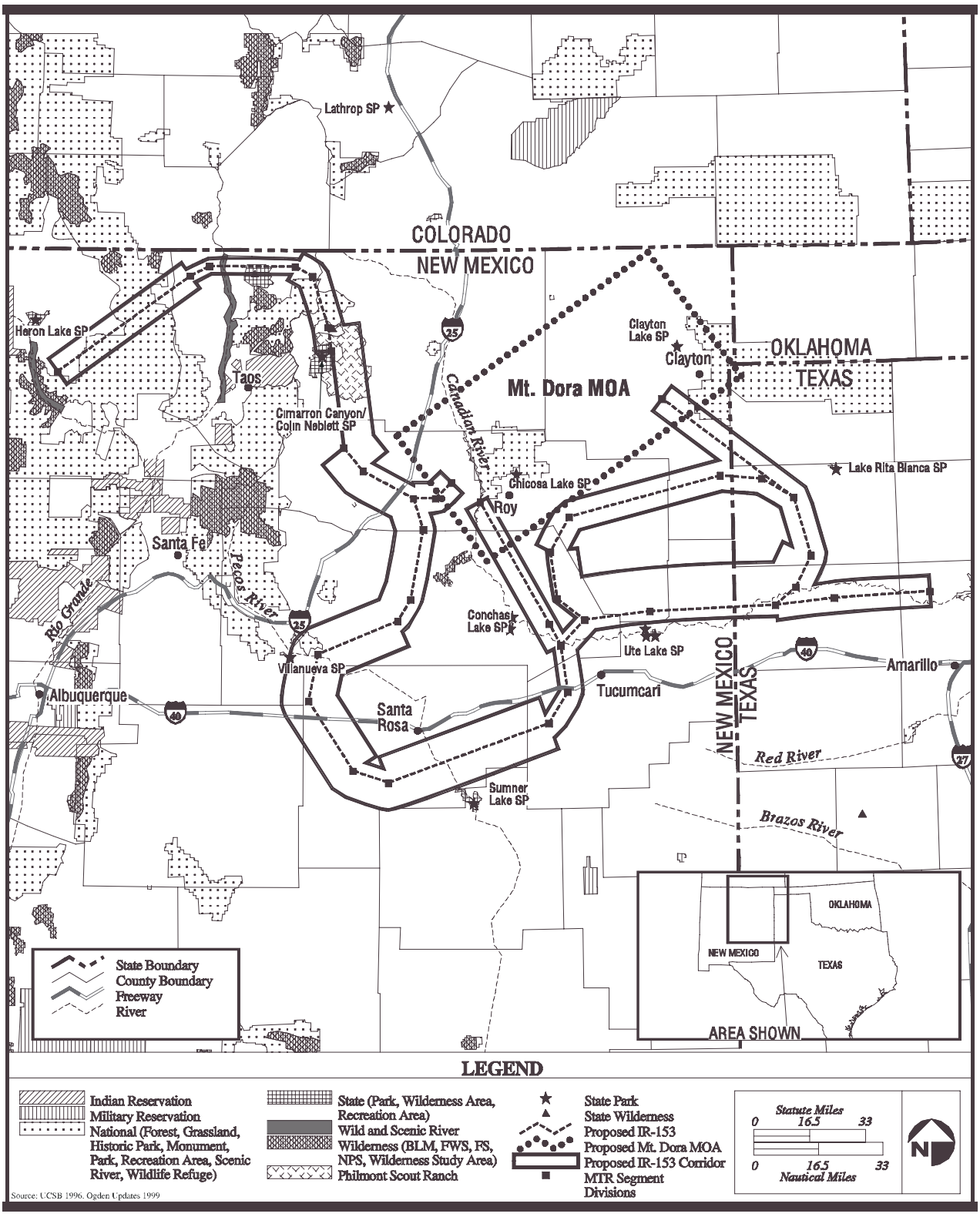
MTR/MOA	*New Mexico Communities*
Proposed IR-153	Ocate, Anton Chico, Mosquero, Wagon Mound
Proposed Mt. Dora MOA/ATCAA	Clayton, Roy, Abbott, Mt. Dora

Thirteen special use land management areas underlie Alternative D airspace (Figure 4.2-8 and Table 4.2-12). These recreational areas provide a wide range of recreational opportunities, including hiking, camping, fishing, hunting, picnicking, wildlife viewing, boating, and winter sports. Recreational use tends to be greatest from the spring to fall months. Philmont Scout Ranch is located under proposed IR-153 segments EF to GH. The ranch has about 5,000 visitors per day during the summer months in an area that includes trails, established campgrounds, and assembly areas of more than 137,000 acres. Capulin Volcano National Monument, which underlies the existing Mt. Dora MOA, would lie outside the proposed Mt.



Existing Land Use Under Alternative D: IR-153/Mt. Dora MOA

Figure 4.2-7



Special Use Land Management Areas Under Alternative D: IR-153/Mt. Dora MOA **Figure 4.2-8**

Dora MOA. The MOA border would be approximately 4 nm southeast of the monument.

Table 4.2-12
Special Use Land Management Areas Under Alternative D

				Noise Level	
IR-153 Segment, MOA	*Minimum Flight Altitude (feet AGL)*	*Area*	*Acreage Under Airspace*	*Projected (DNL)*	*Change from Baseline (dB)*
AB	400	Carson National Forest	138,928	62	15
CD	800	Rio Grande Wild and Scenic River Urraca Wildlife Area	4,743 12,020	61	15
EF	400	Carson National Forest Elliott Barker Wildlife Area Philmont Scout Ranch[1]	67,880 200 489	62	15
FG	400	Elliott Barker Wildlife Area Colin Neblett Wildlife Area/ Cimarron Canyon State Park Philmont Scout Ranch[1] Carson National Forest	1,053 5,079 37,180 86	60 - 61	15 - 16
GH	400	Colin Neblett Wildlife Area/ Cimarron Canyon State Park Philmont Scout Ranch[1]	 1,387 77,004	62	17
MN	300	Santa Fe National Forest	12,267	60	15
NO	300	Santa Fe National Forest Villanueva State Park	5,213 708	60	10
QR	300	Sumner Lake State Park	13	60	11
ZZA	2,000	Kiowa National Grassland	7,313	49	4
Mt. Dora MOA	3,000	Kiowa National Grassland Rita Blanca National Grassland Chicosa Lake State Park Clayton Lake State Park	259,921 8,016 473 178	46	1
		Total	640,151		

Refer to Figure 2.4-9 for segment locations.

[1] Philmont Scout Ranch privately owned by Boy Scouts of America.

Source: UCSB 1996.

The airspace associated with Alternative D covers an area located in northeastern New Mexico and the northwest corner of the Texas panhandle. It overlies land characterized by high plains and grasslands with sparse vegetation and few permanent bodies of water. The visual environment of the High Plains area is described above for Alternative A. Portions of the airspace cross mountainous areas near Taos, New Mexico, where the topographic features are more varied. Chapter 3 describes this area in detail.

The mountainous areas are quite scenic, with numerous river valleys, mesas, and plateaus; many scenic overlooks and vistas exist in this region. The visual environment of this region plays a large part in the attraction and popularity of its recreational resources. Various public recreation resources underlie Alternative D airspace.

Emitter and Electronic Scoring Sites. Candidate sites are located in New Mexico and privately owned, with the exception of sites 61 and 62, which are located in Texas and owned by DoD (Table 4.2-13). All the emitter sites are located in remote, rural areas and the majority are part of larger acreages used for grazing livestock. Two of the candidate sites (35 and 41) are prime farmland. Two sites (14 and 28) are currently enrolled in the CRP. Twelve of the parcels are located within 1 mile of residences (refer to Table 4.2-13). None of the candidate sites are located in or adjacent to identified recreation areas. While recreational uses such as horseback riding may occur on the parcels, the sites are privately owned and not generally available for public use.

Table 4.2-13
Emitter and Electronic Scoring Site Land Use Under Alternative D

Site Number	*Site Type*	*County and State*	*Current Land Use*	*Distance to Nearest Occupied Land Use Category (Approximate)*	*Current Visual Environment*
2	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
6	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
7	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
14	MOA	Harding, NM	Grazing, 20% fallow field[1]	5 miles to Town of Roy	Flat, rural grassland
15	MOA	Colfax, NM	Grazing	0.45 mile to roadside rest stop; 5 miles to residential	Flat, rural grassland
16	MOA	Colfax, NM	Grazing	0.6 mile to roadside rest stop; 0.5 mile to residential	Flat, rural grassland
17	MOA	Union, NM	Grazing	0.5 mile to residential	Flat, rural grassland
20	MOA	Union, NM	Grazing	5 miles to residential	Flat, rural grassland
21	MOA	Union, NM	Grazing	0.5 mile to residential; 5 miles to Town of Clayton	Flat, rural grassland
24	MTR Emitter	Guadalupe, NM	Grazing	0.4 mile to residential	Flat, rural grassland
28	Electronic Scoring Site	Harding, NM	Fallow field[1]	0.5 mile to residential	Flat, rural grassland
33	Electronic Scoring Site	Union, NM	Grazing	5 miles to residential	Flat, rural grassland
34	Electronic Scoring Site	Quay, NM	Grazing	0.5 mile to residential	Flat, rural grassland
35	MOA	Harding, NM	Grazing[2]	0.5 mile to residential	Flat, rural grassland
36	MOA	Harding, NM	Grazing	1 mile to residential	Flat, rural grassland
37	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
38	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
39	MTR Emitter	Guadalupe, NM	Grazing	5 miles to residential	Flat, rural grassland
40	MTR Emitter	Mora, NM	Grazing	5 miles to residential	Flat, rural grassland
41	MTR Emitter	Mora, NM	Grazing[2]	0.5 mile to residential	Flat, rural grassland
61	Electronic Scoring Site	Taylor, TX	Existing unused AF facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland
62	Electronic Scoring Site	Taylor, TX	Existing unused Air Force facility	0.5 mile to City of Abilene	Existing one-story building; flat, rural grassland

[1] Conservation Reserve Program.
[2] Prime farmland.

The visual environment of the areas surrounding the candidate sites is typical of the High Plains area of northeastern New Mexico. The sites are located in remote, rural areas used primarily for livestock grazing. The topography is generally flat, and the predominant vegetative cover is grassland. There are no identified scenic resources or vistas within visual range of each site. All of the sites are within approximately 5 miles of residential or commercial use areas and would be considered to be compatible with views from surrounding occupied land uses, depending on topography and intervening structures (refer to Table 4.2-13).

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Flight operations would not likely affect designated land use, recreation resources, or visual settings under the airspace. However, impacts would likely be perceived as adverse by the public merely due to the change. Flight operations would not be expected to preclude existing land uses or continued use or occupation of an area, preempt recreational uses, threaten public health and safety, or be inconsistent with applicable regulations. Nor would flight operations change features of the physical environment or block aesthetic landscape features from view. Flight operations could, however, be perceived by the public as negatively affecting their quality of life.

Noise levels under proposed IR-153 for Alternative D would increase in some areas by more than 10 dB. A change of 3 dB (DNL) is readily noticeable to people.

As detailed in Chapter 2, Alternative D would result in a decrease in the total amount of land under the airspace (refer to Table 2.4-11). Proposed IR-153 would predominantly coincide with existing secondary MTR airspace; little new airspace would be added. The proposed Mt. Dora MOA/ATCAA would shrink in overall size in comparison to existing Mt. Dora MOA.

As discussed in Section 4.1, the existing sortie-operations generate noise levels ranging from less than 45 to 51 DNL. The additional one to ten average daily sortie-operations associated with proposed IR-153 would generate noise levels from less than 45 to 64 DNL (Appendix B, Table B-8, and Table 4.1-19), depending on the number of sortie-operations, segment width, and altitude regimes flown. Noise levels under the proposed Mt. Dora MOA/ATCAA would be 46 DNL.

Noise levels under most of proposed IR-153 would range from less than 45 to 64 DNL, increases of up to 18 dB over baseline conditions. Four communities under IR-153 would experience changes in noise levels of 10 dB or greater. The population of these communities could be expected to notice the change in noise levels even with aircraft using FAA avoidance procedures. The communities underlying the proposed Mt. Dora MOA/ATCAA (refer to Table 4.2-11) would experience noise levels of 46 DNL, 1 dB greater than baseline. This increase would not be noticeable.

Annoyance can be used as a measure of noise effects.

All the special use land management areas under proposed IR-153 would experience changes in noise levels greater than 10 dB (refer to Table 4.2-12). Most visitors to these areas would notice the change in noise level due to aircraft. Special use land management areas under the proposed Mt. Dora MOA/ATCAA would experience noise levels of 46 DNL, 1 dB greater than baseline. Such a change would not be readily noticed.

The startle effect of sudden aircraft noise could also affect people under Alternative D airspace. Given that the startle effect would be more likely to occur under MTR airspace than MOA/ATCAA airspace due to the lower altitudes flown, people in the communities and special use land management areas below proposed IR-153 could be startled by aircraft noise.

Visual intrusion of military aircraft could adversely affect the recreational experiences of visitors to public recreation areas underlying the airspace. The estimated time it would take for the aircraft to pass the recreation areas located under

FAA regulations and Air Force special operations procedures help reduce noise over specific locations considered sensitive to aircraft noise.

the low-altitude segments of the MTR ranges from about 0.1 to 3.3 minutes (Table 4.2-14). Where the terrain is hilly or mountainous (for example, in the Carson and Santa Fe National Forests and Philmont Scout Ranch), views of aircraft would be of shorter duration. However, in areas of flat terrain (for example, Sumner Lake State Park), the views would be more expansive and aircraft could remain in sight longer. The visual intrusion of military aircraft in these recreation areas could negatively affect the solitude expected by some recreational users. However, observations of aircraft may be viewed as a positive and unique experience. Overall, as discussed above, it would be the noise generated by aircraft that would most affect recreational use in the area.

Table 4.2-14
Visual Intrusion of Aircraft on Special Use Land Management Areas Under Alternative D

Area	*Minimum Flight Altitude (feet AGL)*	*Approximate Horizontal Distance Overflown (nm)*	*Estimated Time For B-1 Aircraft To Pass (minutes)* [1]	*Estimated Time For B-52 Aircraft To Pass (minutes)* [1]
Carson National Forest	400	18.9	2.1	3.2
Rio Grande Wild and Scenic River	800	1.6	0.2	0.3
Urraca Wildlife Area	800	6.3	0.7	1.1
Colin Neblett Wildlife Area/ Cimarron Canyon State Park	400	4.7	0.5	0.8
Elliott Barker Wildlife Area	400	1.0	0.1	0.2
Philmont Scout Ranch	400	19.5	2.1	3.3
Santa Fe National Forest	300	5.0	0.6	0.8
Villanueva State Park	300	0.8	0.1	0.1
Sumner Lake State Park	300	0.3	0.1	0.1

[1] Based on an average speed of 540 nm per hour for B-1 aircraft and 360 nm per hour for B-52 aircraft.

[2] Applies to largest section of Carson National Forest under IR-153; another smaller segment overflown.

Lands under most of the affected airspace have been subject to military jet overflights for more than 40 years. Low-altitude military aircraft are part of the existing environment. The Air Force has established special operating procedures to avoid overflight of specific locations considered to be sensitive to aircraft noise. These avoidance procedures form part of the information used by military aircrews to plan missions. Noise levels in these defined avoidance areas would likely be less than those presented in this EIS.

As explained in Section 4.1, the likelihood of being overflown varies depending upon the type of airspace. In MTRs, flights are dispersed within the corridor both horizontally and vertically. The wider the MTR, the less likely that a person or specific location would be repeatedly overflown. For Alternative D, the narrowest segments would receive the most use. In addition, avoidance procedures for populated areas and sensitive locations minimize noise exposure as much as possible. In a MOA, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown.

Lands under Alternative D airspace would be subject to the greatest amount of change in noise levels from baseline conditions.

The effects of noise generated by military overflights on quality of life and traditional lifestyles were frequently raised during the public scoping meetings. Both of these issues are hard to define and extremely subjective; meaning different things to different individuals. However, noise levels of 65 DNL have been identified by various public agencies as a guideline above which significant negative impacts may occur in residential areas (FICUN 1980, FICON 1992). At 65 DNL, approximately 12 percent of people would be highly annoyed by noise. Alternative D operations would not result in noise levels of 65 DNL or higher in any airspace unit. The highest level experienced under Alternative D airspace would be approximately 64

DNL for one portion of IR-153; other portions would be subject to noise levels ranging down to less than 45 DNL. The noise associated with Alternative D could detract from the quality of life for some individuals but barely disturb that of others. Since traditional lifestyles in the region can be interpreted to include wilderness and solitary experiences, as well as petroleum exploration, noise associated with Alternative D would be expected to negatively affect some traditional lifestyles and not affect others. However, some people may enjoy watching military aircraft train and may consider the noise associated with aircraft overflights part of the experience.

Construction. Impacts associated with construction of emitter and scoring sites would be similar to those described for Alternative B. There would be no adverse impacts to land use, recreation resources, or visual settings under Alternative D.

Ground Operations. Impacts related to operation of the Electronic Scoring Sites under this alternative would be similar to those described for Alternative B. Operations would not adversely affect land use, recreation resources, or visual settings. Operation of the Electronic Scoring Site near Tucumcari, New Mexico, would not be inconsistent with local ordinances or expected to preclude other, ongoing uses on surrounding parcels (Harding County 1998, Quay County 1998, Union County 1998).

Decommissioning. Impacts related to decommissioning the Electronic Scoring Sites under this alternative would be similar to those described for Alternative B. Decommissioning the Electronic Scoring Sites would not adversely affect land use, recreation resources, or visual setting.

4.2.6 Summary of Comparison of Impacts

Table 4.2-15 compares the impacts for all four alternatives with regard to airspace and flight operations. None of the alternatives would have more than minimal effects on land use, recreation resources, or visual settings. Alternative D would result in the greatest amount of change from baseline.

Table 4.2-15
Land Management and Use Comparison of Alternatives

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace and Flight Operations	A) No change to land use, recreation resources, or visual setting. B) Five communities underlie IR-178 and one is subject to noise levels of 55 DNL or greater. C) Three special land use management areas are affected by noise levels of 55 DNL or higher.	A) No likely effects to land use, recreation resources, or visual settings. B) Six communities experience increases in noise levels of 1 to 8 dB. One community newly exposed to aircraft noise. C) No Special Use Land Management Areas experience increases in noise levels of more than 3 dB.	A) No likely effects to land use, recreation resources, or visual settings. B) Five communities experience increases in noise levels of 4 to 5 dB. One community newly exposed to aircraft noise. C) No Special Use Land Management Areas experience increases in noise levels of more than 3 dB.	A) No likely effects to land use, recreation resources, or visual settings. B) Four communities experience increases in noise levels of 10 to 16 dB. C) Thirteen Special Use Land Management Areas experience increases in noise levels of 1 to 17 dB.
Construction	No change to land use, recreation resources, or visual setting.	No adverse effects to land use, recreation resources, or visual settings.	Same as Alternative B.	Same as Alternative B.
Ground Operations	No change to land use, recreation resources, or visual setting.	No adverse effects to land use, recreation resources, or visual settings.	Same as Alternative B.	Same as Alternative B.
Decommissioning	No change.	No adverse effects.	Same as Alternative B.	Same as Alternative B.

4.3 BIOLOGICAL RESOURCES

Biological resources incorporate living, native or naturalized, plant and animal species and the habitats within which they occur. Plant species are referred to as vegetation and animal species are referred to as wildlife. Habitat can be defined as the resources and conditions present in an area that cause or allow a plant or animal to live there (Hall *et al.* 1997).

4.3.1 Methods and Approach

Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species or vegetation types that 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 EIS, these resources are divided into three major categories: 1) vegetation; 2) wildlife; and 3) threatened, endangered, or sensitive species.

1. *Vegetation* includes all existing terrestrial plant communities, with the exception of wetlands or threatened, endangered, or sensitive species. The three action alternatives (B, C, and D) are predominantly airspace-related actions, and any ground disturbance would be localized to the proposed Electronic Scoring Sites and emitter sites. Potential impacts to wetlands or sensitive plant species would be localized within the confines of the disturbed area of those sites. Biological surveys of each candidate site revealed no wetlands within or adjacent to the site. Since wetlands would not be affected, they receive no further discussion in this section.

Biological surveys of candidate emitter sites and Electronic Scoring Sites observed no wetlands or threatened or endangered species or their habitat.

2. *Wildlife* includes all animals (i.e., fish, amphibians, reptiles, birds, and mammals) with the exception of those identified as domesticated livestock or listed as threatened, endangered, and sensitive. Many wildlife species have habitats that extend throughout much, if not all, of the areas affected by the alternatives. These habitats both underlie the affected airspace and may occur within the locations for proposed emitter sites and Electronic Scoring Sites.

3. *Threatened, endangered, or sensitive species* are defined as those plant and animal species listed or proposed as such, by the FWS, New Mexico Department of Game and Fish (NMGF), or Texas Parks and Wildlife Department (TPWD). Preservation of sensitive biological resources is accomplished through many means, most notably the Endangered Species Act which protects federally listed threatened and endangered plant and animal species. Federal species of concern, formerly Category 2 candidate species, are not protected by law. However, these species could become listed, and therefore protected, at any time. Their consideration early in the planning process may avoid future conflicts that could occur. The states of New Mexico and Texas also protect state-listed plant and animal species through their respective state fish and wildlife and administrative codes. Additionally, the Natural Heritage Programs of New Mexico and Texas maintain databases of state species of concern, many of which are not afforded legal protection. Discussion of threatened, endangered, and sensitive species focuses on those species with the potential to be affected by aircraft overflights and associated noise. These species consist primarily of birds. Although present within the study area (see Appendix H), neither fish nor plant species would be affected by any element of the proposal. Surveys of the candidate sites for emitters and Electronic Scoring Sites found no watercourses capable of supporting fish and

observed no sensitive plant species or suitable habitat. Construction and operation of these sites, therefore, would not disturb these types of resources.

The Air Force has consulted with the FWS on the Endangered Species Act issues associated with RBTI. In recent years, the Air Force consulted on the expansion of German Air Force operations at Holloman AFB, New Mexico (USAF 1998a) and force structure and foreign military sales actions at Cannon AFB, New Mexico (USAF 1998b). RBTI was considered within the context of these two consultations because RBTI's study area includes much of the same territory.

The Air Force and FWS have and will continue to consult regarding the Endangered Species Act.

Although the airspace units addressed in the German Air Force/Holloman AFB action are not identical to those in RBTI, many comprise secondary MTRs associated with RBTI or otherwise encompassed a similar region in western Texas and part of the same region in eastern New Mexico. This consultation program considered the effects of military aircraft overflights on threatened and endangered species under several airspace units in the region. The Air Force prepared a Biological Assessment (USAF 1998c) and the FWS provided a Biological Opinion (USFWS 1998).

