Environmental Assessment of the Fielding of a CH-47 Chinook Platoon and Conversion to a General Support Aviation Battalion at Buckley Air Force Base, Colorado

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14. ABSTRACT

This EA addresses th~ COARNG's proposal to field a Platoon of CH-47 Chinook helicopters and convert the existing Light Utility Battalion (LOB) to a General-Support Aviation Battalion (GSAB). In addition lo the seven CH-47 Chinook helicopters, 10 UH-60 Black Hawk helicopters would be fielded a1 Bucl~ley AFB along with the removal of 31 UH-1 Huey helicopters. The purpose of the Proposed Action is to enable COARNG aviation units to acquire nnd maintain proficiency in use of the same modem helicopter systems used by the Army's Active Component. The Alternative to the Proposed Action is to field 14 CH-47 Chinook and 10 UH-60 Black Hawk helicopters and remove 31 UII-1 Huey helicopters. In iiCldition, the No Action Alternative was analyze-d, wru'Cb~would only remove the 31 UH-1 Huey helicopters. Implementation of the Proposed Action or altem~tive would support the COARNG's need to maintain readiness, to develop proficiency in current aircraft systems operations. to c.nsute the ability to integrate seamlessJy with the Active Component upon mobilization .in the event of war or national emergency, and to achieve the objectives of the Army Aviation Transformation and Modernization Plan.

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Finding of No Significant Impact

Environmental Assessment of the Fielding of a CH-47 Chinook Platoon and Conversion to a General Support Aviation Battalion at Buckley Air Force Base, Colorado

Introduction

Pursuant to 32 CFR 651, *Environmental Analysis of Army Actions,* and Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500-1508) for implementing the procedural provisions of the National Environmental Policy Act (42 United States Code [U.S.C.] 4321 et seq.), the Colorado Army National Guard (COARNG) has conducted an Environmental Assessment (EA) of the potential environmental and socioeconomic effects associated with the conversion of a Light Utility Battalion (LUB) to a General Support Aviation Battalion (GSAB) at Buckley Air Force Base (AFB), Colorado (CO).

Proposed Action and Alternatives Considered

Proposed Action. The Proposed Action is for the COARNG to convert the existing LUB to a GSAB and field seven CH-47 Chinook helicopters. Buckley AFB is the home station for the existing LUB and is the proposed station for the GSAB. The conversion of the LUB to the GSAB would remove 31 UH-1 Huey helicopters and add 10 UH-60 Black Hawk helicopters.

Alternative. The alternative to the Proposed Action is for the COARNG to convert the existing LUB to a GSAB and field 14 CH-47 Chinooks. Buckley AFB is the home station for the existing LUB and is the proposed station for the GSAB.

No Action Alternative. Under the No Action Alternative, the COARNG would not convert the LUB to a GSAB and would not field CH-47 Chinooks at Buckley AFB, CO. The COARNG would continue to operate as they do at present. COARNG's need to maintain readiness, to develop proficiency in current aircraft systems operations, to ensure the ability to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency, and to achieve the objectives of the Army Aviation Transformation and Modernization Plan would not be met.

Environmental Analysis

The EA considered potential effects on a wide range of environmental resources and conditions. Several environmental resources and conditions have not been evaluated in detail because the Proposed Action and alternatives would not affect those resources and conditions. These include airspace, land use, geological resources and soils, water resources, biological resources, socioeconomics, environmental justice, hazardous materials and waste management, and cultural resources.

Environmental resources examined in detail include air quality, noise, and safety. Potential effects concerning these resources should the Proposed Action or the alternative be implemented include the following:

Air Quality. Minor adverse effects would be expected. Emissions would increase under the Proposed Action but would not exceed *de minimis* levels. Emissions of hazardous air pollutants would contribute minimally to air degradation.

- *Noise.* Minor adverse effects on sensitive noise receptors would be expected. These minor effects would be temporary and not result in any long-term noise effects.

- *Safety.* Minor adverse effects on safety would be expected because proposed flight operations would increase by approximately 150 hours annually. Harmful effects would be avoided through use of the Buckley AFB Bird Avoidance Models (BAMs) and Bird/Wildlife Aircraft Strike Hazard (BASH) Reduction Plan.

Under the No Action Alternative, baseline conditions would remain as present for air quality, noise, and safety. The drawdown of the UH-1 Huey helicopter would result in a decrease in helicopter operations. Therefore, minor beneficial effects would be anticipated as a result of the No Action Alternative on these three resource areas. However, COARNG would not be consistent with the Army's Transformation program to meet national security requirements.

Mitigation

Mitigation consists of actions that avoid, reduce, or compensate for effects caused by a Proposed Action. Under the Proposed Action or alternative, further mitigation would not be required. No mitigation measures are necessary to reduce any environmental impacts to less than significant levels.

Regulations

The Proposed Action would not violate the National Environmental Policy Act (42 USC § 4321 to 4370e), its regulations promulgated by the Council on Environmental Quality (40 CFR parts 1500-1508), 32 CFR Part 651, *Environmental Analysis of Army Actions*, or any other federal, state, or local environmental regulations.

Public Review and Comment

The EA and Draft Finding of No Significant Impact (FNSI) were made available for public review and comment from 22 March to 5 April 2004 at: Aurora Public Library, 14949 E. Alameda Parkway, Aurora, CO 80012, (303) 739-6600 and Denver Public Library, 10 W. Fourteenth Ave. Pkwy., Denver, CO 80204-2731, (720) 865-1111. No public comments were received during the public comment period.

The Draft EA was made available for a public review and comment period from 14 October to 31 October 2003 at Aurora Public Library and Denver Public Library (listed above). No public comments were received during the public comment period.

Finding of No significant Impact

After careful review of the EA, I have concluded that implementation of the proposed action would not generate significant controversy or have a significant impact on the quality of the human or natural environment. Per 32 CFR Part 651, the Final EA and Draft FNSI were made available for a 15-day public review and comment period. This analysis fulfills the requirements of NEPA and the CEQ Regulations. An Environmental Impact Statement will not be prepared, and the National Guard Bureau is issuing this Finding of No Significant Impact.

Gerald I. Walter
Lieutenant Colonel, US Army
Chief, Environmental
Programs Division

15 April 2004
Date

COVER SHEET

FINAL ENVIRONMENTAL ASSESSMENT OF THE FIELDING OF A CH-47 CHINOOK PLATOON AND CONVERSION TO A GENERAL SUPPORT AVIATION BATTALION AT BUCKLEY AIR FORCE BASE, COLORADO

Lead Agency: Department of the Army, National Guard Bureau, and Colorado Army National Guard (COARNG).

Cooperating Agencies: None.

Title of Proposed Action: Fielding of a CH-47 Chinook Platoon and Conversion to a General Support Aviation Battalion at Buckley Air Force Base, Colorado.

Affected Jurisdiction: Buckley Air Force Base is located in Arapahoe County surrounded by the by the City of Aurora, CO, approximately 5 miles east of Denver.

Point of Contact: Mr. Jeff Stalter, Colorado Department of Military and Veterans Affairs, 6848 South Revere Parkway, Centennial, CO 80112-6709, (303) 677-8902, Jeff.Stalter@co.ngb.army.mil.

Proponent: Colorado Army National Guard

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Document Designation: Final Environmental Assessment (EA)

Abstract: This EA addresses the COARNG's proposal to field a Platoon of CH-47 Chinook helicopters and convert the existing Light Utility Battalion (LUB) to a General Support Aviation Battalion (GSAB). In addition to the seven CH-47 Chinook helicopters, 10 UH-60 Black Hawk helicopters would be fielded at Buckley AFB along with the removal of 31 UH-1 Huey helicopters. The purpose of the Proposed Action is to enable COARNG aviation units to acquire and maintain proficiency in use of the same modern helicopter systems used by the Army's Active Component. The Alternative to the Proposed Action is to field 14 CH-47 Chinook and 10 UH-60 Black Hawk helicopters and remove 31 UH-1 Huey helicopters. In addition, the No Action Alternative was analyzed, which would only remove the 31 UH-1 Huey helicopters. Implementation of the Proposed Action or alternative would support the COARNG's need to maintain readiness, to develop proficiency in current aircraft systems operations, to ensure the ability to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency, and to achieve the objectives of the Army Aviation Transformation and Modernization Plan.

EXECUTIVE SUMMARY

BACKGROUND

The Colorado Army National Guard (COARNG) is a tenant organization on Buckley Air Force Base (AFB). The Aviation Command of the COARNG consists of major portions of the 2d Light Utility Battalion, 135th Aviation Regiment, and other aviation units and detachments at Buckley AFB, Colorado, and the High-Altitude Army Aviation Training Site (HAATS) at Gypsum, Colorado. Under the Army Aviation Transformation and Modernization Plan (AATMP), and consistent with the Army's Transformation program to meet the national security requirements of the 21st century, the COARNG proposes to convert its Light Utility Battalion (LUB) assets at Buckley AFB to a General Support Aviation Battalion (GSAB). This is a "focused EA," consistent with guidance issued by CEQ in 40 CFR 1501.7(a)(3) and Department of the Army guidance set forth in 32 CFR 651.34.

PROPOSED ACTION

Buckley AFB is the home station for the existing LUB and is the proposed station for the GSAB. The Proposed Action is for the COARNG to field a platoon of CH-47 Chinook helicopters and to convert the existing LUB to a GSAB. Under the proposed action, Buckley AFB would receive seven CH-47 Chinooks and 10 UH-60 Black Hawk helicopters. Additionally, the proposed action would remove 31 UH-1 Huey helicopters.

PURPOSE AND NEED

The purpose of the proposed action is to enable COARNG aviation units to acquire and maintain proficiency in use of the same modern helicopter systems used by the Army's Active Component. Implementation of the Proposed Action would support the COARNG's need to maintain readiness, to develop proficiency in current aircraft systems operations, to ensure the ability to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency, and to achieve the objectives of the AATMP.

IMPLEMENTING THE PROPOSED ACTION

The drawdown of the UH-1 Huey is set to begin at the end of Fiscal Year 2003. As UH-1 Huey aircraft are removed, CH-47 Chinook and UH-60 Black Hawk helicopters would be fielded at Buckley AFB. Fielding of the new CH-47 Chinooks and UH-60 Black Hawks would be completed by Fiscal Year 2005.

ALTERNATIVES

The Alternative to the Proposed Action is for the COARNG to convert the existing LUB to a GSAB and field 14 CH-47 Chinooks and 10 UH-60 Black Hawks. Buckley AFB is the home station for the existing LUB and is the proposed station for the GSAB.