Informal consultation for the Cannon AFB action covered seven of the secondary MTRs overlapped or intersected by proposed IR-153 in RBTI Alternative D. The Mt. Dora MOA was also addressed. For these specific secondary MTRs (IR-107, IR-109, IR-111, IR-113, VR-100/125, VR-108, and VR-114), the Air Force, in consultation with the FWS, devised and implemented a set of special operating procedures designed to reduce what the FWS considered potential effects on specific threatened and endangered bird species (peregrine falcon, Mexican spotted owl, bald eagles, and willow fly catchers). The Air Force submitted a Biological Evaluation of the proposed action to the FWS (USAF 1998d). Subsequently, the FWS provided written concurrence with the Air Force's determination that the action may affect, but is not likely to adversely affect listed species.

Compliance with the Endangered Species Act for RBTI has been and will continue to be part of the broader consultation effort between the Air Force and FWS. Specific efforts for RBTI have included (to date) discussions of the proposal in Air Force-FWS meetings, notification of the FWS concerning the RBTI proposal, requests for data and species lists from the FWS, and receipt of these data from the FWS (Appendix H). The Air Force will continue consultation with the FWS to resolve issues and comply with the Endangered Species Act before implementation (if it occurs) of any RBTI action alternative.

The region of analysis for biological resources includes lands under existing airspace and proposed primary and candidate sites for emitters and Electronic Scoring Sites. Analysis of impacts considered whether the elements of the alternative resulted in loss of habitat, direct mortality of wildlife, and indirect effects on wildlife, such as disturbance from noise. Although Alternative A: No-Action would involve continued use of the Harrison and La Junta Electronic Scoring Sites, and these facilities would be decommissioned in Alternatives B through D, this section does not address biological resources at those sites. Both Electronic Scoring Sites and their associated emitters consist of developed, disturbed lands attractive to species habituated to human activities and disturbance. Previous environmental documentation for these sites (USAF 1993a, b) revealed no issues or impacts for biological resources.

Information used in developing this section includes soil surveys, topographic maps, National Wetland Inventory maps, vegetation maps, published references, personal communication with species experts and agencies, site visits in April, May, and September 1998, internet searches, other relevant NEPA documents, and biological opinions for similar projects. Agencies contacted include the U.S. Fish and Wildlife Service in Albuquerque, NM, Arlington and Austin, TX; Texas Parks and Wildlife Department; New Mexico Department of Game and Fish; and the New Mexico Natural Heritage Program.

4.3.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

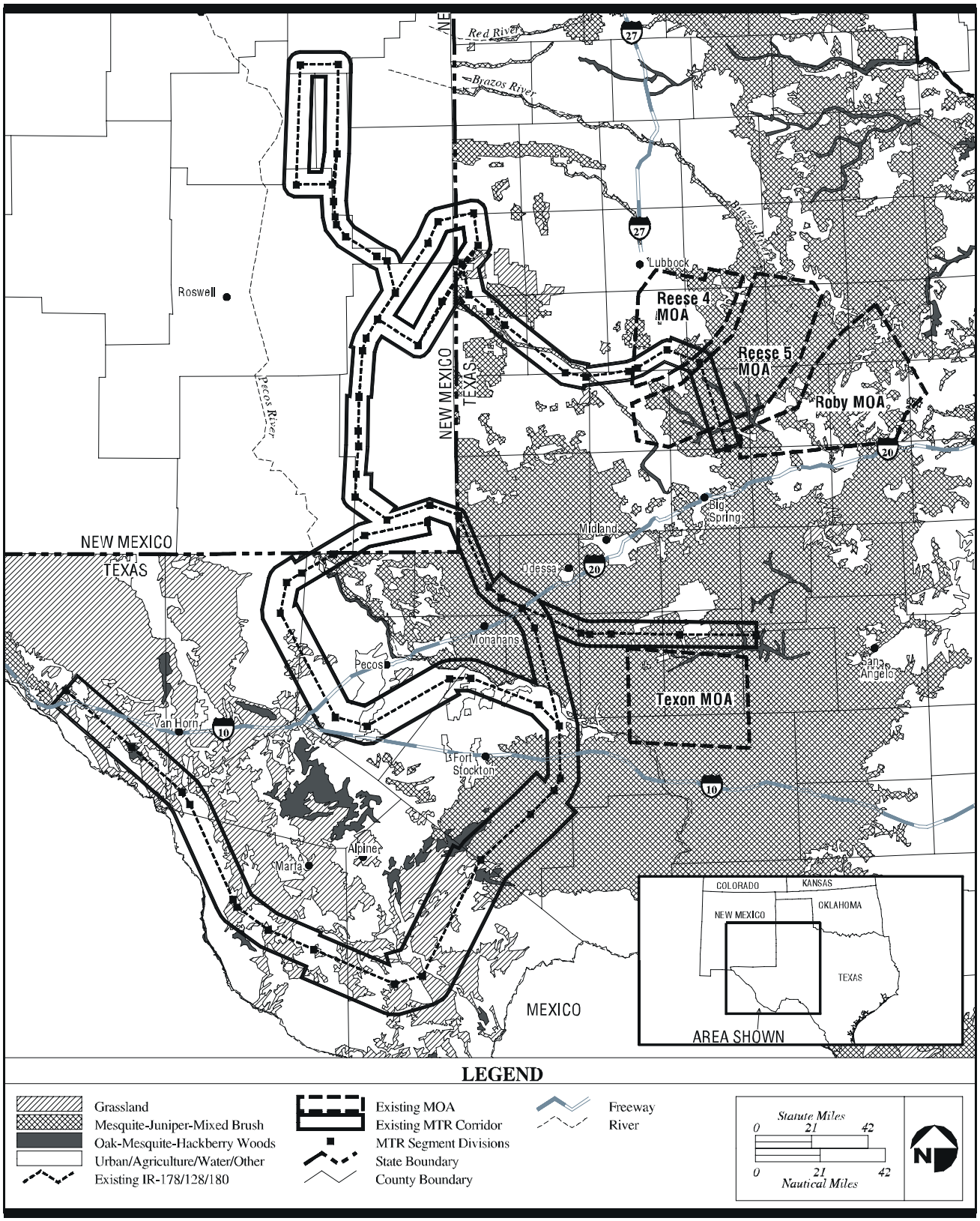
The affected environment encompasses the lands and resources under the primary MTRs and MOA and emphasizes IR-178. This large area, stretching from western Texas to northern New Mexico, includes diverse habitats. These habitats extend beyond the affected area and cover extensive regions. Description of these habitats and the wildlife they support is presented in overview below. Photographs of various parts of the region occur throughout this EIS (refer also to Chapter 3).

Vegetation. Vegetation in the affected region of western Texas and eastern New Mexico is diverse (Figure 4.3-1). In west central Texas, on the lands under IR-178, the Edwards Plateau (refer to Figure 3.1-1) is a deeply dissected, rapidly drained stony plain having broad, flat to undulating divides. The original vegetation was grassland or open savannah plains, with tree or brushy species along stream bottoms and rocky slopes. Most of the tallgrasses, such as cane bluestem, little bluestem, and switchgrass have been replaced by mid- and shortgrasses such as sideoats grama, buffalograss, and Texas grama. The western part of the Plateau is more arid and supports short- to midgrass mixed vegetation. The Edwards Plateau is 98 percent rangeland used primarily for mixed livestock and exotic wildlife production (Brown 1994a, b; Hatch *et al.* 1996).

The Reese 4, Reese 5, and Roby MOAs overlie the southern part of the High Plains area. The area was once dominated by mixed prairie habitats consisting of mid- and tallgrass communities, with scattered sand sage and scrub oaks. However, due to continued grazing and fire suppression, the vegetation is now dominated by shortgrasses, mesquite, yucca, shrubs, and annuals (Hatch *et al.* 1996, Wauer and Elwonger 1998).

Portions of the affected airspace cross over the Trans-Pecos Region (refer to Figure 3.1-1). The original vegetation of the Trans-Pecos ranged from Chihuahuan desert grassland and desertscrub on lower slopes and elevations through juniper, pinyon pine, and Mexican pinyon at mid-elevations. The Guadalupe, Davis, and Chisos mountains are extensions of the Rocky Mountain/Sierra Madre Oriental of North America and support ponderosa pine, oaks, pinyon-juniper, and associated forest vegetation on the higher elevations (Brown 1994a, b; Hatch *et al.* 1996).

The Chihuahuan desert, present in the southern part of the affected area, is the largest of the three creosotebush-dominated deserts in North America. Shrub dominate the vegetation, with cacti only locally dominant and not conspicuous. The basins support a variety of other vegetation types including tarbush, and juniper savannahs with tobosa flats (Brown 1994a, b; Hatch *et al.* 1996).



Texas Vegetation Under Alternative A: No-Action

Figure 4.3-1

Grassland vegetation, especially on the higher mountain slopes, includes southwestern and Rocky Mountain species not present elsewhere in Texas (including Arizona fescue and mountain muhly). Along the desert flats, tobosa, and black grama have mostly been replaced by burrograss and fluffgrass. At higher elevations, little and Texas bluestem, pinyon ricegrass, and several species of needlegrass are common (Brown 1994a, b; Hatch *et al.* 1996). However, cattle grazing occurs on approximately 90 percent of the lands. Rangeland has reverted from perennial grassland to desert shrub and annual forbs and grasses. Creosotebush and tarbush now cover over 15 million acres of former desert grassland (McNab and Avers 1994, Hatch *et al.* 1996).

Northeastern New Mexico and northwestern Texas are known as the Plains-Mesa Grassland (Dick-Peddie 1993, Brown 1994c). Plains-Mesa Grassland is the most extensive grassland in New Mexico and historically was dominated by mixed or short-grass communities. While grazing and its effects (fire suppression followed by shrub invasion) have considerably altered these grassland communities, much of the grassland remains. Dominant species include perennial short grasses, such as blue grama and other gramas; scrubs scattered throughout include sagebrush, mesquite, and rabbitbrush. In northeastern New Mexico and the Texas panhandle, dryland and irrigated farming have greatly reduced the amount of this native shortgrass prairie (Dick-Peddie 1993, Brown 1994c).

The Mt. Dora MOA overlies predominantly Plains-Mesa Grassland with small areas of coniferous and mixed woodland found at its higher, wetter boundaries. These areas are predominantly pinyon-juniper woodlands dominated by pinyon pine and various juniper species. A number of oak species are also found in the woodland areas (Dick-Peddie 1993).

Wildlife. Common wildlife species in the affected areas are listed in Appendix H, so the following discussion summarizes the types of wildlife according to regional vegetation communities. Many of the wildlife species occur throughout the area. The wildlife community of the Edwards Plateau and the High Plains consists of species suited to semi-arid environments. Representative species include coyote, desert cottontail, cactus wren, Couch's spadefoot toad, and Texas spotted whiptail lizard (Davis and Schmidly 1994, McNab and Avers 1994, Wauer and Elwonger 1998).

Many of the same species occur in the desert scrub and grasslands of the Trans-Pecos. Other wildlife in the Trans-Pecos include the Sonoran Desert pocket mouse, kangaroo rats, and desert mule deer (Brown 1994a, b; Davis and Schmidly 1994). The bird life of the Trans-Pecos includes many desert species (e.g., greater roadrunner) (Brown 1994a, b; Wauer and Elwonger 1998). Due to the arid nature of the region, reptile species are prevalent. Common species include Texas banded gecko, Trans-Pecos ratsnake, and the western diamondback. Amphibians can be locally and temporally abundant, especially in ephemeral playas and similar areas after summer thunderstorms.

Three Wildlife Management Areas (WMAs) managed by the TPWD are found in the Trans-Pecos region: Elephant Mountain WMA, located 26 miles south of Alpine; Black Gap WMA, just east of Big Bend National Park; and Sierra Diablo WMA, approximately 25 miles north of Van Horn, Texas. Wildlife management areas were established to develop, manage, and protect habitats and populations of wildlife species; and to provide areas for use by educational groups, naturalists, outdoorsmen, and professional biological investigators (TPWD 1998).

Although not wildlife, livestock (especially cattle and horses) can be found within this area. Range cattle, dairy cattle, and horses are the main agricultural livestock found.

The area under the affected airspace in eastern New Mexico contains many wildlife species typical of the High Plains, although species diversity is low in most habitats due to the low vegetational diversity. Many of the wildlife species are widely distributed throughout the western United States. The most widespread habitat in this region is mixed-species grassland, which, in addition to broadly distributed species, supports a number of species linked directly to grassland habitat. Representative grassland species range from the plains black-headed snake to the burrowing owl to the black-tailed prairie dog.

The lowest species diversities are found in the sand hills and agricultural habitats. Common species found here are prairie lizard, mourning dove, cactus wren, brown-headed cowbird, and vesper sparrow (Brown 1994c, McNab and Avers 1994). Although not wildlife, livestock (especially cattle and horses) can be found within the affected area; range cattle, dairy cattle, and horses are the main livestock found in these areas.

Threatened, Endangered, and Sensitive Species. Within the counties encompassed by the study area for Texas and New Mexico, the FWS lists a total of 35 threatened or endangered species known to occur or potentially occurring. Data on threatened, endangered, and sensitive species were obtained through consultation with the FWS (Appendix H). Additional data were collected from the Natural Heritage Programs of New Mexico and Texas. These data include 14 plant species, 7 fish species, and 1 water snake. Surveys of the candidate emitter sites and Electronic Scoring Sites demonstrate that none of these species or their habitat would be affected by RBTI. As such, they warrant no further discussion. The remaining 13 threatened and endangered species, consisting of 10 bird and 3 mammal species, have the potential to occur in counties underlying affected airspace. However, as described below, this potential is low to negligible.

Data on threatened, endangered, and other sensitive species were obtained as part of Air Force consultation with the FWS.

Three federally listed species of mammals are potentially found in this region: black-footed ferret (endangered), Mexican (greater) long-nosed bat (endangered), and ocelot (endangered). The black-footed ferret is almost totally dependent on the presence of the black-tailed prairie dog, preying on it as a preferred food source and utilizing its burrows for dens and shelter (NMGF 1997a). However, the black-footed ferret has not been observed in Texas since 1963 and in New Mexico since 1934; as of 1988, it was presumed extirpated (eliminated) in New Mexico. The primary causes of extirpation were habitat alteration, predator control, and prairie dog eradication (Campbell 1995, NMGF 1997a).

The Mexican long-nosed bat is found in the higher, cooler mountains of the southern Trans-Pecos along the Texas-Mexico border and into Mexico. They prefer desert scrub vegetation dotted with agaves, mesquite, creosotebush, and a variety of cacti. The bats use caves, crevices, abandoned mines, tunnels, and old buildings as day roosts. Reasons for the decline include loss of roost areas and their primary food source, blooming agaves. The only known roosting site in the U.S. is in Big Bend National Park (Davis and Schmidly 1994, Campbell 1995).

Aplomado falcon, are an endangered species, unlikely to occur except as rare visitors under the affected area for Alternative A.

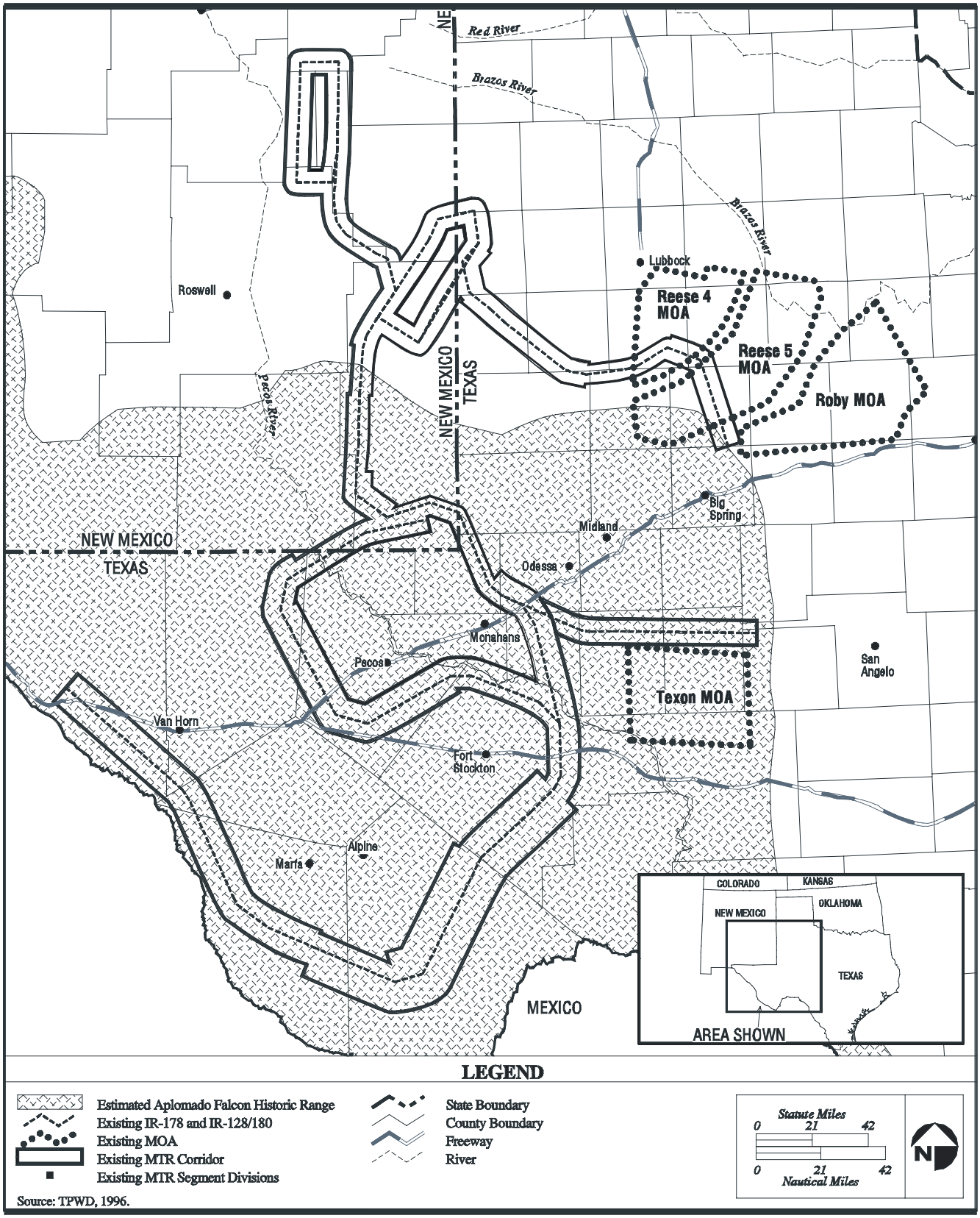
The ocelot once occurred throughout south Texas along the Rio Grande, the southern Edwards Plateau Region, and along the Coastal Plain. Due to the loss of its primary habitat of dense thorny shrublands along the Rio Grande and predator control activities, the ocelot is restricted to three or four counties in the southern Rio Grande Plains (not under any airspace affected by the proposed alternatives) (Davis and Schmidly 1994, Campbell 1995). Only the outer margin of existing IR-178 crosses over the northern tip of Big Bend National Park. Little chance of direct overflights exists.

Out of the ten federally listed species of birds that have the potential to occur in counties within the affected area, five depend on major water bodies (i.e., lakes, rivers) and would only occur within the affected environment as rare transient (e.g., migrating) visitors: bald eagle (threatened), interior least tern (endangered), whooping crane (endangered), piping plover (threatened), and brown pelican (endangered). Three species--Mexican spotted owl (threatened), southwestern willow flycatcher (endangered), and golden-cheeked warbler (endangered)--have specific habitat requirements that are not commonly found under the affected airspace. The closest populations of spotted owls are found in the Guadalupe mountains along the New Mexico/Texas border west of IR-178, and golden-cheeked warblers are found along the eastern Edwards Plateau in Kinney, Edwards, and Kimble counties. These counties lie east of the affected airspace. Spotted owl habitat occurs under some portions of secondary MTRs (i.e., IR-109, IR-111) in northeastern New Mexico, but does not extend to areas overflown by primary MTRs. The eastern edge of the southwestern willow flycatcher's range is in western Texas, with collections having been made in the Guadalupe and Davis mountains and from unspecified locales in Brewster County. The flycatcher is considered a rare summer resident in Big Bend National Park. None of these locations for the flycatcher fall under or directly adjacent to the affected airspace in Texas. Data are lacking on current population levels and trends in Texas (NMGF 1997b, Sogge *et al.* 1997, USFWS 1998).

Another endangered bird, the black-capped vireo, historically bred from southwestern Kansas, southward through Oklahoma, Texas, and into Coahuila, Mexico. Currently black-capped vireos breed locally in central Texas, a few counties in central Oklahoma, and central Coahuila, Mexico. Reasons for the reduction in the vireo's geographic extent include habitat loss due to urbanization, brush clearing, grazing, brown-headed cowbird parasitism, and human disturbance (Campbell 1995).

On the western edge of the black-capped vireo's range in the western Edwards Plateau and Trans-Pecos regions, the birds are often found in canyon bottoms and slopes where sufficient moisture is available to support diverse shrub vegetation. In the Trans-Pecos, vireos are known to nest in southern Brewster County at Big Bend National Park and Black Gap WMA (Campbell 1995). According to the TPWD Biological and Conservation Database and the Element Occurrence Records, vireos are not known to occur in any county under Alternative A. Vireos are known to occur within the counties adjacent to, but not underlying the existing Texon MOA (Campbell 1995).

The federally endangered northern aplomado falcon was considered extirpated from the United States in the late 1950s, with the last documented nesting occurring in 1952 in New Mexico. In the eastern portion of its historic range (east of the Pecos River [Figure 4.3-2]), the aplomado was found in mesquite and yucca desert grasslands, which extended into the southern portion of Lea County, New Mexico, and throughout the Trans-Pecos region of Texas. Combinations of heavy grazing, encroachment of mesquite, and proliferation of weedy species (such as snakeweed) have substantially reduced the amount of suitable habitat in eastern and southeastern New Mexico and Trans-Pecos Texas for aplomado falcons (Leal *et al.* 1996). Recent confirmed observations of adult aplomados in Otero and Socorro counties, New Mexico, and the discovery of two breeding populations 25 miles south of the New Mexico border in Chihuahua, Mexico (west of the affected airspace), have increased the potential for natural colonization of the species' former breeding range in southern New Mexico and Trans-Pecos Texas (Richardson 1996, Montoya *et al.* 1997). Of the total 11 sightings since 1991, there have been two confirmed sightings of aplomados within the affected environment: one sighting in 1992 in Jeff Davis County and one sighting in Culberson County in 1996 (Perez, personal communication 1999). Nine other sightings have occurred during this period outside



Estimated Aplomado Falcon Historic Range and Affected Airspace for Alternative A: No-Action

Figure 4.3-2

4.0 Affected Environment and Environmental Consequences: Biological Resources

of the affected area in southern New Mexico and western Texas. The FWS considers the aplomado falcon to be a potential resident along the Texas/Mexico border. The mountain plover, a proposed threatened species, is uncommon in the area and could be a possible migrant between its winter home in southern Texas and Mexico and the common breeding area in northern New Mexico (Peterson 1990).