Under the No Action Alternative, the COARNG would not convert the LUB to a GSAB and would not field CH-47 Chinook and UH-60 Black Hawk helicopters at Buckley AFB, CO. The COARNG would continue to operate as they do at present. COARNG's need to maintain readiness, to develop proficiency in current aircraft systems operations, to ensure the ability to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency, and to achieve the objectives of the AATMP would not be met.

ENVIRONMENTAL CONSEQUENCES

The EA considered potential effects on a wide range of environmental resources and conditions. Several environmental resources and conditions have not been evaluated in detail because the Proposed Action and alternatives would not affect those resources and conditions. These include

airspace, land use, geological resources and soils, water resources, biological resources, socioeconomics, environmental justice, hazardous materials and waste management, and cultural resources.

Environmental resources examined in detail include air quality, noise, and safety. Potential effects concerning these resources should the Proposed Action or alternative be implemented include the following:

- *Air Quality*. Minor adverse effects would be expected. Emissions would increase under the Proposed Action but would not exceed *de minimis* levels. Hazardous air pollutant emissions would contribute minimally to air quality degradation.

- *Noise*. Minor adverse effects on sensitive noise receptors would be expected. These minor effects would be temporary and not result in any long-term noise effects.

- *Safety*. Minor adverse effects on safety would be expected because proposed flight operations would slightly increase. Harmful effects would be avoided through use of Buckley AFB Bird Avoidance Models and the Bird/Wildlife Aircraft Strike Hazard Reduction Plan.

Under the No Action Alternative, baseline conditions would remain as present for air quality, noise, and safety. The drawdown of the UH-1 Huey helicopter would result in a decrease in helicopter operations. Therefore, minor beneficial effects would be anticipated as a result of the No Action Alternative on all three resource areas. However, COARNG would not be consistent with the Army's Transformation program to meet national security requirements.

MITIGATION

Mitigation consists of actions that avoid, reduce, or compensate for effects caused by a Proposed Action. Under the Proposed Action or alternative, further mitigation would not be required.

CONCLUSIONS

The EA shows that implementation of the Proposed Action would have no significant effects on the quality of the human or natural environment. Preparation of an Environmental Impact Statement is not required before the Proposed Action may be implemented.

FINAL

ENVIRONMENTAL ASSESSMENT OF THE FIELDING OF A CH-47 CHINOOK PLATOON AND CONVERSION TO A GENERAL SUPPORT AVIATION BATTALION AT BUCKLEY AIR FORCE BASE, COLORADO

Prepared for

National Guard Bureau

Colorado Army National Guard

APRIL 2004

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Abbreviations and Acronyms

$\mu g/m^3$	micrograms per cubic meter
140 WG	140th Wing
460 ABW	460th Air Base Wing
460 ABW/SE	460th Air Base Wing/Flight Safety Office
AASF	Army Aviation Support Facility
AATMP	Army Aviation Transformation and Modernization Plan
AFB	Air Force Base
AGL	above ground level
AHPA	Archaeological and Historic Preservation Act
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
APE	area of potential effect
AQCR	Air Quality Control Region
AR	Army Regulation
ARNG	Army National Guard
ARPA	Archaeological Resources Protection Act
ASC	Army Safety Center
BAM	Bird Avoidance Model
BASH	Bird/Wildlife Aircraft Strike Hazard
BHWG	Bird Hazard Working Group
BLM	Bureau of Land Management
CAA	Clean Air Act
CWA	Clean Water Act
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
COARNG	Colorado Army National Guard
dB	decibel
dBA	A-weighted decibel
DCSOPS	Deputy Chief of Staff for Operations and Plans
DNL	day-night average sound level
DoA	Department of Army
DoD	Department of Defense
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FLIP	Flight Information Publication
FNSI	Finding of No Significant Impact
FY	Fiscal Year

GSAB	General Support Aviation Battalion
HAATS	High-Altitude Army Aviation Training Site
HAP	hazardous air pollutants
HUD	Department of Housing and Urban Development
L_{dnmr}	day-night average A-weighted sound level
L_{max}	Maximum Sound Level
LUB	Light Utility Battalion
mg/m^3	milligrams per cubic meter
MOA	Military Operations Area
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection Act and Repatriation Act
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
Pb	lead
PM_{10}	particulate matter less than or equal to 10 microns
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns
POL	petroleum, oil, and lubricants
ppm	parts per million
PSD	prevention of significant deterioration
ROG	reactive organic gas
RCRA	Resource Conservation and Recovery Act
RW	runway
SEL	sound exposure level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
U.S.	United States
U.S.C.	United States Code
USAF	U.S. Air Force
USDA-WS	U.S. Department of Agriculture – Wildlife Services
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

1. Purpose, Need, and Scope

1.1 Background

As a major tenant, the Colorado Army National Guard (COARNG) has a license with the United States Air Force (USAF) to operate facilities, equipment, and helicopters (License number: DACA45-3-00-6082) on Buckley Air Force Base (AFB). The Aviation Command of the COARNG consists of major portions of the 2d Light Utility Battalion (LUB), 135th Aviation Regiment, and other aviation units and detachments at Buckley AFB, Aurora, Colorado, and the High-Altitude Army Aviation Training Site (HAATS) at Gypsum, Colorado. Under the Army Aviation Transformation and Modernization Plan (AATMP) (DoA 2001) , and consistent with the Army's Transformation program to meet the national security requirements of the 21st century, the COARNG proposes to convert its LUB assets at Buckley AFB to a General Support Aviation Battalion (GSAB). This Environmental Assessment (EA) evaluates the potential environmental effects associated with the proposed fielding and conversion.

The Army National Guard (ARNG) is structured across 50 states, three territories, and the District of Columbia. During national emergencies, the President reserves the right to mobilize the ARNG to federal status. The ARNG's federal mission is to maintain properly trained and equipped units available for prompt mobilization for war, national emergency, or as otherwise needed. In its state role, each governor serves as the commander-in-chief and an Adjutant General is responsible for training and readiness. Governors can call up members of the ARNG in times of domestic emergencies. The ARNG's state mission is perhaps the most well known, as the ARNG has responded many times to help battle fires, floods, tornadoes, and hurricanes.

Additional missions for Aviation Command include interacting with the Drug Enforcement Administration to spot marijuana fields, Special Forces transportation support (including air assaults and static line parachute drops), and troop movements.

1.2 Purpose of and Need for the Proposed Action

The COARNG proposes to convert its elements of the 2d LUD, 135th Aviation Regiment, to become part of the 2d General Support Aviation Battalion, 135th Aviation Regiment and station Det 1/E-168, a CH-47 platoon, at Buckley AFB. The purpose of the Proposed Action is to equip and train Aviation Command assets to operate as a general support aviation element of an aviation brigade as set forth in

the AATMP and Army doctrine. Implementation of the Proposed Action would meet the COARNG's need to maintain readiness and to ensure the ability to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency.

1.3 Scope

This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and implementing regulations issued by the President's Council on Environmental Quality (CEQ), the Army, and the National Guard Bureau (NGB).[1] Its purpose is to inform decision makers and the public of likely environmental consequences of the Proposed Action and alternatives.

This EA identifies, documents, and evaluates the effects of operating new types of helicopters at Buckley AFB. An interdisciplinary team of environmental scientists, biologists, planners, economists, engineers, archaeologists, historians, and military technicians has analyzed the Proposed Action and alternatives in light of existing conditions and has identified relevant beneficial and adverse effects associated with the action. The Proposed Action is described in Section 2. Alternatives, including a No Action Alternative, are described in Section 3.0. Baseline conditions are described in Section 4.0, Affected Environment. The expected effects of the Proposed Action are described in Section 5.0, Environmental Consequences. Section 5.0 also addresses the potential for cumulative effects, and mitigation measures are identified where appropriate.

In April 2002, the NGB published its *Final Programmatic Environmental Assessment for Fielding of UH-60 Black Hawk Helicopters*, and thereafter issued a Finding of No Significant Impact (FNSI) for that action. In September 2003, the NGB published its *Final Programmatic Environmental Assessment for Fielding of CH-47 Chinook Helicopters*, and thereafter issued a FNSI for that action. These two programmatic EAs prepared by NGB, which provide technical information and analyses concerning characteristics of the two Army aircraft assigned to the units included in the proposed action, are incorporated by reference in this document.

[1] Title 40 Code of Federal Regulations (CFR) 1500-1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*; 32 CFR Part 651, *Environmental Analysis of Army Actions*; and *Army National Guard Manual for Compliance with the National Environmental Policy Act of 1969*, respectively.

1.4 Agency and Public Participation

Agency and public participation in the NEPA process promotes open communication between the public and the government and enhances decision making. All persons and organizations that have a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process. An information request letter was mailed to government agencies to obtain information concerning the project area and to identify any potential issues. A copy of the agency coordination letter and any agency responses received during the agency coordination period are presented in Appendix A. In addition, a copy of the Notice of Availability that was published in the Denver Post and the Rocky Mountain News on October 14, 2003 is depicted in Appendix B. No public review comments were received during the public review period which began on October 14, 2003 and ended on October 30, 2003.

Public participation in preparing this EA is guided by 32 Code of Federal Regulations (CFR) 651, *Environmental Analysis of Army Actions*, issued in March 2002. The CFR's provisions replace and revise Army Regulation (AR) 200-2, *Environmental Analysis of Army Actions*. Following announcement via press release of availability of the Draft EA, the COARNG made the Draft EA available for 15 days to obtain public comments. No comments were received during the public comment period, which began on 14 October 2003 and ended on 30 October 2003. Because no public comments were received, the COARNG choose not to hold a public meeting. Upon completion, the Final EA and Draft FNSI were made available for an additional 15-day comment period. During this time, the COARNG considers any further comments submitted by agencies, organizations, or members of the public on the Proposed Action, Final EA, or Draft FNSI[2]. Upon conclusion of the final review period the COARNG will, if appropriate, execute the FNSI and proceed with the Proposed Action.

1.5 Regulatory Framework

A decision on whether to proceed with the Proposed Action rests on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, the COARNG is guided by several relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resource management and planning procedures. These

include the Clean Air Act (CAA), Clean Water Act (CWA), Noise Control Act, Endangered Species Act (ESA), National Historic Preservation Act (NHPA), Resource Conservation and Recovery Act (RCRA), EO 11990 (*Protection of Wetlands*), EO 12088 (*Federal Compliance with Pollution Control Standards*), EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), and EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*).