Over 290 species considered sensitive by federal or state agencies also occur within the affected area. These sensitive species receive no protection under law, but are worthy of note. Most (240) of these species consist of plants, fish, insects, and amphibians that would not be affected by any aspect of RBTI. Of the remainder, which primarily consist of birds and mammals, several species have habitat in the region potentially affected by RBTI. These include the ferruginous hawk, loggerhead shrike, burrowing owl, white-faced ibis, swift fox, and Texas horned-lizard.

ENVIRONMENTAL CONSEQUENCES

Under Alternative A: No-Action, there would be no change to current baseline conditions. No new construction or training operations would occur; therefore, baseline conditions applicable to biological resources would continue to apply. None of these conditions have resulted in significant impacts to vegetation, wildlife, or threatened, endangered, or sensitive species.

Most of the federally listed threatened or endangered species are not known to occur directly under the affected airspace. For most species, past studies (Manci *et al.* 1988; Krausman *et al.* 1993, 1998; USFS 1992; Workman *et al.* 1992; Ellis *et al.* 1991) show that wildlife habituates to the sporadic intrusion of low-altitude jet aircraft without negative effects on populations (see Appendix G).

Although the aplomado falcon's estimated historic range covers the affected area, its presence as a migrant visitor is rare. Some concerns, however, were raised by the public regarding the potential effects of overflights on aplomado falcons. The rarity of the species in the huge region makes an overflight of an aplomado falcon improbable, but not impossible.

There have been no studies on the responses of aplomado falcons to aircraft overflights, but there have been studies on the closely related peregrine and prairie falcons and other raptors (e.g., Ellis *et al.* 1991). These studies suggest that falcons will nest within areas overflown by low-altitude jet aircraft. Although birds do at times flush from nests, they soon return, and nest success is not affected. Peregrine falcons and other raptor species are known to nest in the immediate vicinity of airports, under the flight patterns where aircraft land and take off. Although reactions of the aplomado falcon may differ from other raptors studied for aircraft overflight, those species studied did not show a great concern for aircraft overflight. Aplomado falcons show little response to human activity and noise from ground-based activity. In Mexico, populations nested in close proximity to agricultural activities and ground-based human activities (Montoya *et al.* 1997). Studies of raptors (such as the bald eagle, peregrine falcon, and Swainson's hawk) suggest that raptors respond more consistently and noticeably to ground-based human activities (pedestrians, hunters) than to aircraft. Therefore, if the aplomado falcon is similar to other raptors, then it is unlikely that it is adversely affected by current aircraft operations.

4.3.3 Alternative B: IR-178/Lancer MOA

AFFECTED ENVIRONMENT

The affected environment for proposed IR-178 and the proposed Lancer MOA/ATCAA is a subset of the area in Texas associated with Alternative A: No-Action. Most of the proposed airspace coincides with existing primary or secondary airspace, so little new habitat would be exposed to overflights. Candidate sites for emitters and Electronic Scoring Sites are also included in the affected environment.

Construction and operation of emitters would not significantly affect biological resources under Alternative B.

Alternative B is located predominantly in the Trans-Pecos region of west Texas with a small portion extending into the Edwards Plateau and north into the southern Texas Panhandle or High Plains (refer to Figure 3.1-1). A portion of proposed IR-178 overlies a small area of extreme southeastern New Mexico.

Vegetation. Vegetation in the affected area (Figure 4.3-3) under the airspace is typical of the Trans-Pecos region, as described under Alternative A: No-Action. All candidate sites for emitters and Electronic Scoring Sites lie within this region. All have undergone disturbance to vegetation as a result of agriculture, grazing, or other uses (Appendix D).

Wildlife. Wildlife under the affected primary airspace matches that described for western Texas under Alternative A: No-Action. Field surveys of the candidate sites for Electronic Scoring Sites and emitters observed common wildlife species generally distributed throughout the region.

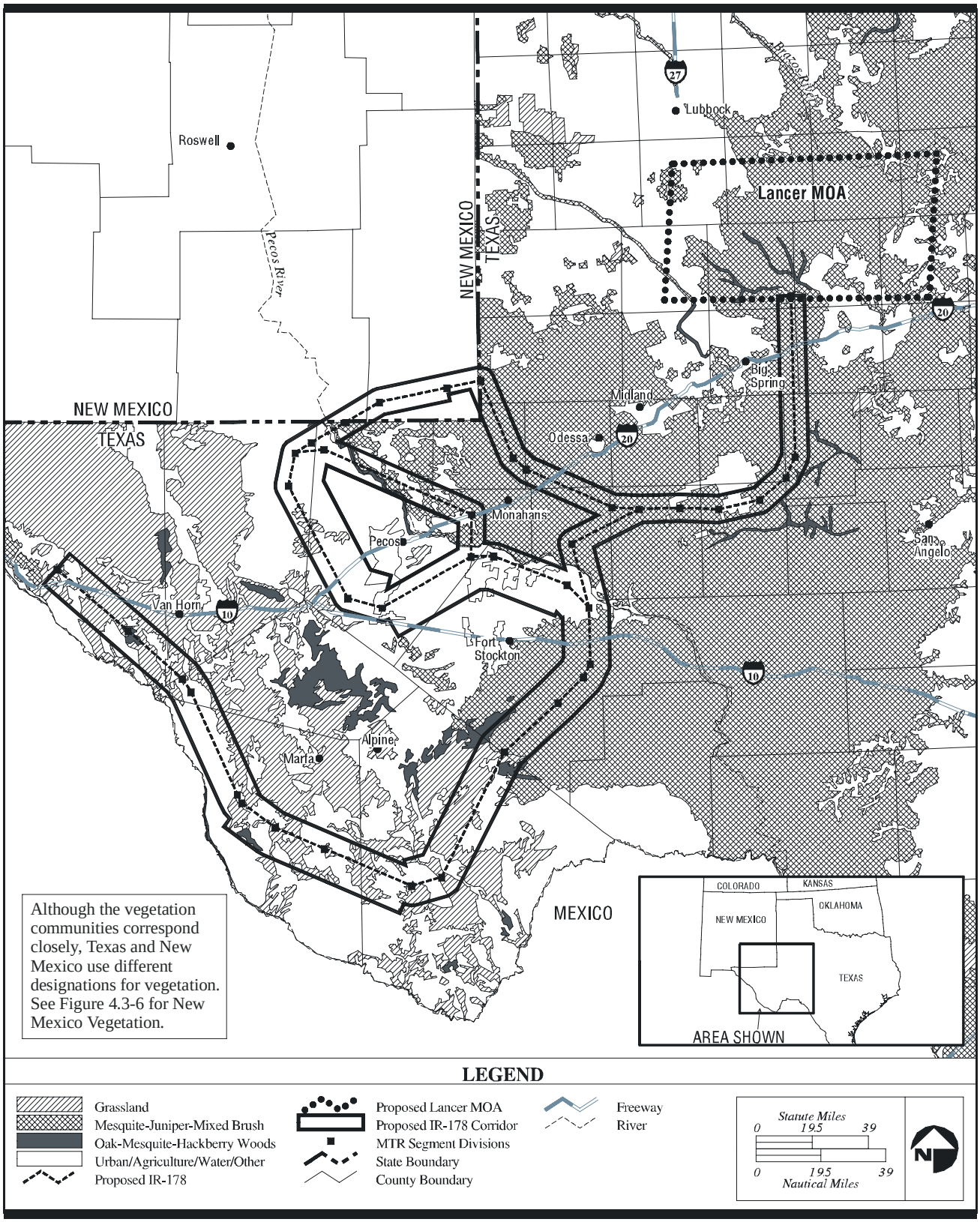
Threatened, Endangered, and Sensitive Species. The threatened, endangered, and sensitive species for Alternative B consist of the same species as described for Alternative A: No-Action. Figure 4.3-4 shows the historic range of the aplomado falcon in relation to this alternative. There is little difference in the affected area of the estimated aplomado falcon historic range among Alternatives A, B, or C.

ENVIRONMENTAL CONSEQUENCES

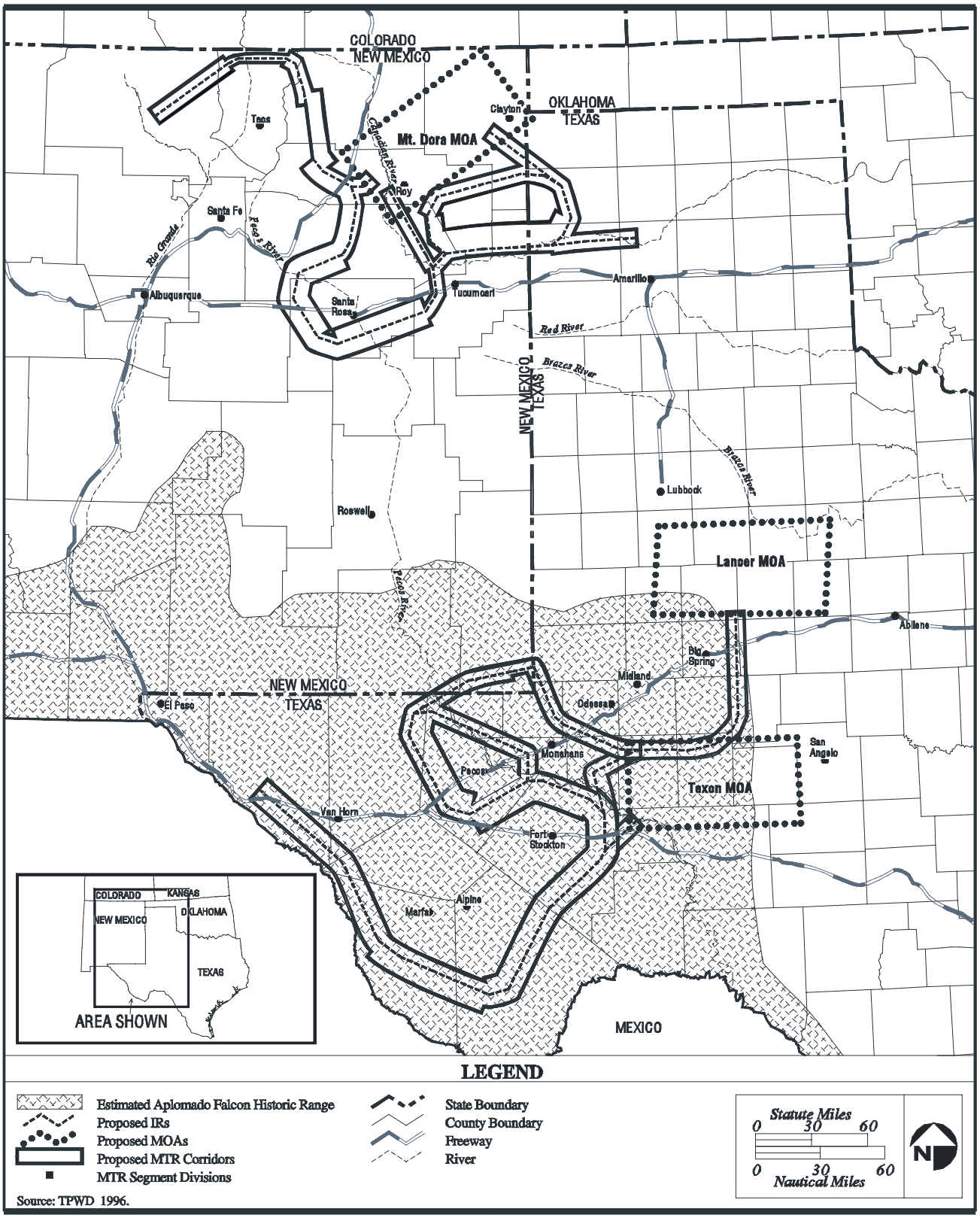
The results of analysis, as presented below, demonstrate that neither airspace operations, construction, nor emitter and Electronic Scoring Site operations would significantly impact biological resources.

Airspace and Flight Operations. The potential sources of impacts to wildlife from aircraft overflights are discussed in detail in Appendix G, but include the visual effect of the approaching aircraft and the associated subsonic noise. Any visual impacts would be most likely to occur along those portions of MTRs that are below 1,000 feet AGL, the altitude accounting for most reactions to visual stimuli by wildlife (Lamp 1989, Bowles 1995).

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies of subsonic aircraft disturbances on ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects are transient and of short duration, and suggest that the animals habituate to the sounds (Workman *et al.* 1992, Krausman *et al.* 1993, 1998; Weisenberger *et al.* 1996). Similarly, the impacts to raptors and other birds from aircraft low-level flights were found to be brief and insignificant and not detrimental to reproductive success (Smith *et al.* 1988, Lamp 1989, Ellis *et al.* 1991, Grubb and Bowerman 1997).



Texas Vegetation Under Alternative B: IR-178/Lancer MOA **Figure 4.3-3**



Source: TPWD 1996.

Estimated Aplomado Falcon Historic Range and Affected Airspace for Alternatives B/C/D

Figure 4.3-4

Under Alternative B, the increase in sortie-operations over lands underlying the proposed Lancer MOA/ATCAA would result in negligible impacts to exposed wildlife, since all flight activity would occur above 3,000 feet AGL.

For proposed IR-178, most segments would experience an increase, over current levels, of one to six sortie-operations per day. The potential for more than one to six overflights of a wildlife receptor would be low, and exposure to noise would be short in duration. These overflights would be dispersed across the MTR corridor, and the widest segments would support the greatest number of sortie-operations. Although this increase in flight activity is not great, the potential for impacts to wildlife may be greater since most of IR-178 would be flown at altitudes less than 1,000 feet AGL, with many segments flown at altitudes less than 500 feet AGL but greater than 300 feet AGL (refer to Section 4.1-3). Overall, only 5 percent of flight activity would occur between 300-500 feet AGL and 75 percent of flight activity would occur between 500-1,000 feet AGL. As previous research has shown (see above and Appendix G), wildlife response would also be short-term and would not result in significant effects.

Bird-aircraft strikes would continue to be rare in MOAs and MTRs. As established in Section 4.1, aircrews would employ the Bird Avoidance Model when planning and executing training sorties. Use of this model has proven to minimize the potential for bird-aircraft strikes.

The potential impacts from aircraft overflights in MOAs and MTRs on federally threatened and endangered species are expected to be similar to those described for wildlife. The three threatened or endangered mammal species do not have habitat under the affected airspace, and most of the 10 bird species represent rare transient visitors or lack habitat under the affected airspace. Two bird species and their habitats are found on lands underlying the affected airspace addressed in Alternative B.

Black-capped vireos (federally listed-endangered) are not currently known to nest on lands underlying any MTR or MOA proposed airspace. Due to the nature of the area (i.e., predominantly private), extensive surveys have not been conducted to accurately establish presence/absence of this species throughout the RBTI study area. As discussed previously, studies on an array of mammal and bird species indicate that sporadic noise from military jet overflights does not negatively affect reproduction or habitat use. Although no specific studies have been conducted for black-capped vireos, a similar lack of response would be expected under Alternative B, especially since any habitat has already been exposed to aircraft noise for more than a decade.

Although aplomado falcons (federally listed-endangered) are not currently known to nest within the affected airspace, desert grassland that might be potential habitat does exist, primarily along the Texas/Mexico border. The FWS considers the aplomado falcon to be a potential resident along the Texas/New Mexico border. Over 1.3 million acres of grassland that the FWS considers within the estimated aplomado historic range occur under IR-178 (segments AB-JK). Recent studies in Chihuahua, Mexico, have found aplomados nesting as close as 34 miles from the Texas border near Ruidosa, Mexico. It is possible that aplomados are more common in the southern Trans-Pecos of Texas than is normally believed based on sighting records of amateur and professional ornithologists (USFWS 1998). Even so, they are still visitors. This ecosystem historically constituted nesting habitat for the aplomado falcon in the desert southwest. Because of its proximity to breeding aplomado populations in nearby Mexico, this area is considered by the FWS to be a high priority recovery area for this endangered species (Perez and Torrez, personal communication 1999). Habitat loss is a concern for affecting the recovery of this species. It is unknown if low aircraft overflight in parts of the historic habitat would

contribute to the loss of habitat by rendering the habitat unsuitable for the aplomado falcon's return. This area is currently being overflown by existing actions. As part of the RBTI action, the Air Force, in cooperation with the FWS, has committed to studying the aplomado falcon population trends in the area along the Texas/Mexico border to learn if aircraft actions in the area have an affect on this species. The proposed increase of four sortie-operations along parts of IR-178 (segments AB-JK) that overfly potential aplomado habitat may result in disturbance to individual aplomado falcons. However, the potential for this effect is negligible due to the rarity of aplomados within their historic range (11 sightings since 1991) and the probability that aplomado responses would be minimal like those of other, similar raptors.

Under Alternative B, the mountain plover is classified by the New Mexico Department of Game and Fish as uncommon in Lea county, New Mexico. Lea county was once thought to be important to the mountain plover (Ligon 1961), but there are no records of mountain plover in this country for 25 years (the 1970s through 1995) (Sager 1996). The mountain plover has also been reported in Eddy County, New Mexico, and Jeff Davis, Brewster, Dawson, and Lynn counties in Texas. Dawson and Lynn counties are underneath the MOA, so no low overflighs would occur. The other three counties have not had confirmed nesting activity and are likely to be visited by migrants as they fly between their winter home in southern Texas and Mexico and the common breeding area in northern New Mexico (Peterson 1990). Therefore, no adverse effect from RBTI aircraft overflight on the mountain plover is expected from this alternative.

Although not wildlife, some public scoping concerns focused on the effects of overflights on domestic livestock including cattle, horses, and bison (see Appendix G). The effects of aircraft overflights and their accompanying noise on domestic livestock have been the subject of numerous studies since the late 1950s (Gladwin *et al.* 1988, USFS 1992, USAF 1993c). These studies have examined the effects on a wide range of livestock including poultry, cattle, sheep, pigs, goats, and mink. Exposure to multiple overflights at all altitudes provided the basis for testing the animal's response. Several general conclusions are drawn from these studies:

- Overflights do not increase death rates and abortion rates, or reduce productivity rates (e.g., birth rates and weights), and do not lower milk production among domestic livestock.

- Animals take care not to damage themselves and do not run into obstructions, unless confined or traversing dangerous ground at a high rate if overflown by aircraft 50 to 100 m (163 to 325 feet) AGL (USFS 1992).

- Domestic livestock habituate to overflights and other noise. Although they may look or startle at a sudden onset of aircraft noise, they resume normal behavior within 2 minutes after the disturbance.

Inconclusive results have been obtained in some cases because the effect observed is no different than any other disturbance livestock experience on a daily basis, such as from tractors or blowing paper. Historical interactions between the cattle and numerous overflights have not indicated a problem. For example, cattle have grazed under heavily used military airspace at Avon Park Range in Florida, Saylor Creek Range in Idaho, and Smoky Hill Air National Guard Range in Kansas for decades. At these training ranges, grazing cattle have been subject to upwards of 100 overflights per day, many as low as 100 feet AGL. No evidence exists that the health or well being of the cattle has been threatened. The animals, including calves, show all indications of habituating to the noise and overflights.

Some horses with riders have been reported to startle when surprised by a low aircraft overflight, but response varies with the horse, the rider, the terrain, and other conditions; sometimes a horse reacts dramatically, but sometimes no reaction occurs. Several studies noted that horses gallop, more randomly or exhibit biting and kicking behavior in response to low-altitude aircraft overflights. However, no injuries or abortions were reported, and there was evidence that horses adapted to the flyovers.

Construction. Biological surveys of all Alternative B candidate emitter sites and Electronic Scoring Sites revealed no water-dependent species, and no critical habitat for said species were observed or identified. Therefore, the construction of these sites would have no impacts to water or wetland dependent species including fish, reptiles, birds, or vegetation.

No federally listed threatened and endangered species or potential habitat were observed during biological surveys of each of the candidate Electronic Scoring Sites and emitter sites in Texas. However, the sites overlap with the general range for several sensitive bird, mammal, and reptile species. These species, like the Texas horned lizard and burrowing owl, have widespread ranges and habitats throughout much of the region encompassing the candidate sites. Construction would disturb less than 20 acres (including roads), and some portion of this area potentially includes habitat for these widespread sensitive species. Two factors, however, indicate that construction would not result in significant impacts to sensitive species: (1) the amount of affected habitat (less than 20 acres) is negligible compared to the total habitat available within the region; and (2) the candidate sites have been subject to varying degrees of previous disturbance (e.g., agriculture, grazing, oil and gas development) that has altered habitat.

Ground Operations. Ground operations would have the potential to affect biological resources only in the localized areas within the emitter and Electronic Scoring Sites. Since existing data and surveys establish that these sites contain neither threatened nor endangered species, and do not represent important habitat for sensitive species, impacts to biological resources due to ground operations would be unlikely.

4.3.4 Alternative C: IR-178/Texon MOA

The affected environment represents a subset of the area in Texas associated with Alternative A: No-Action. Most of the proposed airspace coincides with existing primary or secondary airspace. It is focused on proposed IR-178 and the Texon MOA/ATCAA, and includes the candidate sites for emitters and Electronic Scoring Sites.

Vegetation. Vegetation for the affected area under the airspace matches that described for Alternative A: No-Action (Figure 4.3-5). With the proposed Texon MOA/ATCAA, more grasslands would be included in the affected area. For the candidate Electronic Scoring Sites and emitter sites, the vegetation is generally grassland, but many of the sites have been disturbed by grazing or agriculture.

Wildlife. The wildlife in the affected area is the same as described for Alternative A: No-Action.

Threatened, Endangered, and Sensitive Species. The threatened, endangered, and sensitive species within the affected area match those already described in Alternative B. The same basic areas are affected, so the habitats would also be similar.

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. As in Alternative B, the potential effects of overflights on wildlife and threatened and endangered species would be negligible.

Studies on an array of bird and mammal species indicate that intermittent short-duration noise from military jet overflights does not result in significant adverse effects. While not all individual species have been studied, data on similar species support this conclusion.

As in Alternative B, airspace associated with Alternative C (IR-178) would overlie historic aplomado falcon range. In this area, proposed average daily sortie-operations would increase by four. Due to the rarity of aplomado falcons within this historic range (e.g., 11 sightings since 1991), the probability that the additional sortie-operations would overfly an aplomado would be negligible. If such an event occurred, data on similar birds suggest that an aplomado would not be deleteriously affected. Bird-aircraft strike potential would increase slightly (refer to Section 4.1), but is expected to remain low. No measurable effects on bird populations are anticipated.

Effects to the mountain plover are the same as for Alternative B. Mountain plover are uncommon residents or occassional visitors in the area under the affected airspace for Alternative C. Therefore, no adverse effect from RBTI aircraft overflight on the mountain plover is expected from this alternative.

Construction. During biological surveys of all candidate emitter sites and Electronic Scoring Sites, no water dependent species (or critical habitat for such species) or wetlands were observed or identified at any of the sites. Construction of these sites would have no impacts to water or wetland-dependent species, including fish, reptiles, birds, or vegetation. No federally listed threatened and endangered species or potential habitat were observed during biological surveys of each of the candidate sites under Alternative C. No impacts to these biological resources would occur.

Potential effects of construction on sensitive species would be minimal, as described for Alternative B. None of the candidate sites contain crucial habitat for such species, and the total amount of area affected would be less than 20 acres.

Ground Operations. For the same reasons discussed under ***Construction***, no impacts to biological resources would be expected.

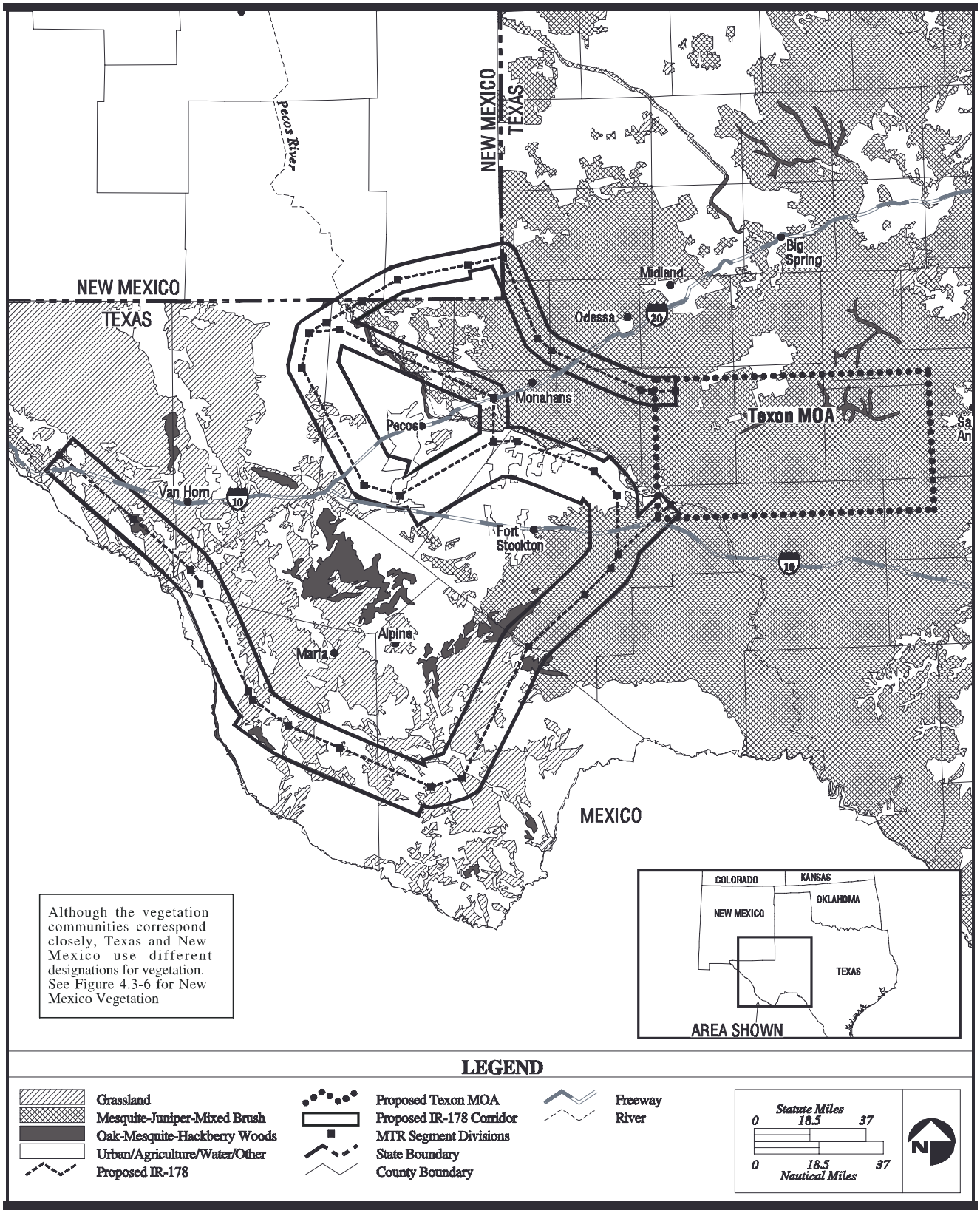
4.3.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

The affected environment for Alternative D includes the primary MTRs and MOAs, particularly proposed IR-153 and the secondary MTRs it intersects or overlaps, as well as the Mt. Dora MOA. These airspace units predominantly coincide with existing airspace in northeastern New Mexico. Candidate emitter sites and Electronic Scoring Sites are also part of the affected environment.

Vegetation. Proposed IR-153 overlies a variety of vegetation communities (Figure 4.3-6). Much of the proposed route, especially its southern half, is over Plains-Mesa Grasslands. In its northern extent, IR-153 would overlie areas at higher elevations dominated by ponderosa pine, mixed-conifer, and spruce-fir forests (Figure 4.3-6). Interspersed juniper savanna and montane grasslands dominate lower elevations. In some areas, mesa tops dominated by ponderosa pine and juniper are dissected by steep canyons. Vegetation on canyon slopes and bottoms includes a variety of coniferous and deciduous trees. Plains-Mesa Grasslands dominate the lands under the Mt. Dora MOA, but montane coniferous forest also occurs in this area.

Wildlife. Most of the wildlife occurring under Alternative D airspace consists of those species generally associated with mixed grasslands, although montane,



Texas Vegetation Under Alternative C: IR-178/Texon MOA

Figure 4.3-5

lacustrine, riverine, and riparian habitats also exist within the grasslands. As described previously under Alternative A: No-Action, many of these wildlife species are habitat generalists able to adapt to a range of habitats, but most are adapted to aquatic, wetland, or riparian habitats. Appendix H lists common, representative species in the area. The abundance and diversity of resident and migratory wildlife are greatest around riparian areas, lakes, reservoirs, and ephemeral playas. These areas provide important resident and migratory waterfowl habitat, in addition to habitat for amphibians, reptiles, and mammals.

In the portions of IR-153 overlying areas of coniferous forests, common wildlife include skink, kingsnake, Cooper's hawk, great-horned owl, dark-eyed junco, American dipper, mountain chickadee, northern flicker, elk, mule deer, and chipmunk. Sand hills and scrub communities under proposed IR-153 possess the least species diversity for wildlife.

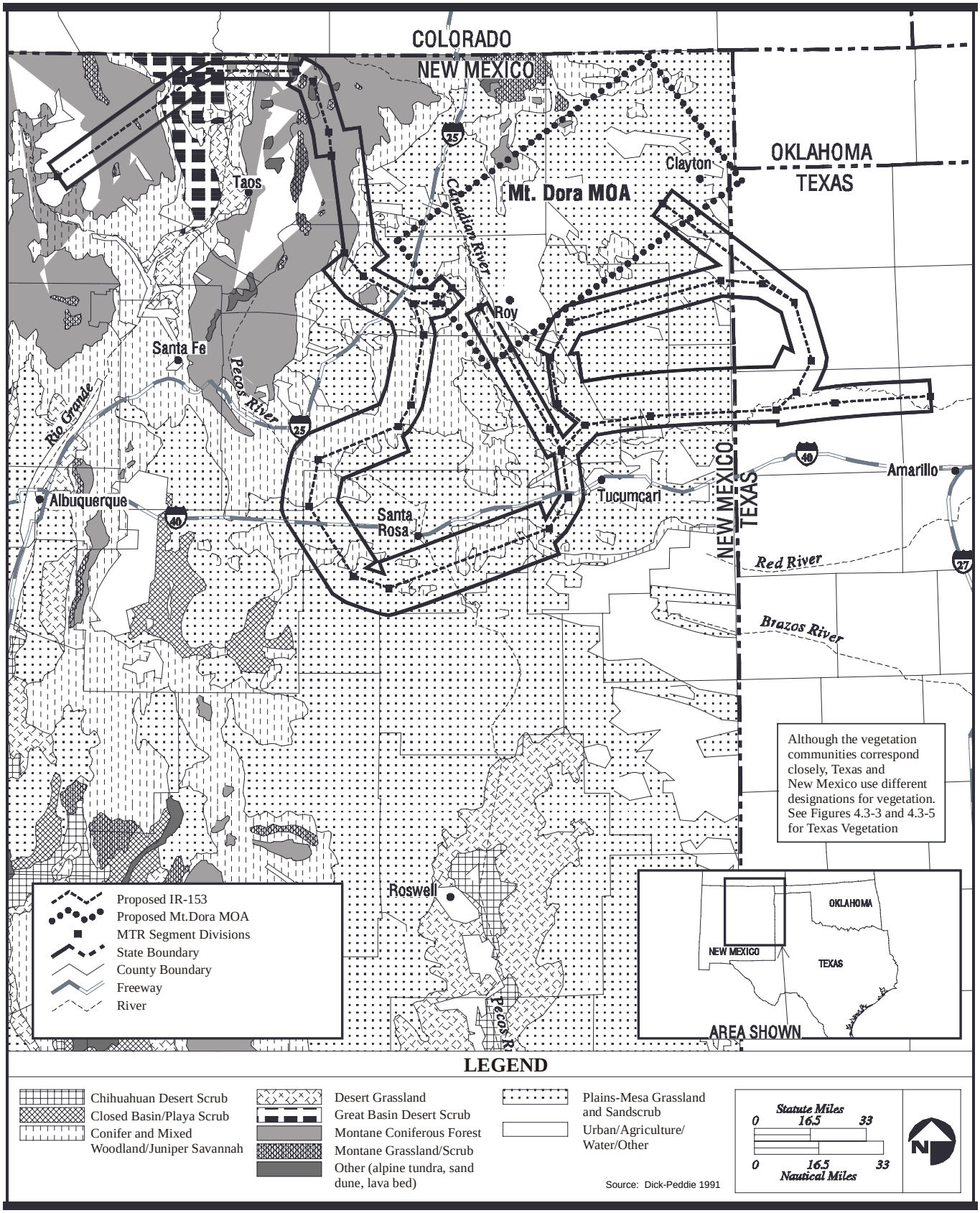
The Valle Vidal Management Unit underlies the portion of the MTR directly adjacent to the Colorado-New Mexico border (segments BC-CD). This is a critical elk calving and wintering habitat that supports a substantial number of resident and migratory elk, which generally occupy the area in December and stay until April (Stephenson, personal communication 1999).

Threatened, Endangered, and Sensitive Species. A total of 12 federal endangered or threatened species occur within northeastern New Mexico under and around the affected area for Alternative D. Appendix H (Table H-12) lists these species. Of this total, one is a plant and three are fish. Surveys of the candidate emitter sites and Electronic Scoring Sites demonstrate that none of these species or their habitat occur on or near the sites. Since aircraft overflights do not affect these species, and construction would not affect their habitat, these species warrant no further analysis.

Eight federally listed amphibian, bird, and mammal species have the potential to occur in this part of New Mexico: bald eagle, Mexican spotted owl, southwestern willow flycatcher, interior least tern, piping plover, whooping crane, brown pelican, and black-footed ferret. Four of these species are considered to occur only rarely, if at all, in the region: piping plover, whooping crane, brown pelican, and black-footed ferret. One species, the mountain plover, is a federal candidate species for listing as threatened or endangered.

The piping plover inhabits open beaches, alkali flats, and sandflats of North America. The piping plover breeds primarily along the Atlantic coast from southern Canada to North Carolina, along portions of the Great Lakes, and along rivers and wetlands of the northern Great Plains from southern Canada, south along major prairie rivers (Yellowstone, Missouri, Platte), and into alkali wetlands in northeastern Montana, the Dakotas, Nebraska, and Iowa. During the winter, the bird is found along coastal beaches and mudflats from the Carolinas and Gulf States to Yucatan, Mexico (Haig 1992). In New Mexico, piping plover are considered very rare migrants at wetlands in Colfax, Eddy, Guadalupe, and Socorro counties. They have been reported in the state on only six occasions (Santa Rosa, Brantley, and Springer lakes, Bosque del Apache National Wildlife Refuge [NWR] and Maxwell NWR; and Avalon Reservoir), including twice in April 1995 (NMGF 1997c).

The whooping crane is the rarest of the world's 15 crane species. A combination of habitat preservation, legal protection, and international cooperation between Canada and the U.S. has allowed the only self-sustaining natural wild population, the Aransas/Wood Buffalo population, to increase from a low of 16 known individuals in 1941 to 165 in 1997. This population breeds in Wood Buffalo National Park in northern Alberta and winters at Arkansas NWR on the south coast of Texas, hundreds of miles from the RBTI study area. The whooping crane currently exists in



New Mexico Vegetation Under Alternative D: IR-153/Mt. Dora MOA

Figure 4.3-6

two other wild populations and four captive locations, totaling 185 birds (Meine and Archibald 1996, USFWS 1997).

In 1975, experimental efforts to establish a migratory wild flock through cross-fostering of whooping crane eggs with sandhill crane adults began at Grays Lake NWR in southeastern Idaho. Sandhill crane "foster parents" raised the whooping cranes and taught them their traditional migration route to wintering grounds along the Rio Grande Valley at Bosque del Apache NWR, New Mexico. They winter here from approximately November through February. However, due to high mortality rates, a prolonged drought in the summer range, and the failure of the birds to pair and breed with conspecifics, it was decided to end the cross-fostering program. In 1996 an alternative technique, using ultralight aircraft to teach captive-reared whooping cranes an appropriate migration route and wintering area, was attempted with limited success (Meine and Archibald 1996, USFWS 1997).

Currently only four adult whooping cranes survive from the experimental population: two from the cross-fostered experiments and two from the ultralight technique. Since the only indication of prior occurrence of whooping cranes in New Mexico is in the form of unverified reports from the 1850s, 1938, and the 1960s, NMGF suggested that with the expected extirpation of the experimental flock, procedures of the Wildlife Conservation Act should be initiated to delist the whooping crane from the state list (NMGF 1997d).

The only area where aircraft may potentially affect the four whooping cranes is beneath IR-153, along the Rio Grande, during the fall and spring migration to Bosque del Apache NWR and from Grays Lake NWR, respectively. Although the whooping crane is listed as potentially occurring in that portion of the airspace that overlies the Texas Panhandle, due to the absence of suitable habitat, cranes would be considered rare transients migrating through the area.

The brown pelican was once found in large numbers along the Atlantic, Pacific, and Gulf coasts of the U.S. Today, the bird occurs throughout its historic range, but its numbers are reduced. Brown pelicans are considered rare visitors to New Mexico (and the Texas Panhandle), occurring primarily as immature wanderers during the summer and fall seasons and presumed to be storm-driven birds (NMGF 1997e).

The black-footed ferret has not been observed in Texas since 1963 and in New Mexico since 1934 and as of 1988, it was presumed extirpated in New Mexico. The primary causes of extirpation were habitat alteration, predator control, and prairie dog eradication (Campbell 1995, NMGF 1997a).

The southwestern willow flycatcher requires dense riparian vegetation associated with rivers, streams, springs, lakes, and other watercourses and wetlands for nesting (Tibbitts *et al.* 1994, Sogge *et al.* 1997). As of 1997, there were an estimated 200 breeding pairs in New Mexico, occurring in widely scattered, small populations in less than 25 general locales, predominantly in the southwestern portion of the state along the Gila River (Williams 1997). Critical habitat in New Mexico is restricted to portions of the Gila, San Francisco, and Tularosa rivers in the southwestern corner of the state and is not found under the affected airspace.

The interior least tern nests along coastal beaches and major interior rivers and reservoirs of North America on barren sand kept free of vegetation by natural scouring from tidal or river action. The New Mexico Department of Game and Fish considers the least tern a migratory transient along the Pecos River in Eddy County and a rare vagrant in Catron, De Baca, Rio Arriba, Dona Ana, Socorro, and Otero counties (NMGF 1997g). Interior least terns are regular vagrants at Bosque del

Since the publication of the RBTI Draft EIS, the U.S. Fish and Wildlife Service removed the peregrine falcon from the threatened and endangered species list.

Apache NWR on the Rio Grande. Since 1949, the bird has nested in New Mexico only at or in the vicinity of Bitter Lake NWR, near Roswell, and not under any airspace proposed for RBTI (BLM 1997). In Texas, interior least terns are not found in any counties underlying proposed RBTI airspace for Alternative B.

The bald eagle is a bird of aquatic ecosystems and frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. However, to support bald eagles such areas must have an adequate prey base, perching areas, and nesting sites. In winter, bald eagles often congregate at specific wintering areas that are generally close to open water and that offer good perch trees and night roosts (Stalmaster 1987). These eagles move frequently and roost singly or in small groups throughout the winter in apparent response to the variable or marginal conditions of weather, prey, and habitat associated with peripheral range (Grubb and Kennedy 1982). Although New Mexico is on the edge of the winter range of bald eagles (Millsap 1986), the state supported an estimated 545 wintering bald eagles in 1996 and 1997 (NMGF 1998). They migrate and winter from the northern border along the San Juan, upper Rio Grande, and upper Pecos, southward regularly to the Gila, lower Rio Grande, middle Pecos, and Canadian valleys. Key winter roost and concentration areas include Navajo Lake, the Chama Valley, Cochiti Lake, the northeastern lakes from Raton to Las Vegas, the lower Canadian valley, Sumner Lake, Elephant Butte Lake, and the upper Gila Basin. The species is occasional elsewhere in summer, and only four nests are known for the state: Caballo Reservoir along the Rio Grande, the Maxwell-Springer area in the northeast, and two nests in the vicinity of Eagle Nest Lake (Williams 1995, 1996; NMGF 1997h).

In Texas, breeding populations of bald eagles occur primarily in the eastern half of the state and along coastal counties. Wintering populations occur primarily in the Panhandle, Central, and East Texas, and in other areas of suitable habitat throughout the state. Wintering populations of eagles occur at Lake Rita Blanca in northern Hartley County, Lake Meredith in the northeastern corner of Potter County, and Buffalo Lake NWR in Randall County (Campbell 1995).

Although the Mexican spotted owl's entire range covers a large area of the southwestern U.S. and Mexico, its distribution within this range is largely unknown. The owl does not occur uniformly throughout its range but rather occupies a fragmented distribution corresponding to the availability of forested mountains and canyons. Between 1990 and 1993, 91 percent of Mexican spotted owls known to exist in the U.S. occurred on land administered by the U.S. Forest Service. The majority of owls occur within 11 national forests in New Mexico and Arizona (USFWS 1995).

The Mexican spotted owl occupies a variety of vegetative habitats but these contain certain common characteristics including: high canopy closure, a multi-layered canopy, uneven-aged stands, downed woody matter, and numerous snags, all of which are indicative of old growth forests (usually greater than 200 years old) and the absence of active management. The mixed-conifer community is the most frequently used vegetative community. Common species of overstory trees are white fir, Douglas fir, and ponderosa pine. In the northern portion of their range, including southern Utah and Colorado, and northern Arizona and New Mexico, much of the owl habitat is characterized by steep slopes and canyons with rocky cliffs. Along the Mogollon Rim in central Arizona and New Mexico, habitat use is less restricted, and owls occur in mixed-conifer forests, ponderosa pine-Gambel oak forests, rocky canyons, and associated riparian forests (USFWS 1993, 1995).

The recovery plan for the Mexican spotted owl divides the owl's range into 11 Recovery Units, six in the U.S. and five in Mexico. Currently affected airspace encompasses a portion of the Southern Rocky Mountains, the New Mexico Recovery

Unit. This unit is the smallest of the six and contains the second lowest concentration of owl sites (4.5 percent). Owl occurrences within the affected area are disjunct and correspond to the mountain ranges where steep sloped and canyon habitats are available. Owls generally inhabit steep terrain and canyons of the Sangre de Cristo Mountains, and occupy canyons incised into volcanic rock in the Jemez Mountains. Patches of mixed-conifer forest which appear to contain attributes of owl habitat exist throughout northern New Mexico (USFWS 1995).

Portions of the Southern Rocky Mountains-New Mexico Recovery Unit underlie proposed IR-153. In general, owls inhabit steep terrain and canyons in this unit and typically occur in mixed-conifer forests on steep slopes in the Sangre de Cristo Mountains. Although privately owned lands comprise almost half the total land within this unit, owls have been found primarily on USFS lands which account for about 27 percent of the land within the unit (USFWS 1995). The Carson and Santa Fe national forests are found within this unit and have an estimated 1 (Carson) and 37 (Santa Fe) protected activity centers (PACs [an area established around a known owl nest or roost site for the purpose of protecting the area]).

Mountain plovers, recently proposed for federal listing as threatened, utilize shortgrass prairies and dry playas dominated by blue grama, buffalo grass, and scattered taller vegetation during the breeding season (Sager 1996). They appear to require some degree of bare ground which is compatible with livestock grazing, prairie dog towns, barren playas, or other disturbed areas (Graul 1975). In late summer and fall, the birds are occassionally observed on agricultural fields. The species does not require a free water source (Sager 1996). Other vegetation includes western wheat grass, four-wing saltbrush, rabbitbrush, snakeweek, cholla, prickly pear, yucca, and occassionally juniper. In north-central and northwestern New Mexico, they occur in basin sagebrush (Sager 1996). The mountain plover migrates to Mexico and the southern point of Texas during the winter which is not underneath any RBTI proposed airspace (Peterson 1990).

Of the 15 counties affected by Alternative D, the mountain plover is considered to potentially occur in all of them. The four Texas counties, Dallum, Hartley, Oldham, and Potter, have a low relative abundance; Dallum has the highest abundance of those four but it is underneath the MOA and would not experience low overflight (USGS PWRC 1999). Flights in Potter county and half of Oldham would be over 2,000 feet AGL, so any occurance of mountain plovers in these areas would not be disturbed by low overflight. Of the remaining New Mexico counties, the mountain plover is considered common in only three of them: Union, Colfax, and Torrance. Union and Colfax, the two counties identified by FWS as of high concern, are underneath the MOA and would not experience low overflight. Torrance is crossed by an MTR in the northeast corner, leaving most of the county undisturbed. The remaining eight counties only have uncommon to rare breeding populations (NMGF 1997i), but these popultaions might experience some disturbance during the breeding season. However, many populations in the state are not expected to suffer adverse effects, including those areas with the highest abundance of mountain plover.