[2] If it is determined that implementation of the Proposed Action would result in significant impacts, the NGB would (a) publish in the *Federal Register* a notice of intent to prepare an environmental impact statement, (b) commit to mitigation actions sufficient to reduce impacts below significance thresholds, or (c) not take the action.

2. Description of the Proposed Action

Buckley AFB is located on the eastern edge of the urbanized portion of the City of Aurora, in Arapahoe County, approximately 5 miles east of the City of Denver (Figure 2-1). The COARNG operates an Army Aviation Support Facility (AASF) and an armory at Buckley AFB. Units presently assigned to the AASF include Headquarters Company, Company A, and Company B of the 2d Light Utility Battalion, 135th Aviation Regiment; Headquarters Detachment, Company B, and Detachment, Company E (Aviation Unit Maintenance) of the 2d Assault Battalion, 147th Aviation Regiment; and Detachment, Company F (Aviation Intermediate Maintenance) of the 135th Aviation Regiment. Of these units, only the 2d Light Utility Battalion, 135th Aviation Regiment would be affected by the Proposed Action.

2.1 Aircraft Fielding and Unit Designations

Consistent with the AATMP, units of the 2d Light Utility Battalion, 135th Aviation Regiment that are located at the AASF at Buckley AFB would be converted to units of the 2d General Support Aviation Battalion, 135th Aviation Regiment. The principal distinction between an LUB and a GSAB lies in their types of aircraft. Additionally, Det 1/E-168th Heavy Helicopter Battalion, a CH-47 platoon would be stationed at Buckley AFB.

Aircraft presently available to the COARNG's Aviation Command consist of 31 UH-1 Huey helicopters and six UH-60 Black Hawk helicopters. As part of the 2d Light Utility Battalion, 135th Aviation Regiment, the UH-1 Hueys primarily perform the Army's utility aircraft mission. As part of the 1022d Air Ambulance Company formerly located at Buckley AFB, the six UH-60 Black Hawks are configured to operate in support of the Army's air ambulance mission.

Under the Proposed Action, all 31 UH-1 Huey aircraft would be removed from Buckley AFB. The six Black Hawks would be retained, with an additional ten Black Hawk helicopters distributed to the proposed assigned units at Buckley AFB. All 16 Black Hawks would be configured for the Army's utility mission. In addition, seven CH-47 Chinook helicopters would be delivered to the COARNG for performance of the heavy lift mission. As a result of the Proposed Action, the inventory of all aircraft assigned to units at Buckley AFB would decrease from 37 to 23 aircraft upon completion of all fielding. Table 2-1 depicts the existing and proposed aircraft operated by the COARNG at Buckley AFB.

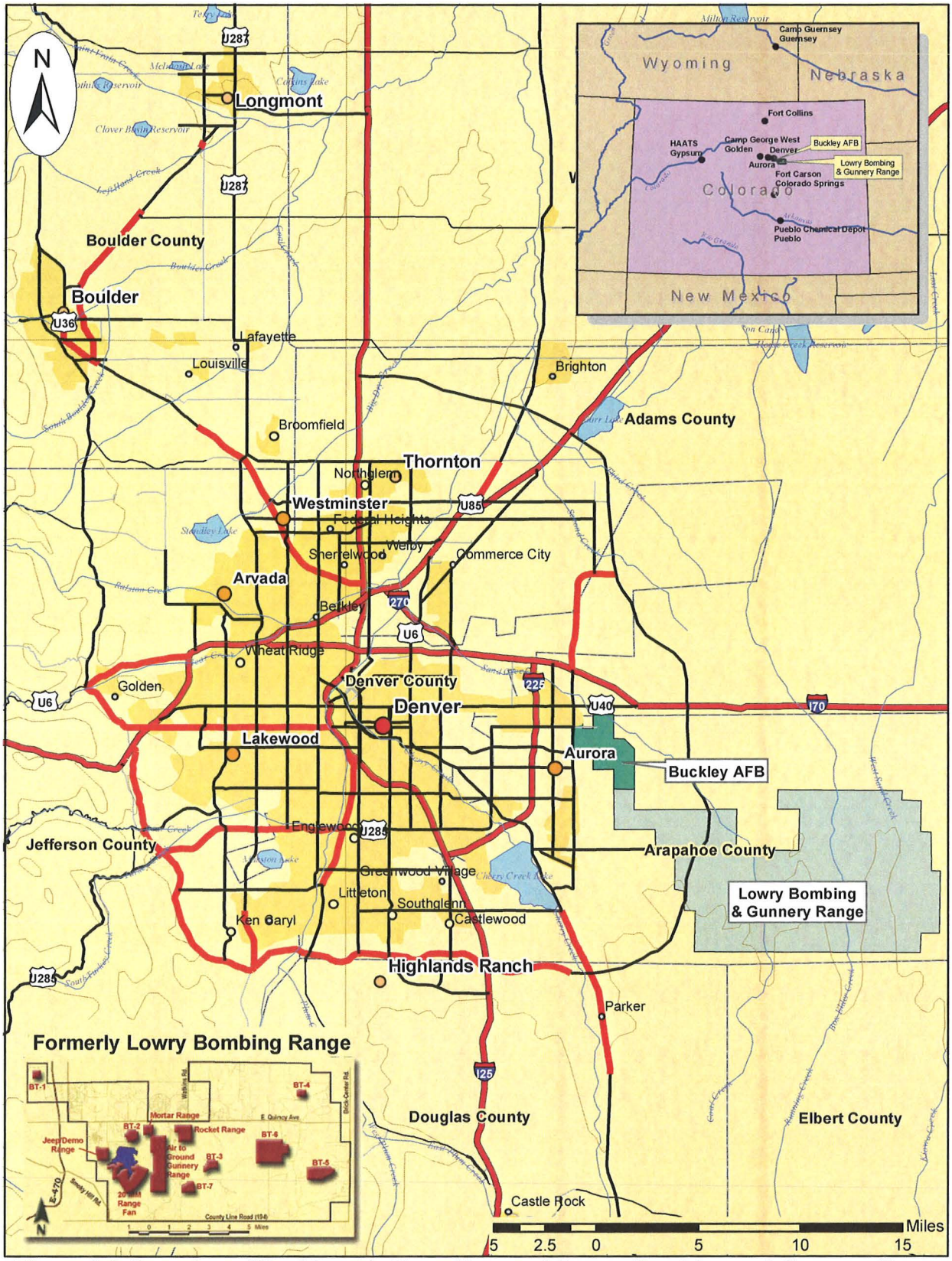

Figure 2-1. Location of Buckley Air Force Base and Lowry Bombing and Gunnery Range

Table 2-1. Existing and Proposed COARNG Aircraft at Buckley AFB

Timeline	UH-1	UH-60	CH-47	Total COARNG
Fiscal Year (FY) 01	31	6	0	37
Existing FY 03	12	10	0	22
Proposed	0	16	7	23

Although no additional personnel are required under the proposed action, units and personnel assigned to the AASF would be re-designated to form units of the GSAB to support the reassigned and proposed aircraft. New units equipped with aircraft for UH-60 Black Hawk helicopter operations would be Headquarters Company and Companies A, B, and C of the 2d General Support Aviation Battalion, 135th Aviation Regiment. These units would be part of the 35th Division, a Reserve Component organization with headquarters at Fort Leavenworth, Kansas. Also to be established and equipped with aircraft for CH-47 Chinook operations would be a platoon of Company E, 168th Heavy Helicopter Battalion. That unit would also operate as part of the 35th Division.

2.2 Operations

Training Missions. To support strategic and operational mobility called for by Army doctrine, the pilots, crews, and other personnel of the 2d Light Utility Battalion and 135th Aviation Regiment would train to a variety of utility and cargo aircraft missions for both the offensive and defensive roles. These would include operations involving air assault, air movement, command and control, casualty evacuation, combat search and rescue, stability and support, combat service and support, and fueling (to include forward fueling and rearming operations).

Helicopter training missions vary in duration depending on matters such as destination and type of training. Training missions are typically between 1 and 2 hours in duration, though shorter and longer flights often occur. For purposes of estimating potential environmental effects, this EA assumes that each training mission originates and terminates at Buckley AFB. Under these assumptions, the 31 UH-1 Huey aircraft would conduct approximately 1,229 training missions per year (an average of five missions per flying day), the 16 UH-60 Black Hawk aircraft would conduct approximately 2,000 training missions per year (an average of eight missions per flying day), and

seven CH-47 Chinook aircraft would annually involve approximately 695 training missions (an average of three missions per flying day) (see Table 2-2). The COARNG conducts training approximately 250 days per year.

Table 2-2. Existing and Proposed COARNG Training Missions at Buckley AFB

Aircraft Assigned	Estimated Number of Daily Training Missions	Estimated Number of Annual Training Missions
Existing		
UH-1	5	1,229
UH-60	2	505
CH-47	0	0
Proposed		
UH-1	0	0
UH-60	8	2,000
CH-47	3	695

Departure and Arrival Corridors. Buckley AFB's runway (RW) 14/32 is 11,000 feet long and 150 feet wide. The AASF, located west of the runway and slightly north of its mid point, is the point of origin and termination of all helicopter flight activities. Flights generally depart the point of origin and may proceed along RW 14/32 to the northwest or southeast. Figure 2-2 depicts the COARNG's arrival and departure flight tracks. Other principal departure corridors have the flights proceed due west or due east from the point of origin. Return flights might reverse these routes. These principal departure and approach corridors, founded on considerations of avoidance of populated areas, efforts to keep noise levels low (especially at night), and minimization of conflict with civilian aircraft operations, would not be affected by conversion of COARNG aviation assets to various assigned units.

Training Locations. The majority of training activities in the past have occurred at Fort Carson, Colorado (137,403.75 acres, with aviation facilities); the former Lowry Bombing and Gunnery Range; and the ARNG training facility at Guernsey, Wyoming (34,260 acres, with aviation facilities). These locations would continue to be used for flight activities of the assigned units.