Over 60 species considered sensitive by federal or state agencies occur within counties overlain by elements of Alternative D. These species range from federal candidate species to state species of concern. Most (46) of these species consist of plants, fish, insects, amphibians, and small mammals whose habitat would remain unaffected by construction or operation of ground-based assets in Alternative D. The remainder are primarily birds and mammals that are distributed throughout many portions of the region. The most commonly noted sensitive species match those also associated with Alternatives A, B, and C: ferruginous hawk, loggerhead shrike, burrowing owl, white-face ibis, and Texas horned-lizard.

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Potential sources of impacts to wildlife from aircraft overflights are the visual effect of the approaching aircraft and the associated subsonic noise. Any visual impacts would be most likely to occur along those portions of IR-153 that are below 1,000 feet AGL (e.g., segments AB-IJ), the altitude accounting for most reactions to visual stimuli by wildlife (Lamp 1989, Bowles 1995).

The lands under proposed IR-153 would experience an increase of approximately one to ten sortie-operations per day, depending upon the segments flown. The potential for impacts to wildlife and birds would be greatest where the segments permit flight at altitudes below 1,000 feet AGL but above 300 feet AGL. Of the 38 segments on proposed IR-153, 30 would permit overflights below 1,000 feet AGL (Appendix C, Table C-3). It is estimated that approximately 80 percent of the flight activity along these segments would occur below 1,000 feet AGL. The FWS raised concerns regarding the effects of low-altitude overflights on threatened or endangered bird species. None of the flight activity in the proposed Mt. Dora MOA/ATCAA would be below 3,000 feet AGL, and it should not affect wildlife.

The FWS, based on consultations, has indicated that low-altitude flights could result in adverse impacts to sensitive bird species such as the Mexican spotted owl and mountain plover.

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies of subsonic aircraft disturbances on ungulates, in both laboratory and field conditions, have shown that effects are transient and of short duration, and suggest that the animals habituate to the sounds (Workman *et al.* 1992; Krausman *et al.* 1993, 1998; Weisenberger *et al.* 1996). Animals begin to show startle and avoidance behaviors when an intruding noise exceeds the ambient level by 10 to 30 dB (Bowles *et al.* 1991). A sound that is 50 dB over ambient conditions can cause animals to panic and leave a preferred habitat (Bowles *et al.* 1991). These animals habituate relatively rapidly to the noise disturbance, however. Although startle responses may never disappear completely, a continued disturbance that can be habituated to does not force abandonment of young or critical habitat (Bowles *et al.* 1991).

Similarly, the impacts to raptors and other birds from aircraft low-level flights were found to be brief, insignificant, and not detrimental to reproductive success (Smith *et al.* 1988, Lamp 1989, Ellis *et al.* 1991, Grubb and Bowerman 1997). The majority of the MTR will experience an average increase of 10 to 15 dB over the current condition under Alternative D. One section is 18 dB, and the MOA and higher MTR segment near the MOA increased in noise by 3 dB. At no time does the ambient noise range over 63 DNL. A summary of the aircraft overflight effects on wildlife studies reviewed for this analysis is discussed in detail in Appendix G. Based on these studies, the evidence would suggest that Alternative D flight operations would not result in significant, adverse impacts to wildlife or threatened, endangered, or sensitive species. Historically, and at present, most (about 90 percent) of the area and wildlife under proposed IR-153 has been subject to low-altitude military overflights.

However, the FWS considers that a greater potential for adverse impacts to threatened or endangered bird species may result from implementing Alternative D. The Carson and Santa Fe National Forests underlie parts of proposed IR-153 (segments AB and EF) and contain large areas of unsurveyed but potential Mexican spotted owl habitat. Recent studies (Malakoff 1997, Wasser *et al.* 1997) suggest that spotted owls may be susceptible to disturbance-induced stress, which could contribute to population declines. Under Alternative D, these areas could be overflown at an altitude of as low as 400 feet AGL approximately 12 times per day (an increase of roughly 10 per day). These areas overlap or intersect secondary MTRs, particularly IR-109. As part of the consultations associated with the Cannon

AFB action described previously, the FWS stipulated the Air Force would survey these areas to determine the locations of owl populations (if any) and avoid overflights by 1,600 feet AGL from March 1 through August 31 annually.

Concentrations of wintering bald eagles occur under the proposed IR-153 (segments HI and QR) and Mt. Dora MOA (Pecos and Canadian rivers, respectively). These segments currently underlie multiple secondary MTRs and have supported low-altitude flight activities for more than a decade. The FWS, however, indicated as part of consultations associated with the Cannon AFB action that flights at or below 2,000 feet AGL from October 1 through March 1 could result in significant adverse impacts to wintering bald eagles (USFWS 1998). On average, 12 to 14 sortie-operations would occur 260 days per year along these segments, with roughly 60 to 80 percent below 1,000 feet AGL. Since overflights associated with the Canadian River under the Mt. Dora MOA/ATCAA would occur at altitudes greater than 3,000 feet AGL, no significant impacts to bald eagles would be expected under the MOA.

Concentrations of bald eagles occur under segments of proposed IR-153.

Bird-aircraft strikes would be expected to remain minimal in the MTR and MOA/ATCAA. Aircrews would employ the Bird Avoidance Model when planning and conducting sorties. Use of this model has minimized the potential for bird-aircraft strikes.

Construction. During biological surveys, no water dependent species, critical habitat for said species, or wetlands were observed or identified at any of the candidate sites for Alternative D. Therefore, the construction of emitters or Electronic Scoring Sites would not impact water or wetland-dependent species.

No federally listed threatened or endangered species, or potential habitat, were observed during biological surveys of each of the candidate Electronic Scoring Sites and emitter sites in New Mexico. Construction would disturb a total of less than 20 acres. While this may cause a reduction in habitat for some wildlife, it would represent a minimal impact. The amount of habitat affected compared to the amount of similar habitat in the region would be miniscule. Additionally, all of the candidate sites have been subject to varying degrees of previous habitat-altering disturbance.

Ground Operations. Since ground operations would occur only at the candidate emitters and Electronic Scoring Sites, and no sensitive biological resources have been identified there, no impacts to biological resources due to ground operations under Alternative D would be expected.

4.3.6 Summary Comparison of Impacts

Table 4.3-1 compares the impacts for all four alternatives with regard to airspace and flight operations, construction, and ground operations. None of the alternatives would have more than moderate effects on natural resources.

The Air Force, in consultation with the FWS, has determined that none of the identified alternatives for the proposed action is likely to adversely affect any listed species or critical habitat. The FWS has concurred with this determination.

Table 4.3-1
Biological Resources Summary Comparison of Impacts

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace and Flight Operations	Approximately 6 low-altitude overflights per day over estimated aplomado falcon historic range.	Approximately 10 low-altitude overflights per day over estimated aplomado falcon historic range.	Approximately 10 low-altitude overflights per day over estimated aplomado falcon historic range.	Increase of 10 low-altitude overflights over wintering bald eagle areas and Mexican spotted owl and mountain plover habitat.
Construction	No Effect	Disturbance of less than 20 acres of possible wildlife habitat.	Disturbance of less than 20 acres of possible wildlife habitat.	Disturbance of less than 20 acres of possible wildlife habitat.
Ground Operations	No Effect	No Effect	No Effect	No Effect
Decommissioning	No Effect	No Effect	No Effect	No Effect

4.4 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section describes and analyzes the general features of the economy--including employment, population, and income--that could be affected by the proposed alternatives. It also addresses environmental justice. Environmental justice, as defined in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, looks at whether an action disproportionately affects these types of populations.

4.4.1 Methods and Approach

Most direct and indirect socioeconomic effects associated with implementation of any of the action alternatives (Alternative B, C, or D) would occur in the immediate vicinity of where Electronic Scoring Sites and emitter sites would be constructed and operated. Socioeconomics would also be affected in the vicinity of the Electronic Scoring Sites proposed for decommissioning in Harrison, Arkansas, and La Junta, Colorado. Therefore, the primary focus of this analysis is on these communities and the counties in which existing and proposed sites are located (Figure 4.4-1).

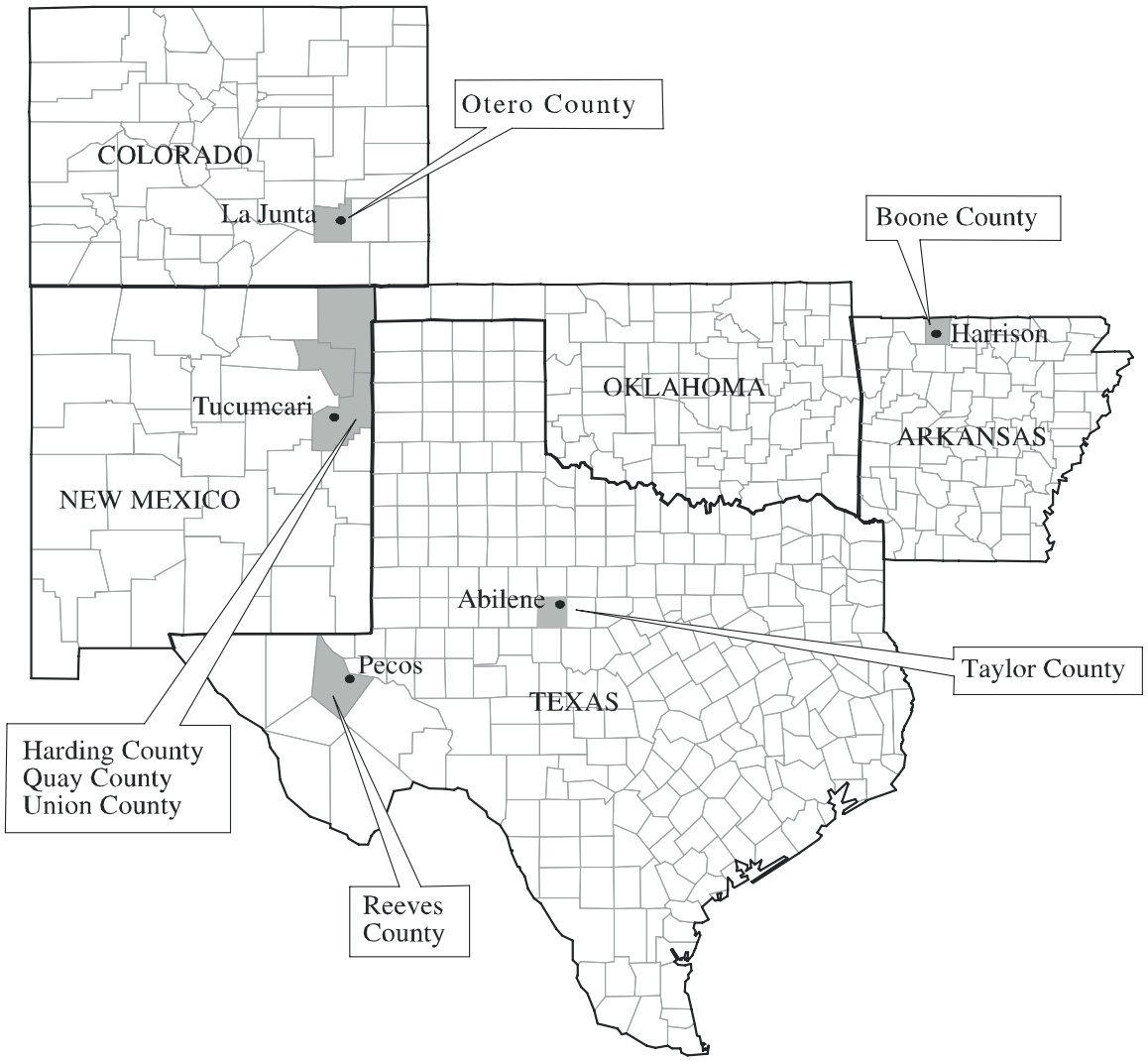
Impacts to the local economies would be generated by the one-time cost of construction and the yearly expenditures on operations and maintenance of the emitter and scoring sites, as well as by the decommissioning of existing Electronic Scoring Sites and the loss of jobs. The primary measures by which socioeconomic impacts were identified include changes to employment, population, and earnings associated with the proposed alternatives. The details of the methodology, assumptions, and calculations are discussed in Appendix I, Socioeconomics.

Other factors related to socioeconomics were identified throughout the public involvement process. Concerns were expressed that aircraft overflights could affect economic pursuits and land values. While these perceptions are recognized, there is little data to support these suppositions.

In 1980, the Air Force prepared an Environmental Impact Report (USAF 1980) analyzing communities in western Texas, southern New Mexico, and parts of Arizona and Nevada. The research focused on the potential impacts supersonic and increased subsonic flight would have on local economies. Factors examined included property values, employment opportunities, environmental amenities (such as hunting), and housing features, as well as community education and health-care services. It concluded that national and regional economic trends had substantially more impact than supersonic or subsonic overflights. While the study is almost 20 years old, the general economies of these communities (e.g., ranching, tourism, and hunting) have changed little. Therefore, drawing similar conclusions for RBTI proposed aircraft overflights are valid.

There is little to suggest that the sporadic and dispersed nature of RBTI overflights would impact land values. Land value studies have been conducted around urban airports and Air Force bases (Fidell *et al*. 1996) and measures of change in value (e.g., Noise Depreciation Sensitivity Index) have been defined. However, these are not applicable to the dispersed, higher altitude, episodic noise under an MTR or MOA. The variability of land values due to the diversity of land uses, locations, and improvements make it difficult to quantify potential impacts, if any, that might be associated with aircraft overflights.

Under an MTR or MOA, changes in conditions from daily overflights may or may not be readily discernable. In MOAs, no standard flight paths exist; in MTRs, overflights are dispersed across the width of the corridor. Both situations indicate



Communities Potentially Affected by RBTI Actions

Figure 4.4-1

that any single location would not likely be subject to consistent, direct overflights and the associated noise. In the present instance, given the rural nature of the region and the history of military use of the associated airspace (see Section 3.4), changes in numbers or types of overflights are not expected to produce measurable impacts on the economic value of the underlying land.

The likelihood of being overflown under the affected airspace varies depending upon the type of airspace unit the aircraft is using. In MTRs, flights are dispersed within the corridor both horizontally and vertically. The width of the MTRs proposed under the alternatives varies from 4 to 16 nm. In the narrower corridors, the potential for a person or a parcel of land to be overflown is greater than in the wider corridors. It is possible, however, that a recreationalist or rancher could be startled if an overflight took place at a specific point of time, but such an event is difficult to predict. In a MOA, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown. Therefore, no significant adverse consequences to economic activities are expected.

The region of analysis for environmental justice includes the geographic areas underlying the existing and proposed airspace for the alternatives in western Texas and northeastern New Mexico. These areas are located in block numbering areas (BNAs) or census tracts. The analysis examined the anticipated impacts associated with noise levels that communities underlying the affected airspace would experience. The analysis then determined whether these impacts would be disproportionately high and adverse for minority or low-income populations.

Comments received during the public involvement process revealed concerns about the potential effect of increased overflights on ranching and tourism due to increased annoyance of overflown population.

Environmental justice analysis examines disproportionately high or adverse impacts to low income and minority populations as a result of implementation of any of the alternatives. Information contained in the 1990 Census of Population and Housing (U.S. Census Bureau 1990) was used to identify these populations. Although these census data are more than 8 years old, there are no indications that regional trends since 1990 have significantly altered these population characteristics in this region of the U.S. Minority and low-income populations are defined as:

- *Minority Populations:* Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.

- *Low-Income Populations:* Persons living below the poverty level, based on a total annual income of $12,674 for a family of four persons as reported in the 1990 census.

Environmental justice concerns are measured using census tracts and BNAs. BNAs are the rough equivalent of census tracts in rural areas. Because of the rural nature of the region of comparison, BNAs were the predominant unit of measurement.

Socioeconomic effects on a community include the addition of both direct jobs associated with construction and indirect employment of service, retail, and wholesale industry workers.

In 1990, the number of persons living in the portion of each BNA/census tract that falls under MTR corridors and MOAs associated with all alternatives was calculated by dividing the area under the affected airspace within the BNA/census tract by the area of the BNA/census tract, then applying that proportion to the minority and low-income populations. The lands under the affected airspace currently support higher proportions of these groups than is found, on average, nationwide.

In accordance with the *Interim Guide for Environmental Justice with the Environmental Impact Analysis Process* (USAF 1997c), noise levels under the affected airspace were examined. The review of the area established that no populations of any kind, including minority or low-income populations, would be

subject to noise levels of 65 DNL or higher under any alternative. Use of this 65 DNL guideline for the evaluation of environmental justice issues in relation to sporadic military training flights is consistent with the intent of E.O. 12898. Other components of RBTI, including construction, decommissioning of facilities, and operation of new facilities in new areas, are also relevant to evaluating environmental justice. Individually and collectively, these various factors indicate minority and low-income populations would not be adversely affected. For this action, no further assessment of environmental justice is warranted.

Under the Alternative A: No-Action, current socioeconomic activities would remain unchanged. For Alternatives B, C, and D, an approximate 1 to 2 percent increase in the affected county revenues is anticipated and about 45 new jobs would be created. These jobs would be derived from direct employment of construction workers and facility operators and indirect employment of additional service workers in the community. Decommissioning of the two Electronic Scoring Sites in Harrison, Arkansas, and La Junta, Colorado, would decrease county revenues by approximately 1 percent and about 15 indirect jobs would be lost. Under all three action alternatives, minority and low-income populations would not be disproportionately affected by noise generated by aircraft overflights.

4.4.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

For Alternative A: No-Action, the current economic activities associated with the Harrison and La Junta Electronic Scoring Sites would continue unchanged.

The Harrison Electronic Scoring Site, near the city of Harrison, is located in north-central Arkansas in Boone County. The population is approximately 11,500 and represents about 40 percent of Boone county's population (28,297) (U.S. Census 1990). Total employment for the county is about 12,500, primarily employed in wholesale and retail trade, manufacturing, as well as educational and health services industries (U.S. Census 1990). The unemployment rate in the county is 5.9 percent (Arkansas Employment Security Division 1998), and total personal income is $398 million (Geostat 1990). The Harrison Electronic Scoring Site, which began operation in the mid-1990s, employs 30 personnel whose annual salaries contribute $900,000 per year to the local economy (average $30,000 salary) (USAF 1993a). The Air Force contracts a private corporation to manage and maintain this facility and the four associated emitter sites.

The city of La Junta, Colorado, is located in Otero County. City population is approximately 11,300 and represents approximately 56 percent of county population (20,185) (U.S. Census 1990). County employment is 7,656, primarily employed in health and educational services, wholesale and retail trade, manufacturing, and

agriculture (U.S. Census 1990). The unemployment rate is 4.7 percent (Colorado Department of Labor 1998). Total personal income is $274 million (Geostat 1990). The La Junta Electronic Scoring Site began operation in the late 1980s and employs 31 civilian personnel. The annual salaries contribute $930,000 per year to the local economy (average $30,000 salary) (USAF 1993b). Similar to the Harrison site, a private corporation is contracted by the Air Force to manage and maintain this facility and its four associated emitter sites.

ENVIRONMENTAL CONSEQUENCES

No change in socioeconomic conditions would result from implementation of the No-Action Alternative. The Electronic Scoring Sites and associated emitter sites would continue their current operations. Revenues generated from the operation of these sites would continue to accrue to the local communities.

4.4.3 Alternative B: IR-178/Lancer MOA

AFFECTED ENVIRONMENT

For Alternative B, the en route Electronic Scoring Site (with operations and maintenance facilities) would be constructed on one of two sites owned by DoD and currently managed by the Air Force. Located near Dyess AFB in Abilene, Texas, the Electronic Scoring Site would employ 31 civilian personnel.

The city of Abilene, in Taylor County, supports a population of around 110,000 and accounts for approximately 92 percent of the county population (119,655) (U.S. Census 1990). Total county employment is 50,278 and the largest employment sectors are professional services, government, wholesale and retail trade, and manufacturing (U.S. Census 1990). The county unemployment rate averages 4 percent (Texas Labor Market Information 1998). Total personal income is $2.1 billion (Geostat 1990).

For the MTR Electronic Scoring Site, the two candidate sites are located near the town of Pecos, Texas, on private land. The site chosen would be leased by the Air Force. This scoring site would employ 30 civilian personnel.

The city of Pecos is located in Reeves County. Pecos population is 12,000 and represents 76 percent of the county population (15,852) (U.S. Census 1990). Total employment in the county is 5,906 and the largest employment sectors are professional services, wholesale and retail trade, and government (Geostat 1990). The county unemployment rate averages 9 percent (Texas Labor Market Information 1998). Total personal income is $162 million (Geostat 1990).

Construction would create 8 direct short term jobs and 220 indirect, short-term jobs, 140 in Taylor County and 80 in Reeves County.

The candidate emitter sites associated with this alternative would be located in the rural counties of Borden, Brewster, Garza, Pecos, Presidio, Scurry, and Upton, Texas. Since these sites are unmanned and would be managed from the Abilene and Pecos Electronic Scoring Site facilities, the socioeconomic conditions for each county would not be measurably affected and are not described further.

ENVIRONMENTAL CONSEQUENCES

Construction. Under Alternative B, construction costs are estimated to range from $3.6 million to $5 million for each site at Abilene and Pecos. Construction costs for the associated emitter sites would range from $300,000 to $680,000 per site. Construction would take place in the year 2001 and last for 12 to 18 months for each Electronic Scoring Site and about 2 months for each emitter site.

Construction expenditures for the Abilene and Pecos sites would generate temporary, increased revenues of $11,500,000 and $9,000,000 within Taylor and Reeves counties, respectively (for details, see Appendix I, Socioeconomics). Construction of the ten emitter sites would also generate temporary, but lower amounts of revenue in the seven other counties.

Construction activities would employ an average of eight workers at any one time. The required construction force would be drawn from the local labor supply, and no changes to population would occur from construction activities. Indirect short-term jobs associated with construction expenditures would be approximately 140 in Taylor County and 80 in Reeves County. Typically, most indirect jobs are created in the services, wholesale, and retail trade industries. This would represent about 1 percent of current employment in both counties. No one would be expected to move into the area as a result of indirect job growth. Increased earnings as a result of construction activities would total $3,400,000 for Taylor County and $1,900,000 for Reeves County and would represent approximately 1 percent of current county personal income. This 1 percent temporary increase of revenue from construction would be easily absorbed by the local economies.

Ground operations at the Electronic Scoring Sites would create 61 direct jobs and 29 indirect jobs, 17 in Taylor County and 12 in Reeves County.

Ground Operations. The facilities in Abilene and Pecos would employ 31 and 30 people, respectively, at an average salary of $30,000. It is assumed that these personnel would move into the area for employment. Annual maintenance costs for each scoring site would be approximately $150,000. The emitter sites would be unmanned; annual maintenance costs would be less than $50,000.