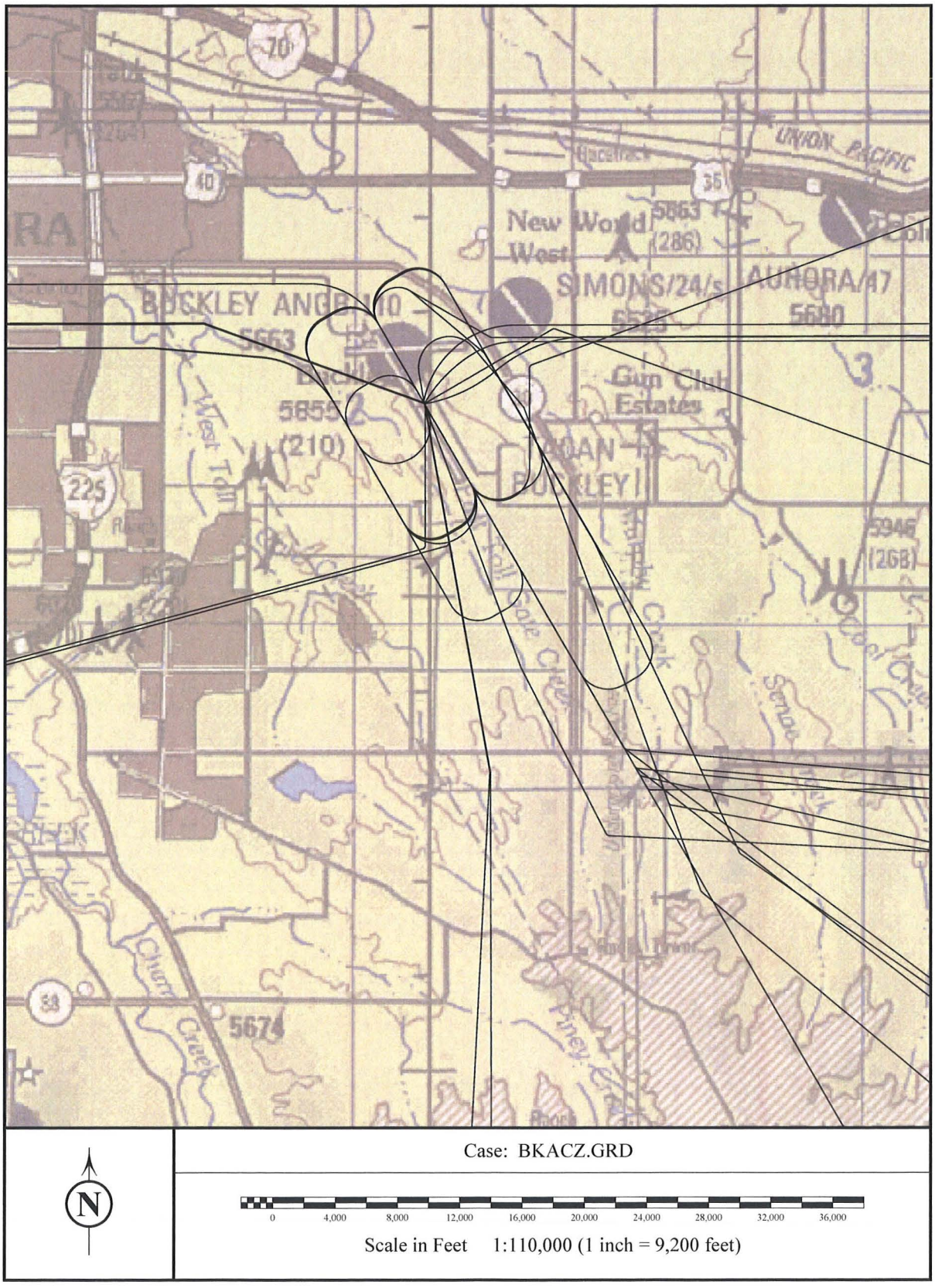

Figure 2-2. COARNG Flight Tracks

Other locations within Colorado that could be available to assigned unit pilots and crews would be Camp George West (320 acres, with helipad) in Golden, Colorado, Pueblo Chemical Depot activity (helipad) in Pueblo, Colorado, and the HAATS (with aviation facilities) in Gypsum, Colorado.

Frequency of Operations. The COARNG projects that its 16 UH-60 Black Hawk aircraft would be operated a total of 3,000 hours per year and that its seven CH-47 Chinook aircraft would be operated a total of 1,042 hours per year. These projections are based on matters such as historical levels of flight activities at Buckley AFB, estimated budget resources to fund flight operations, the numbers of pilots and crew members requiring minimum annual flight hours, and general amounts of flight operations training needed to achieve proficiencies to operate as a GSAB. Actual flight hours may vary due to budgetary constraints, operational tempo during annual training duty, potential deployments of personnel or aircraft, and similar matters. The projected annual flight hours for each UH-60 Black Hawk are consistent with recent operational experience. At an annual average of 149 flight hours per aircraft, the projected annual flight hours for each CH-47 Chinook are greater than the average annual 118 flight hours contained in the NGB's *Final Programmatic Environmental Assessment for Fielding of CH-47 Chinook Helicopters* (where the average annual flight hours was derived from nationwide ARNG statistics). COARNG experience with the CH-47 Chinook might result in fewer hours of flight per aircraft than currently projected.

Maintenance. Maintenance activities would be conducted to ensure the aircraft are fully operational and safe to operate, therefore, aircraft maintenance would be conducted in support of the GSAB mission. Maintenance activities would be conducted exactly as they are currently completed on existing aircraft. No change in maintenance activities are anticipated under the proposed action.

2.3 Schedule

The removal of existing aircraft and fielding of new aircraft to the COARNG at Buckley AFB would occur during Fiscal Year 2004 and 2005. That is, as UH-1 Huey aircraft are removed, UH-60 Black Hawk and CH-47 Chinook aircraft would be fielded. Such phased removal and fielding allows the COARNG to accomplish transition training of all the pilots, crewmembers, mechanics, and other personnel on a deliberate, sequenced basis. Fielding of new UH-60 Black Hawk and CH-47 Chinook helicopters would be completed in Fiscal Year 2005.

3. Alternatives Considered

3.1 Alternatives Development

Military capability—the ability to achieve a specified wartime objective — includes four major components: force structure, modernization, readiness, and sustainability. Force structure, which pertains to the numbers, size, and composition of the units that comprise U.S. defense forces, is determined at levels of command above the COARNG. Accordingly, the COARNG does not have the independent authority to create alternatives to the Proposed Action. Furthermore, the proposed aircraft must be fielded where the COARNG currently have infrastructure to support the flying mission, which currently exists at Buckley AFB.

3.2 Alternatives to the Proposed Action

It would be reasonable and possible for COARNG to undertake responsibility for carrying out additional similar missions. That is, rather than convert existing assets in order to field a detachment of seven CH-47 Chinook helicopters, the COARNG could field a complete CH-47 Chinook heavy helicopter company of 14 helicopters. In addition, the 10 UH-60 Black Hawk helicopters would also be fielded at Buckley AFB. As this alternative would meet the purpose and need for the Proposed Action, it is evaluated in detail in this EA.

3.3 No Action Alternative

This EA refers to the continuation of existing conditions of the affected environment, without implementation of the Proposed Action, as the No Action Alternative. Under the No Action Alternative, the COARNG would not convert existing units to perform the GSAB mission. The UH-1 Huey helicopters, which presently number 31 aircraft at Buckley AFB, would be phased out in this alternative and would not be replaced with other aircraft. The result would be no UH-1 Hueys at Buckley AFB. Inclusion of the No Action Alternative is prescribed by CEQ regulations and serves as a benchmark against which federal actions can be evaluated.

3.4 Alternatives Evaluated in Detail

The alternatives evaluated in detail in this EA are

- Proposed Action: Conversion of existing units to the GSAB, having 16 UH-60 Black Hawk aircraft and 7 CH-47 Chinook aircraft. The Proposed Action is the preferred alternative.

- Alternative Action: Conversion of existing units to the GSAB, having 16 UH-60 Black Hawk aircraft and 14 CH-47 Chinook aircraft.

- No Action Alternative.

4. Affected Environment

This section identifies environmental conditions relevant to fielding a CH-47 Chinook platoon and establishing a GSAB at Buckley AFB. Any construction activities in support of the COARNG at Buckley AFB that would also support the Proposed Action, such as the proposed construction of a new AASF, will be evaluated separately; therefore, effects as a result of construction are not examined in this EA.

4.1 Resources Not Examined in Detail

This is a "focused EA," consistent with guidance issued by CEQ in 40 CFR 1501.7(a)(3) and Department of the Army guidance set forth in 32 CFR 651.34. The description of the affected environment focuses on those conditions and resource areas that are potentially subject to impacts. Some environmental resource areas and conditions that are often analyzed in an EA have been omitted from this analysis. All environmental documentation (i.e., Integrated Natural Resource Management Plan, Cultural Resources Management Plan) used to eliminate the following resource areas has been provided by the COARNG, a tenant organization at Buckley AFB. The following paragraphs detail omitted resource areas and the basis for such exclusions.

4.1.1 Airspace

The Federal Aviation Administration (FAA) manages and controls all airspace in the U.S. for commercial, civil, and military aircraft use. To ensure safe and efficient airspace use, the FAA defines types of airspace, horizontal and vertical boundaries of each type, and the nature of activities that each type can accommodate. "Controlled airspace" is a generic term that covers the five different classifications of controlled airspace: Classes A, B, C, D, and E airspace. The classification of Class G airspace is essentially uncontrolled. The FAA provides air traffic control service to instrument flight rules flights and visual flight rules flights in accordance with the "Controlled Airspace" classifications. Special use airspace permits activities that either must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited and Restricted Areas are regulatory special use airspace. They are established in Federal Aviation Regulation Part 73 through the rule-making process. Warning Areas, Military Operations Areas (MOA), Alert Areas, and Controlled Firing Areas are nonregulatory special use airspace.

Currently, Buckley AFB operates a Class C airspace surrounding its airfield. Implementation of the Proposed Action or alternative would not affect use of this existing airspace or cause any changes in airspace classification designations surrounding Buckley AFB. Therefore, airspace management was omitted from detailed analysis.

4.1.2 Land Use

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel of land. In many cases, land use descriptions are codified in local zoning laws. There is, however, no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, "labels," and definitions vary among jurisdictions.

Under the Proposed Action or alternative, present land use, as outlined in the Integrated Natural Resources Management Plan and the Air Installation Compatible Use Zone Study at Buckley AFB, is industrial. Furthermore, the future Military Family Housing and Child Development Center would be located in areas of compatible noise and land use areas. The total number of helicopters on base would decrease for both alternatives, creating, if any, beneficial effects of noise on land use. These are described under Section 4.3, Noise. Accordingly, detailed examination of land use has been omitted.

4.1.3 Geological Resources and Soils

An area's geological resources typically consist of surface and subsurface materials and their inherent properties, including soils. Principle factors influencing the ability of geological resources to support structural development are seismic properties (i.e., potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography.

Because there are no ground-disturbing activities associated with the Proposed Action or alternative, there would be no anticipated impacts to geology and soils. Therefore, geological resources and soils were omitted from detailed analysis.

4.1.4 Water Resources

Water resources include surface water, groundwater, and floodplains. Evaluation of water resources includes identification; quantity and quality; and demand for drinking, irrigation, and industrial purposes.

There are no construction-related activities associated with the Proposed Action. Therefore, erosion and sedimentation and other pollutants (e.g., petroleum, oil, lubricants [POLs]) from construction equipment are not a concern to surface or groundwater quality. Although the CH-47 Chinook requires larger volumes of POLs for operations and maintenance, increasing the risk of spills, adherence to appropriate stormwater pollution prevention best management practices, engineering controls, and the spill control and response plan for the base should ensure that any spill does not affect surface or groundwater resources. Additionally, there would be no change in water quantity or water rights associated with the Proposed Action or alternative. Therefore, evaluation of water resources was omitted from detailed analysis.

4.1.5 Biological Resources

Biological resources include native or naturalized plants and animals, and the habitats, such as wetlands, forests, and grasslands, in which they exist. Wetlands are an important natural system and habitat because of the diverse biologic and hydrologic functions they perform. Wetlands generally include swamps, marshes, bogs, and similar areas. Sensitive and protected biological resources include plant and animal species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the State of Colorado. Determining which species occur in an area affected by a proposed action might be accomplished through literature reviews and coordination with appropriate federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

The COARNG followed standard procedures in attempting to solicit agency input regarding sensitive species. In July 2003, a letter was sent to the USFWS, the Colorado Department of Natural Resources, and the Colorado Division of Wildlife to request current information on any listed threatened, endangered, or other special status species and their habitats occurring in the vicinity of Buckley AFB. The request also solicited the agencies for comments on the potential impacts to any such species as a result of fielding the CH-47 Chinooks. The USFWS responded to the request for information and concurred with the action. Therefore, the COARNG considered potential impacts to

those species identified in the *Integrated Natural Resources Management Plan* (BANG 1999) that are currently listed by either the state or the USFWS, including the following:

Table 4-1. Federally and State-Listed Threatened, Endangered, Candidate, and Special Concern Species Potentially Occurring on Buckley AFB

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	*T*	*T*
Mountain plover	*Charadrius montanus*	*NL*	*C*
Ferruginous hawk	*Buteo regalis*	*NL*	*SC*
Western burrowing owl	*Speotyto cunicularia hypugea*	*NL*	*T*
MAMMALS			
Black-footed ferret	*Mustela nigripes*	*E*	*E*
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	*T*	*T*
Swift fox	*Vulpes velox*	*NL*	*SC*

NOTES: E - Federally or State-listed endangered species
T – Federally or State-listed threatened species
C – Federally listed candidate species
SC - State-listed special concern species
NL – Not listed

Noise and downdrafts generated as a result of helicopter operations represent the primary source of effects to biological resources under all alternatives in this EA. Increased aircraft operational numbers may also increase the potential for bird/wildlife aircraft strikes at Buckley AFB. However, bird/wildlife strikes would be mitigated through implementation of the Bird Aircraft Strike Hazard (BASH) Plan for the Base (BANG 1999), as well as the use of the Bird Avoidance Model (BAM). The BASH Plan outlines procedures for reducing aircraft strikes on birds and other wildlife, including preventive measures such as habitat management (to reduce the attractiveness of the airfield to birds and other wildlife), active harassment (to remove birds and wildlife from hazard areas), rodent control (to eliminate rodents themselves as well as a food source for raptors), and depredation (with appropriate permits). In addition, the BASH Plan:

- establishes procedures for identifying high hazard situations and to aid supervisors and aircrews in altering or discontinuing flying operations when required;

- provides guidelines for dispersing birds when they are present on the runway; and
- provides guidelines for avoiding birds in operating areas away from the airfield.

The U.S. Army and the USAF have conducted a worldwide program for decades to study bird migrations, bird flight patterns, and past strikes to develop predictions of where and when bird/wildlife aircraft strikes might occur. This program, which consistently updates the data, also defines avoidance procedures through the BAM. Each time an aircrew plans a training sortie within established MOAs or other training airspace, they use the BAM to define altitudes and locations to avoid. The BAM provides a detailed depiction of bird concentrations, consolidating data on bird abundance and distribution, then graphically depicting the relative level of bird mass for every one square kilometer block of the U.S. during two-week periods and four daily time periods. The model then ranks areas with low, moderate, and severe risk of bird aircraft strikes based on the relative level of bird mass. Use of this model has successfully minimized bird/wildlife aircraft strikes.

Although one would expect that the increase in aircraft operational numbers of rotary-wing aircraft would likely have a negative effect on wildlife, including sensitive or protected species, minimal increases of aircraft operations over time do not cause a noticeable change in wildlife or their habitat. Additionally, mitigation through implementation of the BASH Plan and use of the BAM further reduces impacts to wildlife, including sensitive and protected species Therefore, short-term, negative effects on wildlife would be expected, however, the alternatives are not expected to contribute to cumulative effects. Other aspects of the biotic environment (e.g., vegetation, wetlands, and aquatic habitat/fisheries) would remain unaffected; therefore, biological resources were dismissed from detailed analysis.

4.1.6 Socioeconomics

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Also included with socioeconomics are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO directs federal agencies to identify and assess environmental health and safety risks that might disproportionately affect children.

The Proposed Action does not involve any activities that would contribute to changes in socioeconomic resources. There would be no change in the number of personnel assigned to Buckley AFB and, therefore, there would be no changes in area population or associated demands for housing

and support services. No family housing currently exists at Buckley AFB and, accordingly, no children live on base. The only facility on base that caters to children is a day care center in Building 725 in the central, cantonment area of the base. About 150 to 160 children attend the day care center Monday through Friday from 6:00 a.m. to 6:00 p.m. The Proposed Action would not pose any adverse or disproportionate environmental health or safety risks to children living in the vicinity of Buckley AFB. The likelihood of the presence of children at the site where the Proposed Action would occur is considered minimal, which further limits the potential for any effects. Therefore, socioeconomics was omitted from detailed analysis.

4.1.7 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued to focus attention of federal agencies on human health and environmental conditions in minority and low-income communities, and to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed.

The conversion of the LUB to a GSAB is not an action that has the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination because of their race, color, national origin, or low income. There are no anticipated impacts to Environmental Justice, because the existing flight paths would not change under the proposed action nor do they impact off-base low income housing areas. The essential aspect of the Proposed Action is to convert the LUB to a GSAB with the turn-in of UH-1 Hueys and the acquisition of CH-47 Chinooks and additional UH-60 Black Hawks. Maintenance and operational activities and personnel staffing would remain unchanged or decrease. Therefore, environmental justice was omitted from detailed analysis.

4.1.8 Hazardous Materials and Waste Management

No adverse effects concerning hazardous materials and wastes would be expected under either alternative. The AASF on Buckley AFB would comply with AR 200-1 for all requirements concerning hazardous materials and wastes, as well as all other federal, state, and local laws and regulations. CH-47 Chinook and UH-60 Black Hawk helicopter maintenance would typically be conducted within main hangar facilities to reduce the potential for spills to reach the outside environment. All activities involving the handling and use of POLs would be conducted in accordance with established Spill Prevention Control and Countermeasure and hazardous material

and waste management plans. Used oil, antifreeze, paint waste, waste fuels, spent batteries, and spent cleaning compounds and solvent would be temporarily stored in designated waste storage buildings or satellite waste accumulation areas before being recycled or disposed of by contract vendors. In addition, wastes produced by the AASF, which is typically classified as a conditionally exempt small-quantity generator because it produces fewer than 200 pounds of hazardous waste per month, are totaled with all of the wastes generated at Buckley AFB.

Should the proposed fielding of seven CH-47 Chinook and 10 UH-60 Black Hawk helicopters and associated mission exercises occur at Buckley AFB, it is anticipated that procurement of products containing hazardous materials would be comparable to those used for other mission exercises on the base. Therefore, it is estimated that hazardous material procurement would remain comparable to the baseline condition at Buckley AFB. In addition, it is anticipated that the volume, type, classifications, and sources of hazardous waste associated with the Proposed Action would be similar in nature to the current condition of waste streams. Due to the fact that Buckley AFB has a good program in place to dispose of hazardous wastes, the amounts of hazardous materials and wastes of the CH-47 Chinooks are comparable to other helicopters operating at Buckley AFB, and Buckley personnel ensure all recyclable materials are recycled, there are no anticipated issues with implementation of the proposed action. Thus, hazardous materials and waste management at Buckley AFB would not be impacted by the proposed mission exercises. Therefore, hazardous materials and waste management will not be discussed further in this EA.

4.1.9 Cultural Resources

Cultural resources are defined by the NHPA as prehistoric and historic sites, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on the condition and historic use, such resources could provide insight into living conditions in previous civilizations or may retain cultural and religious significance to modern groups.

Several federal laws and regulations govern protection of cultural resources, including the NHPA (1966), the Archaeological and Historic Preservation Act (AHPA) of 1974, the American Indian Religious Freedom Act (AIRFA) of 1978, the Archaeological Resources Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and Department of Defense (DoD) Annotated Policy on American Indians and Alaska Natives dated 27 October 1999.

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no structures remain standing) or architectural resources (buildings or other structures or groups of structures that are of historic or aesthetic significance). Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., arrowheads and bottles). Architectural resources include standing buildings, bridges, dams and other structures of historic or aesthetic significance.

For the purpose of this project, "cultural resource" is defined according to the glossary of AR 200-4, as follows:

> Historic properties as defined by the NHPA, cultural items as defined by NAGPRA, archeological resources as defined by ARPA, sacred sites as defined in EO 13007 to which access is afforded under AIRFA, and collections and associated records as defined in 36 CFR 79 of the NHPA.

The Draft Final Cultural Resources Management Plan for Buckley AFB states that there are no known archaeological resources on Buckley AFB. Due to the lack of archaeological sites on Buckley AFB and the fact that there are no impacts to Native American lands due to there proximity to the proposed action area, the Proposed Action does not have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands. Furthermore, there would be no ground-disturbing activities associated with the Proposed Action or alternatives. Therefore, cultural and archeological resources were omitted from detailed analysis

4.2 Air Quality

4.2.1 Definition of the Resource

In accordance with federal CAA requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these "criteria pollutants" in ambient air are expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu g/m^3$). The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological "air basin," and the prevailing meteorological conditions.