Ground operations would result in a minor increase of revenues to local economies of $1,300,000 for Taylor County and $900,000 for Reeves County (Appendix I). Given an average household size of 2.8 in Taylor County and 3.3 in Reeves County (U.S. Census 1990), estimated direct population change as a result of operations would be 87 in Taylor County and 99 in Reeves County. This would represent less than 1 percent of either county population. No impacts would be expected to population-affected resources such as schools, libraries, fire and police protection, and housing.

Indirect jobs created as a result of facility operations are estimated to be 17 in Taylor County and 12 in Reeves County. Indirect job growth would represent less than 1 percent of county employment. The local labor pool would be expected to absorb this additional demand; no significant change in the unemployment rates and no in-migration of labor would be expected. Increased earnings of $1,200,000 and $1,100,000 for Taylor and Reeves Counties, respectively, as a result of operations would represent approximately 1 percent of current county personal income. The local communities would easily absorb these additional revenues into their economies.

Lost earnings as a result of decommissioning would represent approximately 1 percent of current county personal income for both Boone and Otero Counties.

Decommissioning. Under Alternative B, the existing Harrison Electronic Scoring Site in Boone County, Arkansas, and the La Junta Electronic Scoring Site in Otero County, Colorado, would be decommissioned, and all current employees would move from the area. The equipment from the Electronic Scoring Site facilities and their associated emitter sites would be removed. The building would be offered for sale to other federal and local governmental agencies, and the leased emitter site properties would be returned to the landowners.

Decommissioning would result in decreases in revenue of $1,100,000 and $1,000,000 for the economies of Boone (Harrison site) and Otero (La Junta site) Counties (Appendix I). Given an average household size of 2.5 in Boone and 2.7 in Otero (U.S. Census 1990), direct population loss as a result of decommissioning would be approximately 75 in Boone County and 84 in Otero County. This would

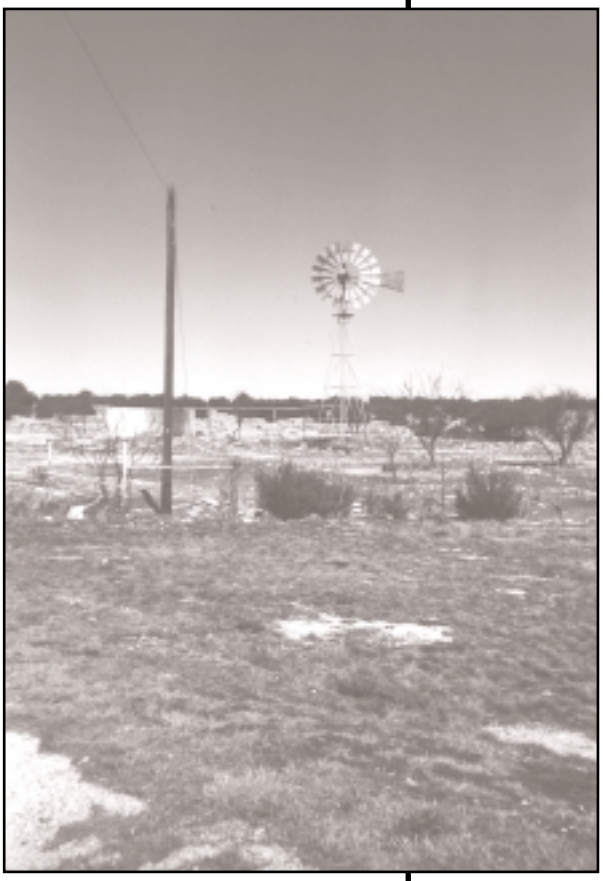
represent less than 1 percent of the total county population. No impacts would be expected to population-affected resources such as schools, libraries, fire and police protection, and housing.

As a result of decommissioning, indirect jobs lost are anticipated to be 15 in Boone County and 14 Otero County. Typically, most indirect job loss occurs in the services, wholesale, and retail trade industries. Indirect job loss would represent less than 1 percent of total county employment. The county economies would be expected to absorb this additional capacity of labor; no significant change in the unemployment rates or out-migration of labor would be expected. Lost earnings of $1,100,000 for Boone County and $1,200,000 for Otero County as a result of decommissioning would represent approximately 1 percent of current county personal income. These 1 percent decreases to the local economies from decommissioning would not represent a significant loss of revenue to the local communities.

4.4.4 Alternative C: IR-178/Texon MOA

Affected Environment

The affected environments for the Abilene and Pecos, Texas, en route and MTR Electronic Scoring Sites are the same as described for Alternative B. The ten candidate emitter sites would also be located in the rural counties of Brewster, Irion, Pecos, Presidio, Reagan, Schleicher, and Upton, Texas. Since these emitter sites would be unmanned and managed from the Abilene and Pecos facilities, the socioeconomic environment for each of these rural counties is not described. Also included in the affected environment would be the communities associated with the Harrison and La Junta Electronic Scoring Sites, as described under Alternative B.



Environmental Consequences

With regard to socioeconomics, the effects of proposed construction, decommissioning, and ground operations under Alternative C would match those described for Alternative B. Changes in population, employment, and earnings would represent only a small fraction of the local economies. It is expected that the changes, both increases and decreases of revenue, population, and jobs, would be easily absorbed by the local communities.

4.4.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

Under Alternative D, the proposed Abilene en route Electronic Scoring Site would be developed, and the affected environment would be the same as described for Alternative B. This alternative would also include an MTR Electronic Scoring Site, with operations and maintenance facilities on private land leased by the Air Force near Tucumcari, New Mexico. The facility would be located at one of the three candidate Electronic Scoring Sites and would employ 30 people. These candidate sites are located in Quay, Union, and Harding counties; one would be chosen.

Tucumcari is located in Quay County. The greater Tucumcari population is 8,644 and represents about 80 percent of the county population (10,823) (U.S. Census 1990). Total county employment is 4,359 and the largest employment sectors are professional services, wholesale and retail trade, transportation, and agriculture (U.S. Census 1990). The county unemployment rate is 4.4 percent (New Mexico Department of Labor 1998). Total personal income is $142 million (Geostat 1990).

The population of Union County is 4,124, about half that of Quay County. Agriculture, retail trade, and construction dominate the employment sectors; total employment is 1,671 (U.S. Census 1990). The county unemployment rate averages 3 percent (New Mexico Department of Labor 1998). Total personal income is approximately $24.6 million (U.S. Census 1990).

Harding County's population is 987 and total employment is approximately 400 (U.S. Census 1990). The largest employment sectors are agriculture, retail trade, and construction (U.S. Census 1990). The county unemployment rate averages 4.8 percent (New Mexico Department of Labor 1998). Total personal income is approximately $4.9 million (U.S. Census 1990).

The ten emitter sites associated with Alternative D are located in the rural counties of Colfax, Guadalupe, Harding, Mora, and Union, New Mexico. Since these sites would be unmanned and managed from the Abilene and Tucumcari facilities, the socioeconomic environment for each county is not described.

ENVIRONMENTAL CONSEQUENCES

Construction. For the proposed Abilene site, construction impacts would be the same as described under Alternative B. Construction costs for the proposed Tucumcari scoring site would range from $3.6 million to $5 million. Construction costs for the associated emitter sites would range from $300,000 to $680,000 per site. Construction would take place in the year 2001 and last for 12 to 18 months for the Electronic Scoring Site and less than 2 months for each emitter site.

Construction would create 8 direct short-term jobs and 133 indirect short-term jobs.

Construction expenditures of $9,700,000 would generate temporary, beneficial impacts in the regional economy of either Quay, Union, or Harding Counties depending on the site chosen (Appendix I). Construction of the emitter sites would also generate temporary, minor revenue increases in the local economies.

Construction activities would employ an average of eight workers at any one time. The required construction force would be drawn from the local labor supply. No changes to population would occur from construction activities. Short-term indirect jobs associated with construction expenditures would be approximately 133. Typically, most indirect jobs are created in the services, wholesale, and retail trade industries. This would represent about 2 percent of current regional employment. No in-migration would be expected as a result of new indirect job growth. Increased

earnings of $2,700,000 as a result of construction activities would represent approximately 2 percent of current regional personal income. These relatively small revenue and job increases from construction would be absorbed by the local economy.

Ground Operations. For the proposed Abilene site, ground operations impacts would be the same as described for Alternative B. The facility near Tucumcari would employ 30 people at an average salary of $30,000. It is assumed that all personnel would move to the area for employment. Annual maintenance costs for the Tucumcari site would be approximately $150,000. The emitter sites would be unmanned; annual maintenance costs would be less than $50,000.

Ground operations would result in revenue increases of $1,000,000 for the regional economy (Appendix I). Given an average household size of 2.6 in the tri-county region (U.S. Census 1990), direct population change as a result of operations would be 78. This would represent less than 1 percent of regional population. No impacts would be expected to population-affected resources, such as schools, libraries, fire and police protection, and housing.

Ground operations near Tucumcari would employ 30 people directly and create 14 indirect jobs.

Indirect jobs created as a result of operations would be 14, less than 1 percent of regional employment. The local labor pool would be able to absorb this additional demand; no significant change in the unemployment rates and no in-migration of labor would be expected. Increased earnings of $1,100,000 as a result of operations would represent approximately 1 percent of current regional personal income. These relatively small increases in revenues and job opportunities from operations would be absorbed by the local economies.

Decommissioning. Impacts from decommissioning the La Junta and Harrison Electronic Scoring Sites would be the same as those described under Alternative B. Both Electronic Scoring Sites represent only a 1 percent contribution to the local economies of Harrison and La Junta; therefore, it is not anticipated to noticeably impact economic activities in these communities.

4.4.6 Summary Comparison of Impacts

Table 4.4-1 compares the socioeconomic and environmental justice impacts associated with all four alternatives. Only slight increases and decreases of revenue and job gain or loss would result from Alternatives B, C, or D.

Table 4.4-1.
Socioeconomics and Environmental Justice Summary Comparison of Impacts

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace and Flight Operations	No Change	No measureable impacts to socioeconomics. No disproportionate impacts to minority and low-income populations.	Same as Alternative B	No measureable impacts to socioeconomics. No disproportionate impacts to minority and low-income populations.
Construction	No Change	Taylor County: Increase in expenditures and revenue of $11.5 million, earnings of $3.4 million, and short-term, indirect jobs of 140. Reeves County: Increase in expenditures and revenue of $9 million, earnings of $1.9 million and short-term, indirect jobs of 80.	Same as Alternative B	Taylor County: Same as Alternative B. Tri-County Region: Increase in expenditures and revenue of $9.7 million, earnings of $2.7 million and short-term, indirect jobs of 133.
Ground Operations	No Change	Taylor County: Increase in expenditures and revenue of $1.3 million, earnings of $1.2 million and direct (31) and indirect (17) jobs of 48. Reeves County: Increase in expenditures and revenue of $0.9 million, earnings of $1.1 million and direct (30) and indirect (12) jobs of 42.	Same as Alternative B	Taylor County: Same as Alternative B. Tri-County Region: Increase in expenditures and revenue of $1 million, earnings of $1.1 million, and direct (30) and indirect (14) jobs of 44.
Decommissioning	No Change	Boone County: Loss in expenditures and revenue of $1.1 million, earnings of $1.1 million, and direct (31) and indirect (14) jobs of 45. Otero County: Loss in expenditures and revenue of $1 million, earnings of $1.2 million, and direct (30) and indirect (15) jobs of 45. Lost earnings would represent approximately 1 percent of current county personal income for each county.	Same as Alternative B	Same as Alternative B

4.5 CULTURAL RESOURCES

4.5.1 Methods and Approach

Cultural resources are prehistoric and historic sites, buildings, districts, or objects that are important to a culture or community. Cultural resources are divided into three categories: archaeological resources, architectural resources, and traditional cultural resources.

- *Archaeological resources* are places where people changed the ground surface or left artifacts or other physical remains (e.g., arrowheads, bottles). Archaeological resources can be classified as either sites or isolates. Isolates often contain only one or two artifacts, while sites are usually larger and contain more artifacts.

- *Architectural resources* are standing buildings, dams, canals, bridges, windmills, oil wells, and other structures.

- *Traditional cultural properties* are resources associated with the cultural practices and beliefs of a living community that link the community to its past and help maintain its cultural identity. Most traditional cultural properties in New Mexico and Texas are associated with Native Americans. Traditional cultural properties can include archaeological resources, locations of historic events, sacred areas, sources of raw material for making tools and sacred objects, or traditional hunting and gathering areas.

Under the National Historic Preservation Act and various federal regulations, only significant cultural resources are considered when assessing the possible impacts of a federal action. Significant archaeological, architectural, and traditional resources include those that are eligible or recommended as eligible for inclusion in the National Register of Historic Places (National Register). The significance of archaeological and architectural resources is usually determined by using the specific criteria (listed in 36 CFR 60.4), including association with a famous individual, ability to contribute to scientific research, and ability to add to an understanding of history and prehistory. Cultural resources must usually be at least 50 years old to be considered eligible for listing. However, more recent structures such as Cold War-era resources may warrant protection if they manifest "exceptional significance." Traditional cultural resources can be evaluated for National Register eligibility, as well. However, even if a traditional cultural resource is determined to be not eligible for the National Register, it may still be significant to a particular Native American tribe. In this case, such resources may be protected under the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and Executive Order 13007, which addresses Indian sacred sites. The significance of a Native American traditional cultural property is determined by consulting with the appropriate Native American tribes.

Under federal laws and regulations, significant cultural resources are considered when assessing the impacts of a federal action.

For this EIS, impacts to cultural resources are evaluated for lands beneath the primary airspace (MTRs and MOAs) and for the locations of the candidate emitter sites and Electronic Scoring Sites and present Electronic Scoring Site locations at Harrison, Arkansas, and La Junta, Colorado.

Information on archaeological and architectural resources within the affected environment was derived by:

- Conducting background research to identify previously recorded National Register properties underneath the affected airspace, and archaeological sites within 1 mile of each candidate emitter, candidate or existing Electronic Scoring Sites.

- Conducting on-the-ground surveys of all candidate emitter sites and Electronic Scoring Sites.

As part of the background research, records searches of the following data sources were carried out:

- The Archaeological Records Management Section of the New Mexico Historic Preservation Division;

- The Texas Archaeological Research Laboratory;

- The database of the National Register of Historic Places; and

- The Colorado Historical Society.

For areas under the affected airspace, only cultural resources listed in the National Register were considered. The Air Force recognizes that hundreds of other cultural resources--some documented and some not yet discovered--exist under the airspace. However, aircraft operations are most likely to affect historic structures and districts where setting is an important criterion for significance. These resources are ones typically found on the National Register. Conversely, if National Register listed properties are not affected by the project elements, then nonlisted resources are unlikely to be affected.

All candidate emitter and Electronic Scoring Sites were examined for cultural resources.

For the candidate emitter sites and Electronic Scoring Sites, all cultural resources were identified. Twenty 15-acre sites in New Mexico and 22 sites in Texas were intensively surveyed for cultural resources. The survey involved close inspection of the ground surface at intervals spaced no more than 25 meters apart. All archaeological resources were identified--even isolated artifacts were recorded. No subsurface excavation of any sort was conducted during the survey and no artifacts were removed.

The results of the field investigations and the Air Force's determinations of National Register eligibility were submitted to the New Mexico and Texas SHPOs for review as part of Section 106 consultation. All archaeological sites recorded during the survey are eligible for the National Register. No archaeological isolates are eligible for the National Register based upon the policies of both the New Mexico and Texas SHPOs. No architectural resources or traditional cultural properties were found during the field survey. The Texas and New Mexico SHPOs are reviewing the Air Force's findings and the Air Force anticipates concurrence with those findings and eligibility determinations. The selected alternative will not be undertaken before measures, if any, are taken to reduce, avoid, or mitigate any adverse effects the action may have on historic properties.

In an ongoing effort to identify traditional cultural properties, the Air Force is in the process of consulting with Native American groups according to the *Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments, Executive Order 13084,* and *DoD Policy on Indian and Native Alaskan Consultation*. Table 4.5-1 lists the 32 Native American pueblos, tribes, and other organizations contacted by the Air Force regarding RBTI. Groups contacted included those who live in the vicinity of the study area today and those who lived there in the past.

Table 4.5-1
Native American Groups Contacted by the U.S. Air Force

Pueblo of Acoma	Pueblo of San Felipe	Jicarilla Apache Tribe
Pueblo of Cochiti	Pueblo of Santa Ana	Mescalero Apache Tribe
Pueblo of Isleta	Pueblo of Santo Domingo	Navajo Nation
Pueblo of Picuris	Pueblo of Santa Clara	Navajo Nation Council
Pueblo of Pojoaque	Pueblo of Taos	Apache Tribe of Oklahoma
Pueblo of San Ildefonso	Pueblo of Tesuque	Cheyenne-Arapaho Tribes of Oklahoma
Pueblo of Jemez	Zia Pueblo	Caddo Tribe of Oklahoma
Pueblo of Laguna	Pueblo of Zuni	Comanche Tribe of Oklahoma
Pueblo of Sandia	Pueblo of Nambe	Kiowa Tribe of Oklahoma
Pueblo of San Juan	Eight Northern Indian Pueblo Council	Wichita and Affiliated Tribes
All Indian Pueblo Council	Five Sandoval Indian Pueblo, Inc.	

The Air Force contacted 32 Native American pueblos, tribes, and other organizations regarding RBTI.

Procedures for assessing adverse effects to cultural resources are discussed in regulations for 36 CFR 800, National Historic Preservation Act. An action results in adverse effects to a cultural resource eligible to the National Register when it alters the resource characteristics that qualify it for inclusion in the register. Adverse effects are most often a result of physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's significance; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property.

Possible sources of adverse effects can include ground disturbance, vandalism, noise, vibrations, visual intrusions, and change in land status that reduces legal protection to the resource. Ground disturbance and vandalism can damage or destroy all types of cultural resources. However, the ground disturbance would be restricted to between 0.25 and 3.0 acres of the 15-acre site, and avoidance of the resources may be possible.

Previous studies have indicated that subsonic noise-related damage to structures is unlikely.

Vandalism is usually associated with increased public access to a resource, and impacts due to visual intrusion or to noise may occur when the setting is altered, either through overflights or construction in an area not primarily exposed to these elements. Changes in land status can adversely affect a significant resource if, under the new owner, the resource is protected by less stringent historic preservation laws or not protected at all. If significant resources are found on federal lands that would be transferred to nonfederal sources, this loss of legal protection is considered to be an adverse effect to the resource. The damage potentially caused by noise, vibrations, and visual intrusion is more difficult to evaluate.

Experimental data and models (Battis 1988, Sutherland 1990, King 1985, King *et al.* 1988) show that damage to architectural resources, including adobe buildings, is unlikely to be caused by subsonic noise and vibrations from aircraft overflights. Subsonic, noise-related vibration damage to structures requires high decibel levels generated at close proximity to the structures and in a low frequency range (USFS 1992, cf. Battis 1983, 1988). Aircraft must generate a maximum sound level (L_{max}) of at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988) and, even at 130 dB, structural damage is unlikely (Appendix G). Sutherland (1990) found that the probability of damage to a poorly

constructed or poorly maintained wood frame building is less than 0.3 percent even when the building is directly under a large, high-speed aircraft flying only a few hundred feet above the ground. In other words, the probability of an aircraft, such as a B-1, operating at 300 feet AGL and generating a maximum sound of 117 dB directly over such a structure is extremely unlikely to cause damage. Operations at higher altitudes would have a lower potential for causing damage, and structures offset from the flight track have an even lower probability of being affected by low-flying aircraft. Since many archaeological resources consist of buried deposits or artifacts lying on the ground surface, noise, vibration, or visual impacts to archaeological sites and isolates are also considered extremely unlikely.

The effects of noise on cultural resources may also be related to setting. Noise impacts to Native American traditional cultural properties may be related to interference with ceremonies and other traditional activities at sacred sites. Undisturbed habitats, resources, and settings are considered to be critical to religious practices (NPS 1994). Potential impacts can be identified only through consultation with the affected groups.

For RBTI, impacts to cultural resources beneath the affected airspace were assessed by using noise analysis data and sortie-operations numbers to determine whether there would be an increase in noise or visual intrusion from overflights sufficient to affect cultural resources known to exist underneath the airspace. Impacts to cultural resources at the Electronic Scoring Site and emitter locations focused on ground disturbance, land ownership transfers, and increased access to resources.

4.5.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

The affected environment for cultural resources includes the land under the affected airspace and the ESSs at Harrison, Arkansas, and La Junta, Colorado. The affected airspace involves the primary MTRs and MOAs currently used by bombers from Barksdale and Dyess AFBs.

Airspace. As part of the background research, cultural resources currently listed in the National Register near or directly underneath existing primary MTRs and MOAs were identified. Twenty-two properties are currently listed in the National Register (Table 4.5-2). They consist of historical districts, petroglyphs, prehistoric pueblos, houses, courthouses, hotels, and roads. The Santa Fe Trail, the Folsom site, Rabbit Ears, and Wagon Mound (the latter three are National Historic Landmarks) are included in these historic properties.

Table 4.5-2
National Register-Listed Cultural Resources Under Alternative A: No-Action Affected Airspace

Resource Type	*Number of Resources*
Petroglyph sites	2
Pueblos, ruins and other archaeological sites	3
Historic districts	6
Courthouses, schools, and other government and public buildings	5
Houses, mansions, and cabins	1
Farms, ranches, barns, windmills, and other agricultural features	0
Hotels, stores, mills, and other commercial buildings	2
Roads, trails, bridges, dams, ditches, etc.	2
Other cultural resources	1
Total	**22**

There are no Native American reservations beneath the existing MTRs and MOAs (Figure 4.5-1). The Mescalero Apache Reservation is 80 to 115 miles from segments of IR-178 and IR-128/180. Taos Pueblo is less than 10 miles from IR-109 and portions of IR-109 overlie the Jicarilla Apache Reservation. In addition to these two communities, groups within 30 miles of IR-109 and VR-1175/1176 include Santa Clara, San Juan, and Picuris Pueblos. However, these MTRs are secondary routes not used by the bombers. Consultation with Native American groups and organizations did not reveal any information about traditional cultural properties under the existing airspace.

Electronic Scoring Sites. Two existing Electronic Scoring Sites would continue to be used under the No-Action Alternative. Harrison Electronic Scoring Site was constructed in 1994 and surveyed for archaeological sites at that time. The land was leased from a private landowner. No sites were recorded on the property. Since the building is less than 50 years old, it is not considered to be significant. The La Junta Electronic Scoring Site was constructed in 1990. It has not been surveyed for archaeological or architectural resources. The La Junta Electronic Scoring Site is currently located on Federal property.