The CAA directed the U.S. Environmental Protection Agency (USEPA) to develop, implement, and enforce strong environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to affect human health and the environment. USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for six criteria air pollutants including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}]) and particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$)], and lead (Pb). The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources along with maintaining visibility standards. Table 4-2 presents the primary and secondary NAAQS that apply to the air quality in Colorado.

Although O_3 is considered a criteria air pollutant and is measurable in the atmosphere, it is not often considered a regulated air pollutant when calculating emissions because O_3 is typically not emitted directly from most emissions sources. Ozone is formed in the atmosphere by photochemical reactions involving sunlight and previously emitted pollutants or "O_3 precursors." These O_3 precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from a wide range of emission sources. For this reason, regulatory agencies attempt to limit atmospheric O_3 concentrations by controlling VOC pollutants (also identified as reactive organic gases or ROG) and NO_2.

The CAA and USEPA delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPs) that must be developed by each state or local regulatory agency and approved by USEPA. An SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emission budgets, controls) must be incorporated into the SIP and approved by USEPA.

Table 4-2. National Ambient Air Quality Standards

Pollutant	Standard Value		Standard Type
CARBON MONOXIDE (CO)			
8-hour Average	9 ppm	(10 mg/m^3) [2]	Primary & Secondary
1-hour Average	35 ppm	(40 mg/m^3) [2]	Primary
NITROGEN DIOXIDE (NO_2)			
Annual Arithmetic Mean	0.053 ppm	(100 $\mu g/m^3$) [2]	Primary & Secondary
OZONE (O_3)			
1-hour Average[1]	0.12 ppm	(235 $\mu g/m^3$) [2]	Primary & Secondary
8-hour Average[1]	0.08 ppm	(157 $\mu g/m^3$) [2]	Primary & Secondary
LEAD (PB)			
Quarterly Average		1.5 $\mu g/m^3$	Primary & Secondary
PARTICULATE < 10 MICROMETERS (PM_{10})			
Annual Arithmetic Mean		50 $\mu g/m^3$	Primary & Secondary
24-hour Average		150 $\mu g/m^3$	Primary & Secondary
PARTICULATE < 2.5 MICROMETERS ($PM_{2.5}$)			
Annual Arithmetic Mean		15 $\mu g/m^3$	Primary & Secondary
24-hour Average		65 $\mu g/m^3$	Primary & Secondary
SULFUR DIOXIDE (SO_2)			
Annual Arithmetic Mean	0.03 ppm	(80 $\mu g/m^3$) [2]	Primary
24-hour Average	0.14 ppm	(365 $\mu g/m^3$) [2]	Primary

Notes:

[1] In July of 1997, the 8-hour O_3 standard was promulgated and the 1-hour O_3 standard was remanded for all areas, except those designated non-attainment with the 1-hour standard when the O_3 8-hour standard was adopted. In July of 2000, the O_3 1-hour standard was reinstated as a result of the federal lawsuits that were preventing the implementation of the new 8-hour O_3 standard. USEPA estimates that the revised 8-hour O_3 standard rules will be promulgated in 2003–2004. In the interim, no areas can be deemed definitively nonattainment with the new 8-hour standard.

[2] Parenthetical value is an approximately equivalent concentration.

ppm – parts per million

mg/m^3 – milligrams per cubic meter

$\mu g/m^3$ – micrograms per cubic meter

In 1997, USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour O_3, $PM_{2.5}$, and regional haze standards that were promulgated in that year. However, because of the litigation and resulting delay in implementing the new O_3 and $PM_{2.5}$ ambient air quality standards, these new conformity requirements have not been completed by USEPA. No draft rule language is currently available.

The General Conformity Rule and the promulgated regulations found in 40 CFR Part 93, exempt certain federal actions from conformity determinations (e.g., contaminated site cleanup and natural emergency response activities). Other federal actions are assumed to conform if total indirect and direct project emissions are below *de minimis* levels presented in 40 CFR Part 93.153. The threshold levels (in tons of pollutant per year) depend upon the nonattainment status that USEPA has assigned to a nonattainment area. Once the net change in nonattainment pollutants is calculated, the federal agency must compare them to the *de minimis* thresholds.

Title V of the CAA Amendments of 1990 requires state and local agencies to permit major stationary sources. A major stationary source is a facility (i.e., plant, base, or activity) that can emit more than 100 tons annually of any one criteria air pollutant, 10 tons per year of a hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants. However, lower pollutant-specific "major source" permitting thresholds apply in nonattainment areas. For example, the Title V permitting threshold for an "extreme" O_3 nonattainment area is 10 tons per year of potential VOC or NO_x emissions. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their effect on air quality.

4.2.2 Existing Conditions

Under the authority of the CAA and subsequent regulations, USEPA has divided the country into geographical regions known as Air Quality Control Regions (AQCRs) to evaluate compliance with the NAAQS. Through the CAA, Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus USEPA has delegated enforcement of the Prevention of Significant Deterioration (PSD) and Title V programs to the Colorado Department of Public Health and Environment (CDPHE). The CDPHE has adopted the NAAQS by reference, thereby requiring the use of the standards within Colorado. The CDPHE implemented the Title V Operating Permit program through 5 Colorado Code of Regulations 1001.

The State of Colorado is divided into eight AQCRs. BAFB is located in the Metropolitan Denver Interstate AQCR (40 CFR, Part 81). Each AQCR is classified as an attainment area or non-attainment area for each of the criteria pollutants depending on whether it meets or fails to meet the NAAQS for the pollutant. Ambient air quality for the Metropolitan Denver Interstate AQCR is classified as attainment/maintenance for O_3, CO, and PM_{10} and is classified as unclassifiable/attainment for all other criteria pollutants. Unclassifiable areas are those areas that have not had ambient air monitoring and are assumed to be in attainment with NAAQS.

Air quality is typically good throughout BAFB, and is generally affected only locally by military and civilian vehicle emission, particulate pollution from vehicle traffic, fumes from wastewater treatment plants, and construction activities. Mobile sources such as vehicle and aircraft emissions are generally not regulated and are not covered under existing permitting requirements. Specific occasional emission sources at BAFB can include boiler/heater fumes, industrial chemical usage, backup generator exhaust, and petroleum fumes.

BAFB is under the jurisdiction of USEPA Region 8 and the CDPHE. The CDPHE conducts annual compliance inspections at BAFB. In addition, Environmental Compliance Assessment System audits are conducted approximately every 2 to 3 years. Based on these two audit mechanisms, the installation has implemented the required programs to maintain compliance with federal and state air regulations.

Eagles Nest Wilderness Area and Rocky Mountain National Park are federal Class I designated areas within 100 kilometers of BAFB. Florissant Fossil Beds is a federal Class II land area within 100 kilometers of the facility. Florissant Fossil Beds has been designated by the state to have the same sulfur dioxide increment as federal Class I areas (CDPHE 2002b). Class I and Class II areas are areas of special national or regional natural, scenic, recreational, or historic value for which PSD regulations provide special protection.

4.3 Noise

4.3.1 Definition of the Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying (FICON 1992). Human response to noise can vary according to the type and characteristic of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

Due to wide variations, sound levels are measured using a logarithmic scale expressed in decibels (dB). Thus, a 10-dB increase in noise corresponds to a 100 percent increase in the perceived sound. Under most conditions, a 5-dB change is necessary for noise increase to be noticeable (USEPA 1972). Sound measurement is further refined by using an A-weighted decibel (dBA) scale that emphasizes the range of sound frequencies that are most audible to humans (between 1,000 and 8,000 cycles per

second). All sound levels analyzed in this EA are A-weighted; the term dB implies dBA unless otherwise noted (refer to Appendix B for a more detailed discussion of noise).

In this EA, a noise-producing single event such as an overflight is described by the sound exposure level (SEL). Airfield noise levels are measured using the day-night average sound level (DNL) metric. The DNL noise metric incorporates a "penalty" for nighttime noise events occurring between the hours of 10:00 p.m. and 7:00 a.m. to account for increased annoyance. A more thorough description of the DNL noise metric is provided below.

Sound Exposure Level. Although DNL or the onset-rate adjusted monthly day-night average A-weighted sound level (L_{dnmr}) is the most useful single metric for characterizing the long-term noise environment, other metrics are useful in characterizing the noise associated with individual events such as a single aircraft flyover. Of the available metrics, the SEL and the single event Maximum Sound Level (L_{max}) are often used. The SEL is the most useful because it is a composite metric which takes into account the most important characteristics of time-varying noise events such as aircraft flyovers: the changing sound levels which occur during the event, and the duration of the noise event. The SEL is a calculated level which represents the level of a constant sound with a duration of 1 second which produces an equivalent amount of sound energy. It is important to note that the SEL does not represent the level of sound heard at any specific time; however, it provides a measure of the total sound energy of a single event and permits comparison of events which differ in both level and duration. The SEL measurement is comprised of the following components: a period of time when an aircraft is approaching a receptor and noise levels are increasing, the instant when the aircraft is closest to the receptor and the maximum noise level is experienced, and the period of time when the aircraft moves away from the receptor resulting in decreased noise levels. One way to understand SEL is to think of it as the sound level one would experience if all of the sound energy of a sound event occurred in 1 second. This normalization to a duration of 1 second allows the direct comparison of sounds of different durations. For example, the highest sound level caused by a nearby motorcycle is 73 dB, while an aircraft generates a maximum sound level of about 68 dB. Even though the maximum level for the motorcycle is greater than the aircraft, the motorcycle sound only lasts a few seconds and produces an SEL of about 77 dB, while the aircraft passing overhead lasts a couple of minutes and generates an SEL of about 81 dB.

Noise generated by aircraft is often assessed in terms of a single event, which is incorporated into SEL measurements. The frequency, magnitude, and duration of single noise events vary according to aircraft type, engine type, power setting, and airspeed. Therefore, individual aircraft noise data are

collected for various types of aircraft and engines flying over a set of noise monitors and operating at a steady and level flight at various power settings, such as takeoff and approach. These values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, altitude, and variations from standard aircraft operating profiles and power settings. Table 4-3 provides SEL values at various altitudes for the various general aviation aircraft currently operating in the vicinity of Buckley AFB, using MENU108. MENU108 is a portion of the DoD-approved NOISEMAP model, which is described further in Appendix B. MENU108 (also called Menu 10 or Omega 10) allows the user to compare varying power profiles of flyover aircraft noise. The SEL represents the A-weighted sound level integrated over the entire duration of the noise event, adjusted to a 1 second duration. When an event lasts longer than 1 second, the SEL value will be higher than the highest sound level during the event. SEL describes the normalized noise from single noise events.

Table 4-3. SEL dB Values for COARNG Aircraft Operating at Buckley AFB

Altitude (feet)	**UH-1**	**UH-60**	
Power Settings	LFO (80 knots)	LFO Lite (100 knots)	LFO (80 knots)
200	101.8	93.5	95.8
500	96.0	87.4	89.8
1000	91.4	82.5	85.0
2000	86.6	77.0	79.6
3150	83.1	72.9	75.7
5000	79.4	68.3	71.2

Note: Data provided by MENU108 data, which are actual aircraft overflight noise measurements, based on steady and level flight. These SEL values are shown at various altitudes for each aircraft type operating at a takeoff or approach power setting. Temperature equals 59 °F and relative humidity equals 70 percent for all SEL dB values presented.

Day-Night Average Sound Levels. The DNL is the energy-averaged sound level measured over a 24-hour period, with a 10-dB penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. DNL values are obtained by averaging SEL values for a given 24-hour period. DNL is the preferred noise metric of Department of Housing and Urban Development (HUD), FAA, USEPA, and the DoD. Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments; there is a consistent relationship between DNL and the level of annoyance. The "Schultz Curve" (see Appendix B) shows the relationship

between DNL noise levels and the percentage of population predicted to be highly annoyed. Most people are exposed to sound levels of 50 to 55 dB (DNL) or higher on a daily basis. Research has indicated that about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB (DNL) (FICON 1992). Therefore, the 65 dB (DNL) noise level is typically used to help determine compatibility of military operations with local land use. For comparison purposes, normal conversation (at a distance of 3 feet) is approximately 60 dB, loud speech is approximately 70 dB, and the sound of a train approaching a subway platform is approximately 90 dB. At approximately 120 dB, sound can be intense enough to induce pain, while at 130 dB, immediate and permanent hearing damage can result (NPS 1994).

Noise Modeling. Noise contributions from airfield operations at Buckley AFB were calculated using the NOISEMAP computer model, the standard noise estimation methodology used for military airfields. NOISEMAP uses the following data to develop noise profiles: aircraft types, runway utilization patterns, engine power settings, airspeeds, altitude profiles, flight track locations, number of operations per flight track, engine run-ups, and time of day.

4.3.2 Existing Conditions

Buckley AFB is located on the eastern edge of the urbanized portion of the City of Aurora in Arapahoe County, approximately 5 miles east of the City of Denver. The base encompasses approximately 3.313 acres. The areas surrounding Buckley AFB have experienced a substantial amount of development and growth in the past few years.

The noise associated with activities at Buckley AFB is characteristic of the noise associated with flying operations at most military aviation facilities. In addition, aircraft maintenance and shop operations for aircraft operations are conducted at Buckley AFB. These sound-producing activities are referred to as the ambient noise environment. For Buckley AFB, it is during periods of aircraft flight activity that the ambient noise environment is affected. Buckley AFB noise signature is dominated by the F-16 Fighting Falcons operated by the Colorado Air National Guard. COARNG helicopter activity contributes a minor amount of noise to the overall ambient noise environment.

Airfield Operations. Aircraft airfield operational data were obtained from the Buckley AFB June 1998 Air Installation Compatible Use Zone (AICUZ) Study. Approximately 75 airfield operations are conducted at Buckley AFB per day, of which less than 10 percent are associated with COARNG helicopter activity. Table 4-4 summarizes the existing daily and annual COARNG helicopter airfield

operations at Buckley AFB by aircraft type. Existing aircraft operations presented and analyzed here are from the 1998 AICUZ Study. DNL noise contours were calculated using NOISEMAP methodology. Noise contours are lines that represent measurable noise values in dBA similar to the way topographic lines represent measurable ground elevations. NOISEMAP will only produce noise contours at 5 dB increments should the results of the modeling effort produce noise levels of 65 dBA (DNL) or greater. The noise contours produced are representative of the forecast noise environment in the vicinity of the airfield.

Table 4-4. Existing and Proposed COARNG Aircraft Operations at Buckley AFB

Aircraft Assigned	UH-1	UH-60	CH-47	COARNG
Flying Hours				
Existing	1,843	757	0	2,600
Proposed	0	3,000	1,042	2,742
Daily Aircraft Operations				
Existing	10.14	2.08	0.00	12.22
Proposed	0.00	5.55	12.50	18.05
Annual Aircraft Operations				
Existing	2,535	520	0	3,055
Proposed	0	1,387	3,125	4,512

The noise modeling of the baseline airfield operations using the NOISEMAP methodology resulted in noise levels less than 65 dBA (DNL). Housing and Urban Development and Federal Interagency Committee on Noise use the 65 dBA (DNL) noise contour as the limiting factor when determining land use guidelines and acceptable levels of noise exposure for land use. Since the 65 dBA (DNL) contour does not exist for baseline conditions, no figure was developed depicting DNL noise contours below 65 dBA (DNL) resulting from the sound produced by the baseline airfield operations. Furthermore, land use areas or residences in the proximity to Buckley AFB are not within the 65 dBA (DNL) contour area. The baseline noise levels reflect only the contribution of aircraft noise to the ambient environmental noise levels. The noise generated by surface vehicles (e.g., cars and trucks) is not included in the contour analysis. Figure 4-1 depicts Buckley AFB noise contours shown in the 1998 AICUZ Study.

4.4 Safety

4.4.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The public has little access to the base, so the primary safety concern is associated with military training flights and the potential for aircraft crashes and loss of life and property damage. Aircraft safety focuses on matters such as the potential for aircraft mishaps, airspace congestion, Bird/Wildlife Aircraft strike hazards, munitions handling and use, flight obstructions, weather, and fire risks.

The public's primary safety concern with regard to military training flights is the potential for aircraft crashes and loss of life and property damage. Such mishaps might involve mid-air collisions with other aircraft; collisions with objects such as towers, buildings, or mountains; weather-related accidents; and bird-aircraft collisions. The environment for air safety is based on the physical risks associated with aircraft flight and current military operational procedures concerning air safety. Historical mishap databases enable the military to calculate the mishap rates for each type of aircraft. These rates are based on the estimated flying time that an aircraft is expected to be in the airspace, the accident rate per 100,000 flying hours for that aircraft, and the annual flying hours for that aircraft. 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 Buckley AFB. Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Activities that can be hazardous include transportation, maintenance and repair, and the creation of highly noisy environs. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation processes creates unsafe environments for nearby populations. Extremely noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

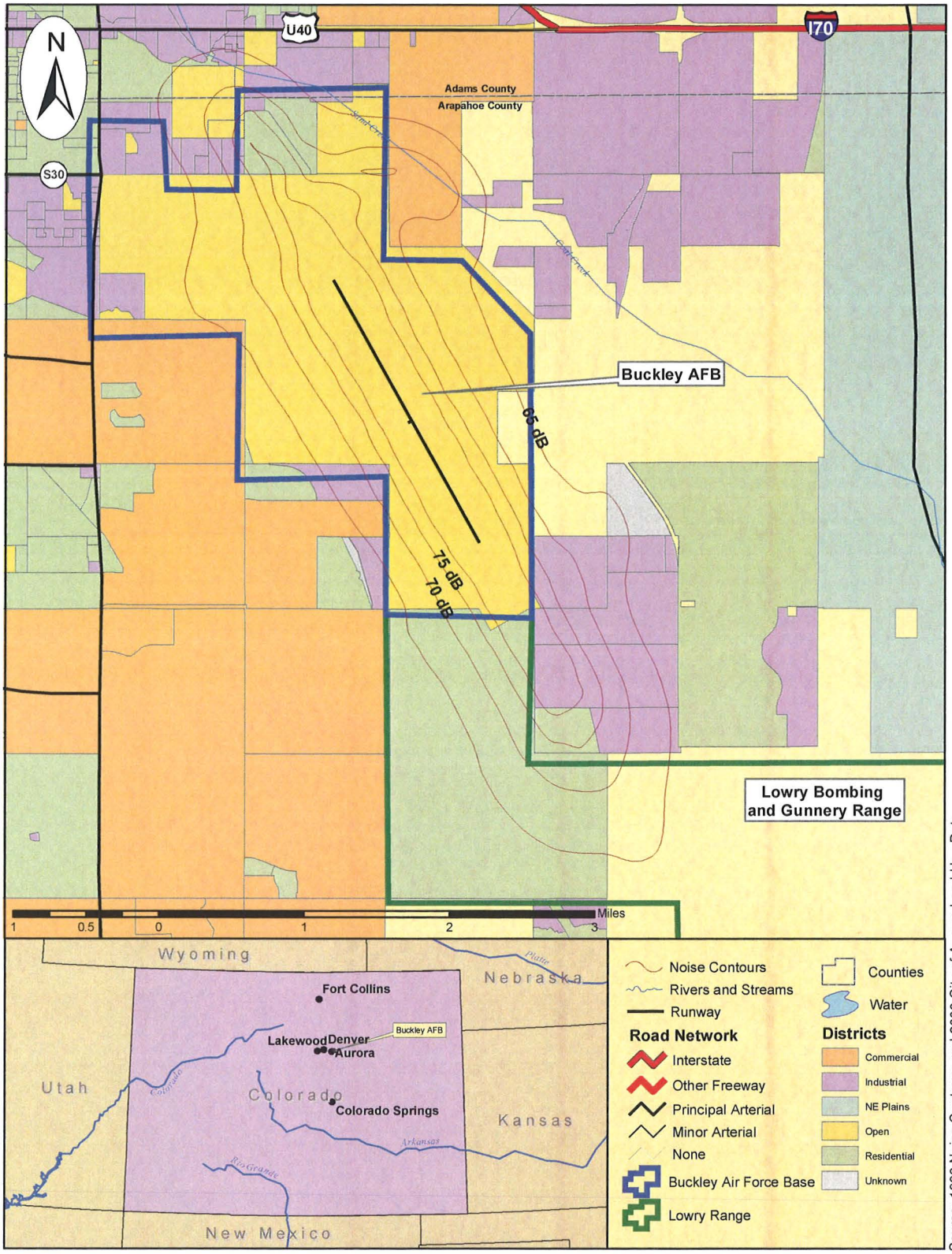

Figure 4-1. Buckley AFB 1998 Noise Contours

The following provides additional information on specific safety hazards associated with training flights.