ENVIRONMENTAL CONSEQUENCES

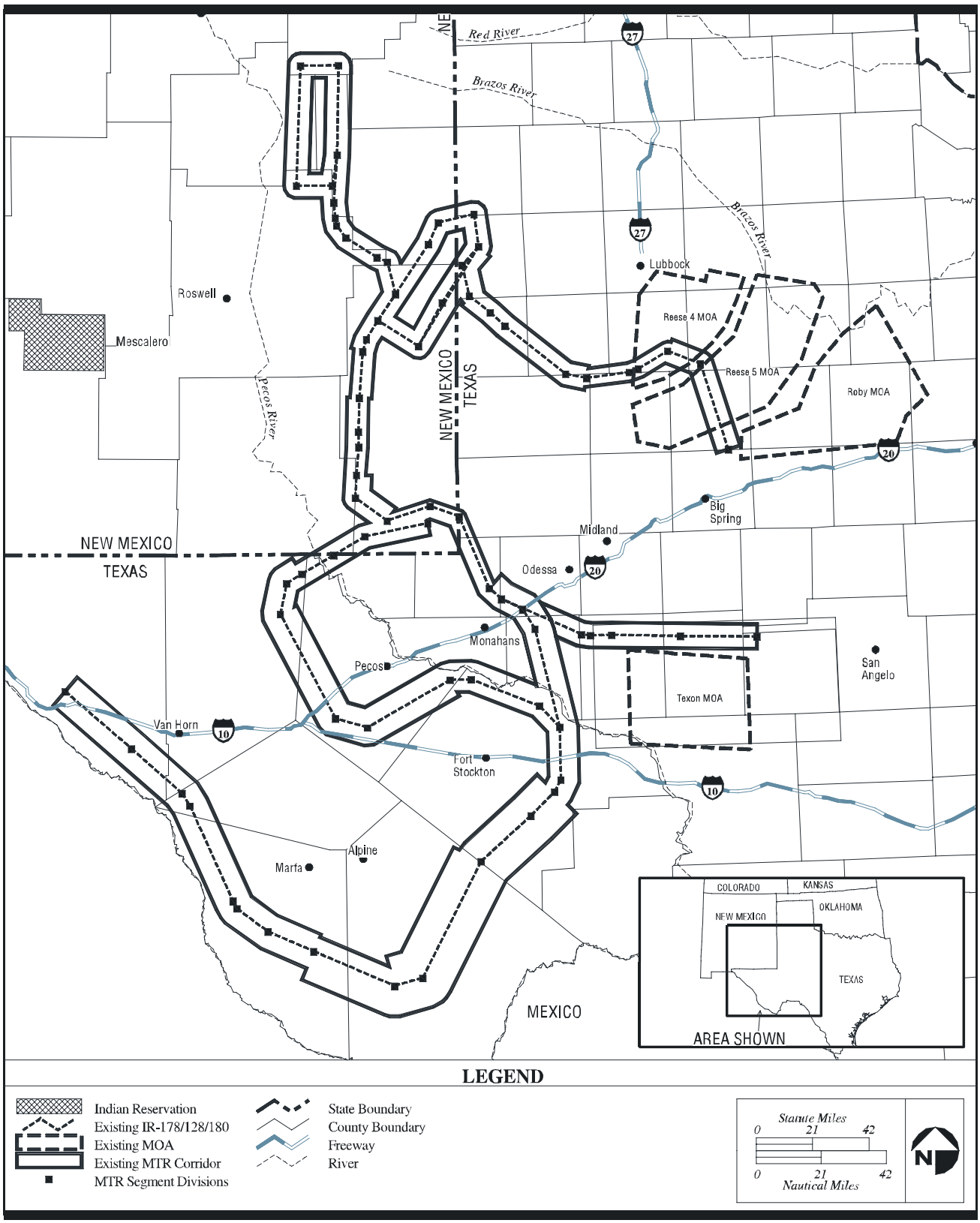
Airspace and Flight Operation. In Alternative A: No-Action there would be no changes to airspace structure, altitude, numbers of sorties, or noise levels (Table 4.5-3). The existing noise levels beneath the airspace do not exceed 59 DNL. Sound exposure levels range from 86 to 116 dB; however, these levels are not expected to cause physical damage to architectural resources. The No-Action Alternative would result in no impact to archaeological sites, historic buildings, traditional cultural properties, or other cultural resources.

Table 4.5-3
Location of National Register-Listed Properties Under Alternative A Affected Airspace

Airspace	*Segment*	*Number of Properties*	*Property Type*	*Affected Environment Noise Level (DNL)*	*Average Daily Sortie-Operations*
IR-178	AB	1	Other	56	6
IR-178	AFAG	1	Courthouse	49-50	1
IR-178	GH	4	Historic District	58-59	6
Mt. Dora MOA		2	Courthouse	<45	1
Mt. Dora MOA		1	Historic District	<45	1
Mt. Dora MOA		1	House	<45	1
Mt. Dora MOA		1	Hotel	<45	1
Mt. Dora MOA		1	Pueblo	<45	1
Mt. Dora MOA		2	Roads	<45	<1
Reese 4 MOA		2	Petroglyph	<45	<1
Reese 4 MOA		1	Hotel	<45	<1
Reese 4 MOA		2	Courthouse	<45	<1
Reese 4 MOA		2	Pueblo	<45	<1
Reese 5 MOA		1	Historic District	<45	<1

Refer to Figure 2.3-1 for segment locations.

Electronic Scoring Sites. Under the No-Action Alternative, the existing operations at the Harrison and La Junta Electronic Scoring Sites would continue at current levels. There would be no construction associated with Alternative A: No-Action or changes to existing operations. Therefore, no changes to cultural resources would occur.



Reservations Within the Region of Alternative A: No-Action

Figure 4.5-1

4.5.3 Alternative B: IR-178/Lancer MOA

AFFECTED ENVIRONMENT

The affected environment includes the lands under the affected airspace and the locations for the candidate emitters, candidate Electronic Scoring Sites, and existing Electronic Scoring Sites at Harrison and La Junta. The affected airspace includes the primary MTRs and MOAs, especially IR-178, as well as Reese 4, Reese 5, and Roby MOAs.

Airspace. As part of the background research, cultural resources currently listed in the National Register underneath the proposed MTRs and MOAs for Alternative B were identified. Fifteen properties are currently listed on the National Register. Among these 15 properties are historic districts, archaeological sites, courthouses, hotels, and other structures (Table 4.5-4). No National Historic Landmarks are located within 20 miles of the affected airspace.

Table 4.5-4
National Register-Listed Cultural Resources
Under Alternative B Affected Airspace

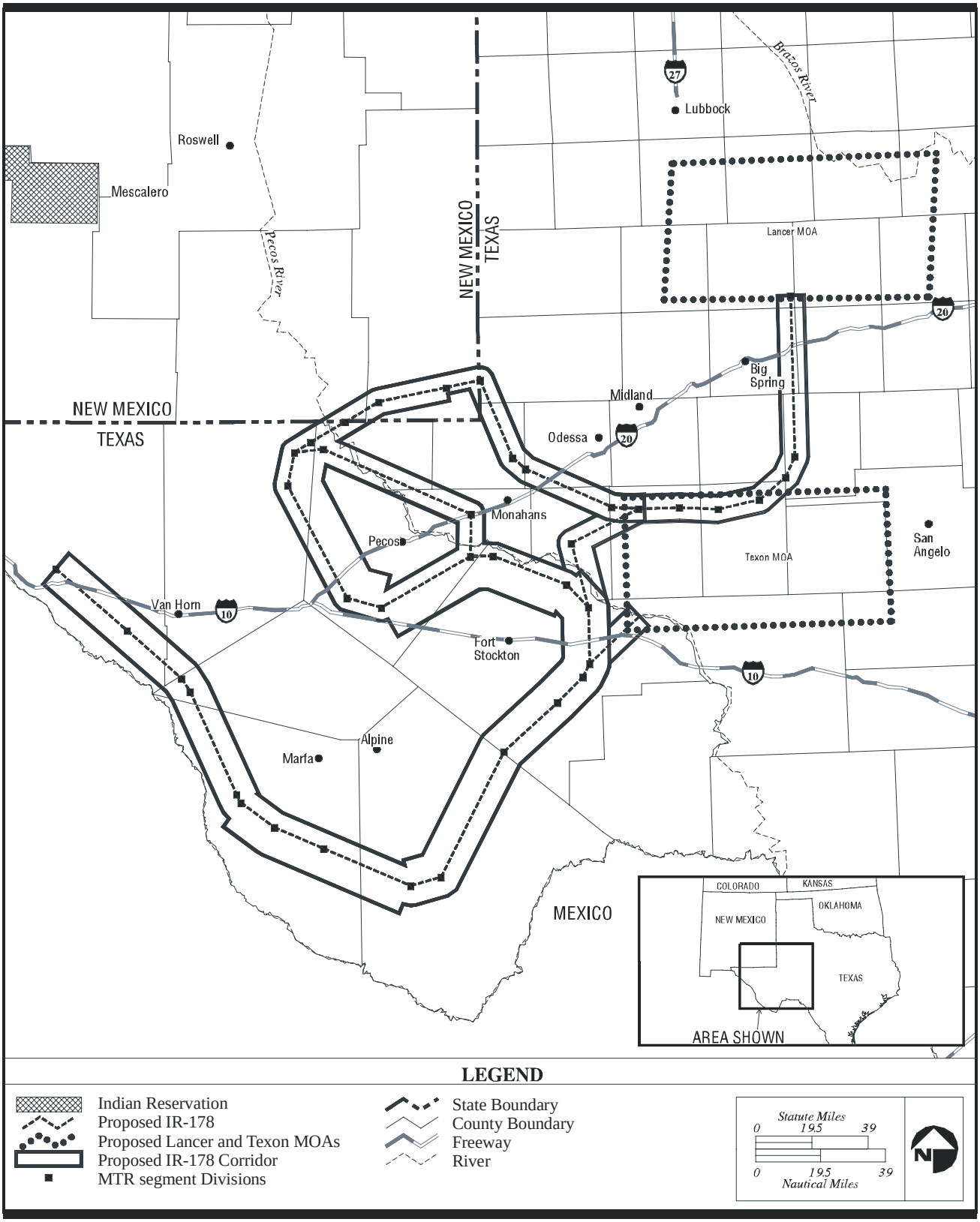
Resource Type	*Number of Resources*
Petroglyph sites	2
Pueblos, ruins, and other archaeological sites	2
Historic districts	5
Courthouses, schools, and other government and public buildings	3
Houses, mansions, and cabins	2
Farms, ranches, barns, windmills, and other agricultural features	0
Hotels, stores, mills, and other commercial buildings	0
Roads, trails, bridges, dams, ditches, etc.	0
Other cultural resources	1
Total	**15**

There are no Native American pueblos or reservations underneath IR-178 or the proposed Lancer MOA. The Mescalero Apache Reservation is about 100 miles from the nearest segment of IR-178 (Figure 4.5-2). No traditional cultural properties have been identified under the affected airspace.

Table 4.5-5
Cultural Resources Associated with Emitter and Scoring Site Locations Under Alternative B

Resource Type	*Number of Resources*
Sites	
Prehistoric	1
Historic	0
Subtotal	**1**
Isolates	
Prehistoric	11
Historic	0
Subtotal	**11**
High Probability Locations	0
Subtotal	**0**
Total	**12**

Emitters and Electronic Scoring Sites. Of the 16 emitter and scoring site locations in Alternative B inspected for cultural resources, 11 contained no prehistoric or historic resources. Of the remaining 5, the survey recorded a prehistoric quarry at 1 site and 11 prehistoric isolated artifacts on 5 emitter/Electronic Scoring Site locations (Table 4.5-5). All of the isolates are stone flakes or tools. The quarry site is considered eligible for listing in the National Register; none of the isolates are considered eligible. The SHPO is reviewing the survey and eligibility determinations; the Air Force anticipates concurrence with the findings and determinations.



Reservations Within the Region of Alternatives B and C **Figure 4.5-2**

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Fifteen National Register properties are located underneath the airspace; however, all of these sites are currently overflown by the military. Properties listed on the National Register would be exposed to noise levels from 46 to 61 DNL, with a 1 to 2 dB change in most segments (Table 4.5-6). In segment AB of proposed IR-178, there would be a 5 dB increase and a 12 dB increase in segment AFAG. The property type in segment AB is a multiple property district and in AFAG, a courthouse. Although subject to a 5 dB and 12 dB increase, noise levels would not exceed 61 DNL and the area is already exposed to overflights from military aircraft. For GH, the historic district, noise levels would increase 2 to 3 dB. The increases in noise levels are unlikely to adversely affect resource significance.

Table 4.5-6
National Register Properties Under Alternative B: Proposed IR-178/Lancer MOA

Airspace	*Segment*	*Number of Properties*	*Property Type*	*RBTI Minimum Flight Altitude*	*Baseline Noise Level (DNL)*	*Projected Noise Level*	*Change in Noise level (dB)*	*Increase in Average Daily Sortie-Operations*
IR-178	AB	1	Other	400	56	61	5	4
IR-178	GH	4	Historic District	300	58-59	60-61	2	4
IR-178	AFAG	1	Courthouse	800	46	58	12	4
Lancer MOA		2	Petroglyphs	3,000	<45	46	1	9
Lancer MOA		2	House	3,000	<45	46	1	9
Lancer MOA		2	Courthouse	3,000	<45	46	1	9
Lancer MOA		1	Historic District	3,000	<45	46	1	9
Lancer MOA		2	Pueblos	3,000	<45	46	1	9

Refer to Figure 2.4-3 for segment locations.

Overflights on the MTR segments would increase by four, on average, per day with an increase in nine overflights per day in the MOA. However, MTR segments are 8 to 14 nm wide and the MOA/ATCAA is over 3,200 square nm in size. National Register properties are unlikely to be overflown in the MOA and would only occasionally be overflown on MTRs. Visual intrusions are unlikely to occur.

Sound exposure levels would range from less than 86 to 116 dB. Studies indicate that low altitude overflights, even with noise levels above 120 dB, do not usually cause damage to buildings. It is extremely unlikely that architectural or archaeological resources would be physically damaged by overflights under this alternative.

Because no traditional cultural properties have been identified and because there are no nearby Native American groups, impacts to traditional cultural resources are considered unlikely.

Construction. Construction associated with this alternative could impact one archaeological site eligible for listing in the National Register. However, this site is located on a portion of an existing Air Force facility and may be avoided during construction. Therefore, no adverse impacts to archaeological sites would occur. No architectural resources or traditional cultural properties would be affected by construction.

Ground Operations. One archaeological site could be affected by ground operations if materials were disturbed or collected by personnel. Established procedures for

informing personnel of federal protection of significant resources will be enforced and no impacts to cultural resources would result from operations or maintenance.

Decommissioning. Decommissioning of La Junta Electronic Scoring Site could result in the transfer of land out of federal ownership. No sites or significant structures are known, but the area has not been surveyed and the Colorado SHPO has expressed concern about the significance of the structure. However, since it was constructed in 1990, it is unlikely to be significant. Nevertheless, if the lands were transferred out of federal ownership, then an archaeological and architectural survey would be conducted to record resources and assess their significance. No sites occur at the Harrison Electronic Scoring Site, and no impact from decommissioning would result.

4.5.4 Alternative C: IR-178/Texon MOA

AFFECTED ENVIRONMENT

The affected environment includes the lands under the affected airspace and the locations for the candidate emitters, candidate Electronic Scoring Sites, and existing Electronic Scoring Sites at Harrison and La Junta. The affected airspace includes the primary MTRs and MOAs, especially IR-178 and the proposed Texon MOA/ATCAA.

Airspace. As part of the background research, cultural resources currently listed in the National Register near or directly underneath the proposed MTRs and MOAs for Alternative C were identified. Six properties are currently listed on the National Register. These six properties include historic districts, multiple property listings, and a courthouse (Table 4.5-7). No National Historic Landmarks are located within 20 miles of the affected airspace.

Table 4.5-7
National Register-Listed Cultural Resources Under Alternative C Affected Airspace

Resource Type	*Number of Resources*
Petroglyph sites	0
Pueblos, ruins, and other archaeological sites	0
Historic districts	4
Courthouses, schools, and other government and public buildings	1
Houses, mansions, and cabins	0
Farms, ranches, barns, windmills, and other agricultural features	0
Hotels, stores, mills, and other commercial buildings	0
Roads, trails, bridges, dams, ditches, etc.	0
Other cultural resources	1
Total	**6**

There are no Native American reservations or pueblos underneath IR-178 or the proposed Texon MOA (refer to Figure 4.5-2). The Mescalero Apache Reservation is about 100 miles from the nearest segment of IR-178. No traditional cultural properties have been identified under the affected airspace. Background research on the Harrison and La Junta Electronic Scoring Sites is discussed under Alternative B.

Table 4.5-8
Cultural Resources Associated with Emitter and Scoring Site Locations Under Alternative C

Resource Type	*Number of Resources*
Sites	
Prehistoric	1
Historic	1
Subtotal	**2**
Isolates	
Prehistoric	10
Historic	0
Subtotal	**10**
High Probability Locations	0
Subtotal	**0**
Total	**12**

Emitter and Electronic Scoring Sites. Of the 16 emitter and Electronic Scoring Site locations inspected for cultural resources for Alternative C, 12 contained no prehistoric or historic resources. Of the remaining four, the survey recorded one prehistoric quarry site, one historic trash scatter used from 1910 to 1930, and ten prehistoric isolates (Table 4.5-8), all of which were stone flakes or tools. The two sites are eligible for listing in the National Register; none of the isolates is considered eligible. The SHPO is reviewing the Air Force survey and eligibility determinations, and the Air Force anticipates concurrence.

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Six National Register properties are located underneath the airspace; however, all of these sites are currently overflown by the military. Properties listed on the National Register would be exposed to noise levels from 45 to 61 DNL, with a 1 to 2 dB change in most segments (Table 4.5-9). In segment AB of IR-178, there would be a 5 dB increase. The property type in segment AB is a multiple property district. Although subject to a 5 dB increase, noise levels would not exceed 61 DNL and the area is already exposed to overflights from military aircraft. The increases in noise levels are unlikely to adversely affect resource significance.

Table 4.5-9
National Register Properties Under Alternative C: Proposed IR-178/Texon MOA

Airspace	*Segment*	*Number of Properties*	*Property Type*	*RBTI Minimum Flight Altitude*	*Baseline Noise Level (DNL)*	*Projected Noise Level*	*Change in Noise level (dB)*	*Increase in Average Daily Sortie-Operations*
IR-178	AB	1	Other	400	56	61	5	4
IR-178	GH	4	Historic District	300	58-59	60-61	2	4
Texon MOA		1	Courthouse	6,000	<45	46	1	9

Refer to Figure 2.4-6 for segment locations.

Overflights on the MTR segments would increase by 4, on average, per day with an increase in 9 overflights per day in the MOA. However, MTR segments are 12 to 14 nm wide and the MOA/ATCAA is over 3,200 square nm in size. National Register properties are unlikely to be overflown in the MOA and would only occasionally be overflown on MTRs. Visual intrusions are unlikely to occur.

Sound exposure levels would range from less than 86 to 116 dB. Studies indicate that low-altitude overflights, even with noise levels above 120 dB, do not usually cause damage to buildings. It is extremely unlikely that architectural or archaeological resources would be physically damaged by overflights under this alternative.

Because no traditional cultural properties have been identified and because there are no nearby Native American groups, impacts to traditional cultural resources are considered unlikely.

Construction. Construction associated with Alternative C could impact two archaeological sites eligible for listing in the National Register. However, one of the sites is located on a portion of Air Force property and may be avoided during construction. The remaining site is located at the edge of the emitter location and can also be avoided. No impact is expected to archaeological resources. No architectural resources or traditional cultural properties would be affected by construction.

Ground Operations. Two significant sites could be affected by operations. Impacts would be the same as those for Alternative B and could be avoided.

Decommissioning. Impacts due to decommissioning the La Junta Electronic Scoring Site are the same as in Alternative B. No impacts would result from decommissioning Harrison Electronic Scoring Site.

4.5.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

The affected environment includes the lands under the affected airspace, the locations for the candidate emitters and Electronic Scoring Sites, and existing Electronic Scoring Sites at Harrison and La Junta. The affected airspace includes the primary MTRs and MOAs, especially proposed IR-153 and the proposed Mt. Dora MOA/ATCAA.

Fifteen National Register-listed properties underlie the affected airspace for Alternative D.

Airspace. As part of the background research, cultural resources currently listed in the National Register near or directly below the proposed MTRs and MOAs for Alternative D were identified. Fifteen properties are currently listed on the National Register (Table 4.5-10). These 15 properties include historic districts; Wagon Mound and Rabbit Ears, both National Historic Landmarks; part of the Santa Fe Trail; courthouses; a store; a hotel; and houses. The Clayton Complex, four sites associated with early settlements, is partially within the area underlying the MOA.

Table 4.5-10
National Register-Listed Cultural Resources
Under Alternative D Affected Airspace

Resource Type	*Number of Resources*
Pueblos, ruins, and other archaeological sites	2[1]
Historic districts	4[2]
Courthouses, schools, and other government and public buildings	3
Houses, mansions, and cabins	4[2]
Hotels, stores, mills, and other commercial buildings	1
Roads, trails, bridges, dams, ditches, etc.	1
Total	**15**

[1] Two historic properties under the airspace are also National Historic Landmarks (Wagon Mound, Rabbit Ears).

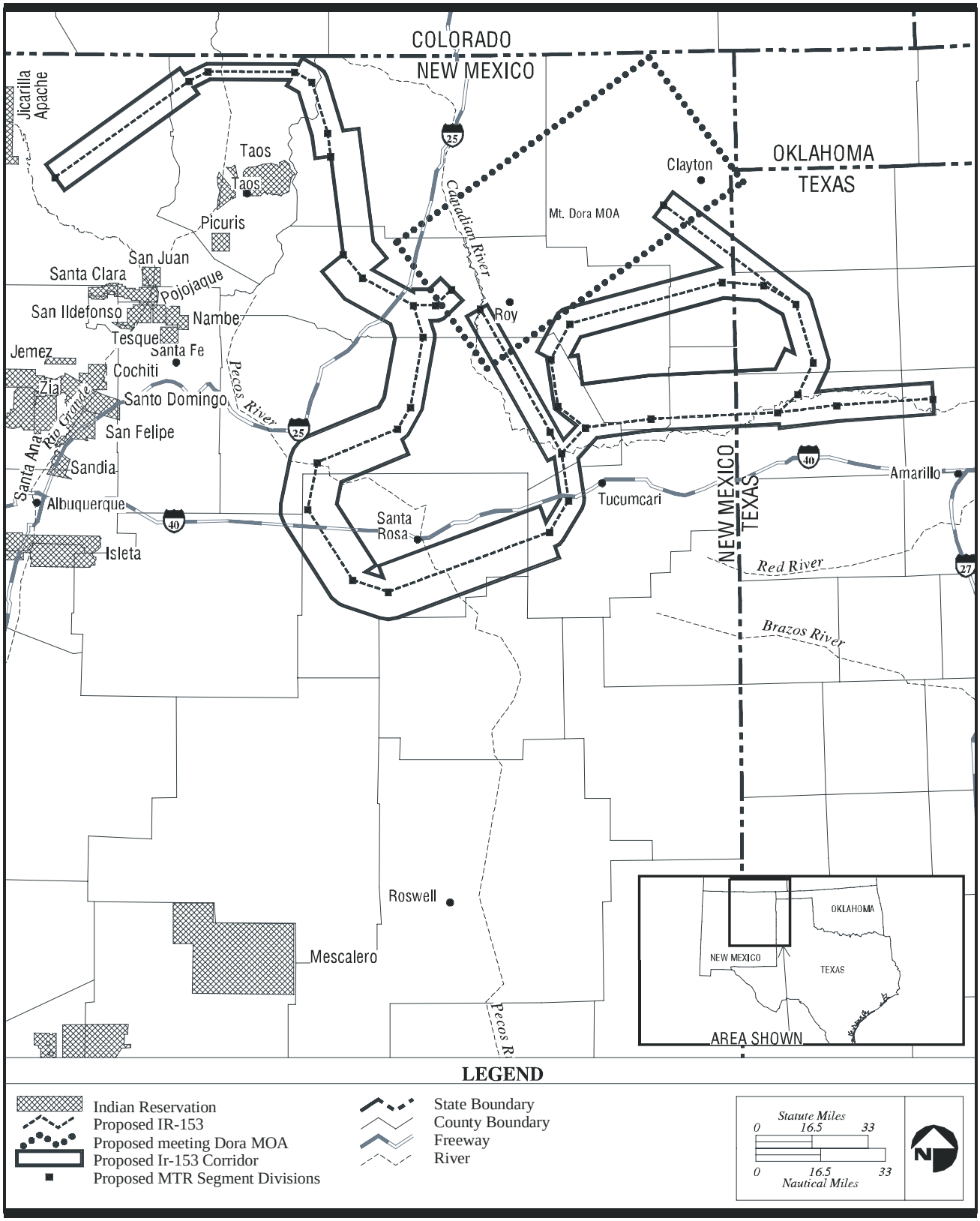
[2] Includes Villa Philmonte Historic District and Maxwell-Abreu House.

There are no Native American reservations or pueblos underneath proposed IR-153 or the proposed Mt. Dora MOA/ATCAA (Figure 4.5-3). Taos Pueblo and the Jicarilla Apache Reservation are each less than 10 miles from different segments of proposed IR-153. In addition to these two communities, Santa Clara, San Juan, and Picuris pueblos are within 30 miles of proposed IR-153. Concern about traditional resources was expressed for areas more than 5 miles from the proposed MTR corridor; however, no traditional cultural properties have been identified under the affected airspace. Background research on the Harrison and La Junta Electronic Scoring Sites are discussed under Alternative B.

Table 4.5-11
Cultural Resources Associated with Emitter and Scoring Site Locations Under Alternative D

Resource Type	*Number of Resources*
Sites	
Prehistoric	4
Historic	1
Subtotal	**5**
Isolates	
Prehistoric	4
Historic	0
Subtotal	**4**
High Probability Locations	1
Subtotal	**1**
Total	**10**

Emitter and Electronic Scoring Sites. Of the 22 emitter and scoring site locations inspected for cultural resources for Alternative D, 14 contained no prehistoric or historic resources. Of the remaining eight, the survey recorded one prehistoric quarry, one historic homestead, three lithic scatters, and four prehistoric isolates (Table 4.5-11). Each of the isolates is a stone tool fragment or flake. The five sites are eligible for listing in the National Register; none of the isolates are eligible. Also, one emitter location did not contain surface evidence of cultural resources, but is believed to have a high potential for buried cultural resources. The New Mexico SHPO is reviewing the Air Force findings and eligibility determinations; the Air Force anticipates concurrence with these findings.



Reservations Within the Region of Alternative D: IR-153/Mt. Dora MOA **Figure 4.5-3**

A summary of the cultural resource investigations for Harrison and La Junta Electronic Scoring Sites is found under Alternative B.

ENVIRONMENTAL CONSEQUENCES

Airspace and Flight Operations. Fifteen National Register properties are located underneath the airspace; however, all of these sites are currently overflown by the military. Properties listed on the National Register would be exposed to noise levels from 45 to 62 DNL, with a 0 to 18 dB change in affected segments (Table 4.5-12). In segments NO and QR of proposed IR-153, there would be a 9 to 10 dB increase, a 17 dB increase in segment IJ, and an 18 dB increase in segment GH. The property types in segments NO and QR are a house and historic district and in GH are the Santa Fe Trail, hotel, houses, and two historic districts. Although subject to an 18 dB increase, noise levels would not exceed 62 DNL, and the area is already exposed to overflights from military aircraft. The increase in noise levels is unlikely to adversely affect the resource significance since these sites are not within a traditional setting. There would be a noticeable change in noise levels for portions of the Santa Fe Trail and Wagon Mound, National Historic Landmarks. The increase in noise could distract from visitors' appreciation of the area, although it would not alter the cultural significance of the resource.

Table 4.5-12
National Register Properties Under Alternative D: Proposed IR-153/Mt. Dora MOA

Airspace	*Segment*	*Number of Properties*	*Property Type*	*RBTI Minimum Flight Altitude*	*Baseline Noise Level (DNL)*	*Projected Noise Level*	*Change in Noise level (dB)*	*Increase in Average Daily Sortie-Operations*
IR-153	GH	2	Historic District[2]	400	<45	62	18	10
IR-153	GH	1	Road	400	<45	62	18	10
IR-153	GH	1	Hotel	400	<45	62	18	10
IR-153	GH	2	House[2]	400	<45	62	18	10
IR-153	IJ	1	Site[1]	400	<45	61	17	10
IR-153	NO	1	Historic District	300	50	60	10	10
IR-153	QR	1	House	300	51	60	9	9
IR-153	ACAD	1	Courthouse	2,000	<45	<45	0	1
Mt. Dora MOA	not applicable	1	Site[1]	1,500	<45	46	1	9
Mt. Dora MOA	not applicable	1	Courthouse	1,500	<45	46	1	9
Mt. Dora MOA	not applicable	1	House	1,500	<45	46	1	9
Mt. Dora MOA	not applicable	1	Historic District	1,500	<45	46	1	9
Mt. Dora MOA	not applicable	1	School	1,500	<45	46	1	9

[1] Two historic properties under the airspace are also National Historic Landmarks (Wagon Mound, Rabbit Ears)
[2] Includes Villa Philmonte Historic District and Kit Carson/Maxwell-Abreu House

Overflights on the MTR segments would increase by 9 to 10, on average, per day. However, MTR segments are 8 to 14 nm wide and the MOA/ATCAA is over 3,200 square nm in size. National Register properties are unlikely to be overflown in the MOA and would only occasionally be overflown on MTRs. Visual intrusions are unlikely to occur.

Sound exposure levels would range from less than 86 to 116 dB. Studies indicate that low-altitude overflights, even with noise levels above 120 dB, do not usually cause damage to buildings. It is extremely unlikely that architectural or archaeological resources would be physically damaged by overflights under this alternative.

No traditional cultural properties have been identified underneath the affected airspace. Reservations and pueblos are found less than 10 miles from portions of the affected airspace. The Air Force will continue its ongoing dialogue with Native American groups to solicit their input about traditional cultural properties and the effects of overflights on their traditional lifestyles.

Construction. Construction associated with Alternative D could impact five archaeological sites eligible for listing in the National Register. However, two of the sites are located at the edge of the parcel or in an area that could be avoided. Three sites were located in the center of the 15-acre parcels and cannot be avoided. If these parcels are selected, then data recovery would be conducted to reduce impacts. Specific mitigation measures are presented in section 2.6.2. No architectural resources or traditional cultural properties would be affected by construction.

Ground Operations. Three significant sites could be affected by operations. Impacts would be the same as Alternative B and could be avoided.

Decommissioning. Impacts due to decommissioning the La Junta Electronic Scoring Site are the same as in Alternative B. No impacts would result from decommissioning the Harrison Electronic Scoring Site.

4.5.6 Summary Comparison of Impacts

Table 4.5-13 compares the impacts for all four alternatives with regard to airspace and flight operations, construction, ground operations, and decommissioning. None of the alternatives would have more than minimal effects on cultural resources.

Table 4.5-13
Cultural Resources Summary Comparison of Impacts

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace and Flight Operations	No change to archaeological, architectural, or traditional cultural resources. 22 National Register-listed properties, including 3 National Historic Landmarks currently overflown.	A) No likely effects to archaeological, architectural, or traditional cultural resources. B) 15 National Register-listed properties exposed to changes of 1 to 12 dB in noise levels; average daily sorties increase by 5 in MTR and 9 in MOA but area already overflown.	A) No likely effects to archaeological, architectural, or traditional cultural resources. B) 6 National Register-listed properties exposed to changes of 1 to 5 dB in noise levels; average daily sorties increase by 4 in MTR and 9 in MOA but area already overflown.	A) No likely effects to archaeological, architectural, or traditional cultural resources. B) 15 National Register-listed properties including 2 National Historic Landmarks exposed to changes of 0 to 18 dB in noise levels; average daily sorties increase by 10 in MTR and MOA but area already overflown.
Construction	No Effect	No adverse effects to archaeological, architectural, or traditional resources. Existing site would be avoided.	No adverse effects to archaeological, architectural, or traditional resources. Two existing archaeological sites would be avoided.	No adverse effects to archaeological, architectural, or traditional resources. Five existing archaeological sites would be avoided or mitigated.
Ground Operations	No Effect	No adverse effects to archaeological, architectural, or traditional resources.	Same as Alternative B.	Same as Alternative B.
Decommissioning	No Effect	Transfer of property could affect resources if present, but effects could be avoided or mitigated to insignificant levels.	Same as Alternative B.	Same as Alternative B.

4.6 SOILS AND WATER RESOURCES

4.6.1 Methods and Approach

For this EIS, earth resources--soil (unconsolidated) and bedrock (consolidated) materials--have been narrowed by the scoping process to an analysis of soil. In particular, the EIS focused on soil erosion and loss. Water resources--the occurrence, circulation, and distribution of surface water and groundwater--have been narrowed to water availability and use issues. Surface waters such as rivers, perennial streams, ponds, or lakes, are not examined because none of the candidate emitter and Electronic Scoring Sites would be located within 1 mile of these natural resources. The potential for impacts to paleontological (fossil) resources and groundwater contamination were reviewed at each of the sites but neither was present; therefore, further analysis was not carried forward. Any mineral or water development rights would be retained by the landowner and are not analyzed. Potential adverse effects to soils could result from ground disturbance leading to soil erosion, fugitive dust propagation, and sedimentation. Adverse effects to water resources could result from erosion, runoff, and surface contamination of groundwater.

At the two Electronic Scoring Sites, construction would disturb 3.3 acres; 0.6 acres would be disturbed at each of the ten emitter sites.

Soils and water resources can be affected by ground-disturbing activities, such as construction or grading. Therefore, this analysis focuses on construction and ground operations at the candidate emitter sites and Electronic Scoring Sites that could potentially impact these resources. Aircraft operations in airspace are not considered to be a source of impact to either soil or water resources and are not evaluated.

The Air Force chose level candidate sites with existing access to the maximum extent possible to reduce erosion and soil loss during construction.

Potential erosion losses were predicted for every candidate site using the Universal Soil Loss Equation (Fuller 1984). Estimated gully losses through water erosion were also assessed. Likewise, potential wind erosion losses were predicted using a similar equation (Fuller 1987) and Natural Resource Conservation Service methodologies. Losses attributable to fugitive dust generated during construction activities were estimated using an accepted USEPA relationship. Overall, no significant impacts to soil and water resources are anticipated at any of the proposed emitter and electronic scoring sites. One ton of soil spread over 1 acre is less than the thickness of a dime. When identifying sites, the Air Force looked for level sites with pre-existing access to the maximum extent possible. Existing gravel roads would be graded and/or improved. Best management practices would be followed to minimize any erosion possibilities when constructing emitter and electronic scoring sites or improving any access roads.

4.6.2 Alternative A: No-Action

AFFECTED ENVIRONMENT

The affected environment for the No-Action Alternative includes the La Junta, Colorado, and Harrison, Arkansas, Electronic Scoring Site facilities. Access and parking areas at the La Junta site are paved. At the Harrison location, both the driveway and parking area are graveled. Access roads and parking areas at both locations are regularly maintained and procedures followed to minimize any soil or water erosion.

General water use averages about 5,000 gallons per month at either Electronic Scoring Site. Harrison draws water from the Valley Springs Municipal water supply and La Junta, from the City of La Junta. Wastewater at La Junta is disposed of through city sewer lines; the Harrison site has a 1,800-gallon septic tank on site.

ENVIRONMENTAL CONSEQUENCES

Under the No-Action Alternative, no changes to the current conditions at the Harrison and La Junta Electronic Scoring Sites would occur. Therefore, no changes in the soil and water resources are anticipated.

4.6.3 Alternative B: IR-178/Lancer MOA

AFFECTED ENVIRONMENT

Under Alternative B, two Electronic Scoring Sites and ten emitter sites would be constructed in western Texas. These proposed facilities would be located primarily in the Trans-Pecos, Edwards Plateau, and southern High Plains (Llano Estacado) physiographic provinces. Erosion (the action of particle removal) and sedimentation (the action of particle deposition) forces are responsible for much of the landscape found today. Gradual uplifting of the Rocky Mountains to the northwest, combined with erosional forces of wind and water, reworked the geologic materials, forming layered deposits of varied textures and thickness across eastern New Mexico and western Texas.

Six of the candidate emitter sites and one Electronic Scoring Site have the potential for loss or impact to soil and water resources due to erosion and/or steepness of terrain. Five candidate sites (54, 59, 65, 67, 81) have a moderate to high potential for erosion. Three (59, 91, 93) candidate sites are partially covered with slopes from 5 to 45 percent near their margins; however, no construction or road development would occur on these steeper areas. The access road leading to site 91 has portions that slope about 20 percent.

The proposed Electronic Scoring Sites, 61 and 62, are located at previously disturbed locations. There are pre-existing facilities at both sites; however, the wells supplying potable water and septic tanks have been closed.

ENVIRONMENTAL CONSEQUENCES

Construction. The soil erosion hazard from both wind and water for all construction activities is generally slight to moderate. Potential wind and water erosion losses are expected to be less than 5 tons per site during a 1-month construction period at any one of the candidate emitter sites, including fugitive dust emissions of about 0.4 tons. Because all sites would be graveled or paved (or protected by other best management practices in the case of disturbed road rights-of-way), long-term erosion losses would be negligible. Erosion loss calculations for these sites are found in Appendix J. Potential wind and water erosion losses at the Electronic Scoring Sites are expected to be less than 5 tons per site during a 1-month construction period at any one of the proposed sites, including fugitive dust emissions of about 2.0 tons per site. Because all sites would be graveled or paved (or protected by other best management practices in the case of disturbed road rights-of-way), long-term erosion losses would be negligible.

Long-term erosion losses due to construction under Alternative B would be negligible.

One site (65) has a moderate to high potential for wind erosion. However, this site has been historically farmed, and wind erosion potential could be minimized by application of vegetation cover. Soils at other sites (54, 59) have shrink-swell potentials with ratings that range from slight to severe. In those areas rated as severe, soils may have reduced load-bearing strengths when wet, and may swell or shrink (depending on soil moisture levels), causing damage to foundations, underground pipes, and other structures. Appropriate road and building design methods would be used to minimize these hazards. Because the majority of these sites are located on relatively flat terrain and receive low levels of precipitation, the potential for water erosion would be minimal. While the ground would be disturbed during site preparation and road construction, best management practices for proper grading and stabilizing the site would be undertaken. The potential for erosion from construction in these areas, therefore, is expected to be minimal.

. . . Alternative B IR-178/Lancer MOA

While some candidate emitter sites have erosive soils (54, 81) and steep slopes (91, 93), the potential for runoff and erosion problems occurring are low because these sites would incur little surface disturbance in the long term. Storm runoff management practices would be used to minimize any potential erosion impacts on or off site. To reduce erosion hazard on steep sites, appropriate management practices will be used to direct potential storm runoff from road or pad surfaces into safe outlets.

No significant impacts are anticipated due to ground operations activities under Alternative B.

Ground Operations. Soil and water erosion along access routes and sites would be minimal due to road grading and gravel or paved site pads; therefore, impacts would not be significant. Potable water at any of the proposed Electronic Scoring Sites would come from existing groundwater supplies; either stored in a water tank, or delivered by pipeline. No long-term environmental consequences are expected for groundwater supplies since water consumption is estimated to be approximately 5,000 gallons per month at any of the proposed scoring site facilities.

Because the emitter sites are unmanned, and require only short weekly visits by personnel, no permanent water supply or wastewater treatment would be installed. All standard Air Force precautions would be taken to prevent contaminants (e.g., motor oils, pesticides, septic drainfield discharge, etc.) from reaching old well heads, waterways (intermittent or perennial), and aquifers. No significant impacts are anticipated due to ground operations activities.

4.6.4 Alternative C: IR-178/Texon MOA

AFFECTED ENVIRONMENT

The candidate Electronic Scoring Sites are the same for this alternative as in Alternative B, and the candidate emitter sites are in the same general vicinity as that found in Alternative B. All candidate MOA and MTR emitter sites have a low to moderate potential for erosion. Please refer to section 4.6.3 for an additional discussion of the affected environment.

Under Alternative C, the candidate Electronic Scoring Sites and the six MTR emitter sites are the same. The MOA candidate emitter sites have low to moderate wind and water erosion potential.

ENVIRONMENTAL CONSEQUENCES

The concerns expressed in Alternative B are the same for Alternative C. No significant long-term impacts to soil and water resources are anticipated due to construction or ground operations activities. Erosion losses are expected to be less than 5 tons per site during a 1-month construction period at any one of the proposed sites, including fugitive dust emissions of about 0.4 to 2.0 tons per site. Sites would be treated in a manner similar to that described for Alternative B, and long-term erosion losses would be negligible. Erosion loss calculations for these sites are found in Appendix J.

No significant long-term impacts to soil and water resources are anticipated for Alternative C.

4.6.5 Alternative D: IR-153/Mt. Dora MOA

AFFECTED ENVIRONMENT

Construction activities proposed for Alternative D would be located in northeastern New Mexico and within the High Plains (Llano Estacado) physiographic province, extending from the Texas panhandle westward to the southern Rocky Mountains (Chronic 1987, Sheldon 1979). Geologic processes described in Alternative B are similar for Alternative D (refer to section 4.6.3, Alternative B).

With the exception of the Electronic Scoring Site in Abilene, Texas, all other proposed sites under Alternative D would be located in northeastern New Mexico. The other Electronic Scoring Site would be located in New Mexico.

Fourteen of the seventeen candidate emitter and two Electronic Scoring Site locations have potential for loss or impact to soil and water resources due to erosion and/or steepness of terrain (6, 7, 14, 15, 16, 17, 20, 21, 28, 33, 35, 36, 37, 39, 40, 41). Sites with erosion potential generally occur with steeper slopes; however, none of these sites are located on areas with more than a 5 percent slope.

Currently, no permanent potable water supplies or wastewater disposal systems exist at candidate Electronic Scoring Sites 28, 33, and 34. Sites 28 and 33 have restrictive soil layers and may require specific engineering solutions for septic drainfield construction.

ENVIRONMENTAL CONSEQUENCES

Construction. Several emitter sites (16, 20, 28, 33, 36, 37, 40, and 41) have road and building construction limitations due to soils exhibiting high shrink-swell properties (see section 4.6.3). However, best management practices would be followed to minimize any hazards for newly constructed roads and existing roads would be improved and routinely maintained. To reduce erosion hazard, appropriate management practices would be used to direct potential storm runoff from road or pad surfaces into safe outlets. Wind erosion could occur at six sites (6, 7, 15, 34, 37, and 39).

Potential wind and water erosion losses are expected to be less than 5 tons per site during a 1-month construction period at any one of the proposed sites, including fugitive dust emissions of about 0.4 to 2.0 tons per site. Because all sites would be graveled or paved (or protected by other best management practices in the case of disturbed road rights-of-way), long-term erosion losses would be minimal. Erosion loss calculations for these sites are found in Appendix J.

Ground operations and construction are not expected to cause significant impacts to soil or water resources.

Ground Operations. Potable water at any of the proposed Electronic Scoring Sites would come from existing groundwater supplies; either stored in a water tank or attached to a pipeline where possible. No long-term environmental consequences are expected for groundwater supplies since water consumption is estimated to be approximately 5,000 gallons per month at any of the proposed scoring site facilities in New Mexico or Texas.

Because the proposed scoring facilities would have septic systems installed to support personnel, chances for surface water and groundwater contamination are unlikely. As with Alternatives B and C, the emitter sites are unmanned, and would not require any permanent water supply or wastewater treatment. All Air Force precautions would be taken to prevent contaminants (e.g., motor oils, pesticides, septic drainfield discharge, etc.) from reaching old well heads, waterways

(intermittent or perennial), and aquifers. No significant impacts are anticipated due to ground operations activities on either surface or groundwater resources.

4.6.6 Summary of Comparison Impacts

Table 4.6-1 summarizes impacts to soil and water resources for all four alternatives. Overall, no significant long-term impacts to soil or water would occur due to any alternative. Best management practices would reduce potential impacts to negligible levels.

Table 4.6-1.
Soils and Water Resources Summary Comparison of Impacts

Project Elements	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*
Airspace and Flight Operations	No Effect	No Effect	No Effect	No Effect
Construction	No Effect	Potential for soil erosion exists on 7 sites but effects would be avoided or mitigated to insignificant levels. Soil losses of no more than 5 tons per 15-acre site with fugitive dust at 0.4 tons for emitters and 0.6 tons for Electronic Scoring Sites. Best Management Practices would reduce effects to negligible levels. No effect due to water use or availability.	Potential for soil erosion exists on 6 sites but effects would be avoided or mitigated to insignificant levels. Soil losses of no more than 5 tons per 15-acre site with fugitive dust at 0.4 tons for emitters and 0.6 tons for Electronic Scoring Sites. Best Management Practices would reduce effects to negligible levels. No effect due to water use or availability.	Potential for soil erosion exists on 16 sites but effects would be avoided or mitigated to insignificant levels. Soil losses of no more than 5 tons per 15-acre site with fugitive dust at 0.4 tons for emitters and 0.6 tons for Electronic Scoring Sites. Best Management Practices would reduce effects to negligible levels. No effect due to water use or availability.
Ground Operations	Soil and water erosion negligible.	Soil and water erosion negligible.	Soil and water erosion negligible.	Soil and water erosion negligible.
Decommissioning	No Effect	No Effect	No Effect	No Effect