Bird/Wildlife Aircraft Strike Hazard. These are a safety concern due to the potential damage that a strike might have on the aircraft or potential injury to aircrews. Birds may be encountered at altitudes of 30,000 feet and higher. However, most birds fly close to ground level, and 95 percent of all reported incidents in which a U.S. Army aircraft has struck a bird have been below 3,000 feet above ground level (AGL). Approximately half of these bird strikes occur in the airport environment, and approximately one-third occur during low-altitude training. Strike rates rise substantially as altitude decreases. The U.S. Army and the U.S. Air Force (USAF) devote considerable attention to avoiding the possibility of Bird/Wildlife Aircraft strikes. The U.S. Army and the USAF have conducted a worldwide program for decades to study bird migrations, bird flight patterns, and past strikes to develop predictions of where and when Bird/Wildlife Aircrafts might occur. This program, which consistently updates the data, also defines avoidance procedures through a Bird Avoidance Model (BAM). Each time an aircrew plans a training sortie within established MOAs or other training airspace, they use the BAM to define altitudes and locations to avoid. Use of this model has minimized Bird/Wildlife Aircraft strikes. Each base or flying unit also develops and maintains a Bird/Wildlife Aircraft avoidance plan that dictates the location and timing of avoidance measures within the airspace used by the base or unit.

Obstructions to Flights. Hazards, such as towers and power transmission lines, represent safety concerns for aircrews, especially those engaged in low-altitude flight training. Aircrews are briefed and familiarized with potential obstructions along their routes before undertaking a mission. Furthermore, the Flight Information Publication (FLIP) and aeronautical charts identify the location of such hazards and indicate the required horizontal and/or vertical separation distances to ensure safety.

Hazardous Weather Conditions. Weather conditions can pose safety hazards and influence a pilot to alter flight. Pilots consult the National Weather Service or weather services at local airports to obtain preflight weather information. Adverse weather conditions of concern include tornadoes, thunderstorms, hail, severe turbulence, dust storms, and wind shear. The evaluation of potential hazards of weather conditions rests in a pilot's sound discretion based on knowledge of available information, experience, and the operational limits of the aircraft.

4.4.2 Existing Conditions

Aircraft Safety. Risks associated with takeoffs and landings at Buckley AFB are presented in the AICUZ Study for the base, which was developed to address safety issues and to identify hazard potential due to aircraft accidents, obstructions to navigation, and incompatible land uses based on exposure levels to aircraft noise in the surrounding area. The Buckley AFB AICUZ Study also defines obstruction-free areas and clear zones relative to runways and taxiways, which in turn results in constraints in the siting and location of facilities on base (BANG 1998).

The U.S. Army Safety Center (ASC) has defined four classifications of mishaps: Classes A, B, C, and High Accident Potentials. Class A mishaps result in a total cost in excess of $1 million for injury, occupational illness, and property damage; a fatality or permanent total disability; or destruction or damage beyond economical repair to U.S. Army aircraft. Class B mishaps result in a total cost in excess of $200,000 (but less than $1 million) in property damage; permanent partial disability; or, hospitalization of five or more personnel. Class C mishaps result in total damage that costs in excess of $10,000 to $20,000 (but less than $200,000), or an injury or occupational illness that results in a loss of workers productivity greater than eight hours. Mishaps not meeting the definitions of Classes A, B, and C, but, because of damage or injury necessitate U.S. Army reporting, are classified as High Accident Potentials.

The environment for air safety is based on the physical risks associated with aircraft flight and current military operational procedures concerning air safety. Historical mishap databases enable the military to calculate the mishap rates for each type of aircraft. These rates are based on the estimated flying time that an aircraft is expected to be in the airspace, the accident rate per 100,000 flying hours for that aircraft, and the annual flying hours for that aircraft.

An aircraft mishap can cause fire and environmental contamination. Military aircraft have the capability to carry large amounts of fuel that can combust in the event of an aircraft crash. Initial response to an aircraft accident is the responsibility of the civilian authorities nearest the crash site. These authorities would provide emergency services such as fire, police, and medical assistance, as necessary. The civilian agency responding to an aircraft accident is responsible for determining what response actions they are capable of performing. If the responding unit is not capable of performing certain response actions, they request assistance from the nearest civilian agency capable of performing the required response. In the event of an aircraft mishap, these authorities would notify the nearest military installation. Upon notification of the aircraft accident, the commanding officer of the nearest military installation dispatches a disaster response force team. The response team would

provide security, medical, fire, legal, munitions, and mortuary services, as required. The response team would also assist with evacuation, accident evaluation and investigation, and retrieval of classified materials or equipment, as well as protective measures such as munitions disposal and hazardous/toxic materials removal or treatment. When necessary, the disaster response force team would coordinate activities with other regional response forces to ensure all personnel and equipment are dispatched for proper control of the accident site.

Bird/Wildlife Aircraft Strike Hazard. The 460th Air Base Wing (460 ABW) and 140th Wing (140 WG) at Buckley AFB actively implement a Bird/Wildlife Aircraft Strike Hazard (BASH) Reduction Plan, thereby reducing the potential for a bird strike to occur at the base. Strike rates rise significantly as altitude decreases, which is partly due to the greater number of low-altitude missions, but mostly because birds are commonly active close to the ground. Any gain in altitude above 1,000 feet represents a substantially reduced threat of a bird strike (Buckley AFB 2002). There have been 23 reported bird/wildlife strikes for the 140 WG in its database recorded between 1985 and July 2001 (Buckley AFB 2002). The potential exists for future bird strikes although current BASH Plan and U.S. Department of Agriculture–Wildlife Services (USDA-WS) management strategies and protocols continue to be implemented. The USDA-WS currently has a contract to assist in wildlife management and control at Buckley AFB but most control measures are undertaken locally by Buckley AFB personnel.

The base has a small reservoir called Lake Williams located northeast of the airfield that is used as a recreation area. This lake is highly attractive to a variety of waterfowl and other species, particularly during the winter months. Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), and great blue herons (*Ardea herodias*) were among the birds observed at this lake.

The 460 ABW – Flight Safety Office (460 ABW/SE) maintains bird strike reports which include the date and time of each strike, conditions, aircraft model, number of birds, bird species, and altitude and location at the time of the strike (Buckley AFB 2002). The 460 ABW OPLAN 91-212, BASH Plan provides a local program for minimizing bird strikes to aircraft by (1) providing guidelines for the Base's Bird Hazard Working Group (BHWG), (2) providing procedures for reporting hazardous bird activity and altering or discontinuing flying operations, (3) providing procedures to disseminate information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance, (4) providing procedures to eliminate or reduce environmental conditions that attract birds to the airfield, and (5) providing procedures to disperse birds on the airfield.

The BASH Reduction Plan specifies maintenance specifications for grass mowing on the airfield to be 7 to 14 inches, seasonal inspection requirements for grain type grasses that attract high-threat avian species, and periodic inspection requirements for ponding and proper drainage on the airfield whenever possible to reduce insect breeding. The BASH Reduction Plan also established a Bird Hazard Warning System to provide a means for immediate exchange of information between the ground operations and aircrews concerning the existence of birds that pose a hazard (Buckley AFB 2002). BASH reduction techniques currently listed in the Buckley AFB BASH Reduction Plan include bio-acoustical equipment, radio-controlled vehicles, paint balls, rodent control, and abating nuisance avian species using pyrotechnics and depredation, when necessary.

Migratory waterfowl (such as ducks, geese, and swan (*Cygnus* sp.)) pose a threat to low-flying aircraft. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. At the base, there are several common bird types that might be present and pose a hazard: Canada geese, mallards, great blue herons, grebes (various genus), pelicans (*Pelicanus* spp.), cormorants (*Phalacrocorax* spp.), pintails (*Anas acuta*), gadwalls (*Anas strepera*), wigeons (*Anas americana*), shovelers (*Anas clypeata*), teals (*Anas cyanoptera*, *A. discors*, and *A. crecca*), gulls (*Larus* spp.), hawks (*Accipiter* and *Buteo* spp.), falcons (*Falco* spp.), eagles (various genus), kestrels (*Falco sparverius*), coots (*Fulica americana*), owls (various genus), doves (various genus), nighthawks (*Chordeiles minor*), kingfishers (*Ceryle alcyon*), and various other small bird species (Buckley AFB 2002). There are two normal migratory seasons, spring and fall. Waterfowl are usually only a hazard during the migratory season. Waterfowl typically migrate at night, and generally fly between 1,500 and 3,000 feet AGL during the fall migration and 1,000 to 3,000 feet AGL during spring migration. In addition, other large avian species, such as turkey vultures (*Cathartes aura*) and gulls, pose a threat to military aircraft.

Table 4-5 illustrates that over 51.2 percent of all USAF Bird/Wildlife Aircrafts occur at or below 600 feet AGL during low-level flights (AFSC 2003a). In addition, 68.3 percent of the total costs associated with Bird/Wildlife Aircrafts result from strikes in this region of airspace (AFSC 2003a). Many low-level strikes occur on low-level routes associated with airdrops and bombing runs. During these flights, aircrews are involved in specific duties that leave little time to monitor bird activity. Instead, flight crews utilize the Low-Level BAM to understand risks associated with their particular route. The operation time or route is adjusted to maximize safety should the BAM show an unacceptable level of risk.

BAMs are used visually to analyze BASH during flight planning. The majority of costs incurred by the USAF occur during the fall migration (Table 4-6) of waterfowl and raptors. During September, 13.14 percent of all Bird/Wildlife Aircraft strikes occur, accounting for 52.23 percent of USAF BASH costs (AFSC 2003b). In addition, most Bird/Wildlife Aircraft strikes occur after 1000 hours (AFSC 2003c). Using online BAM software to calculate BAM during the highest risk months and at high-risk daytimes for Buckley AFB, a BAM risk is shown as a low to moderate avian density over the region of influence. No severe avian densities are shown for these high-risk seasons or daytimes.

Table 4-5. USAF Wildlife Strikes By Altitude (Low-Level/Ranges)

Current as of January 14, 2003

Altitude	Count	% Total	% Cumulative	Cost	% Cost
0	54	1.65%	1.65%	$125,295.00	0.04
100	46	1.40%	3.05%	$125,652.81	0.04
200	80	2.44%	5.49%	$348,994.00	0.10
300	250	7.62%	13.11%	$10,104,366.35	2.88
400	123	3.75%	16.85%	$922,032.00	0.26
500	940	28.65%	45.50%	$10,419,263.07	2.97
600	187	5.70%	51.20%	$217,719,619.00	62.04
700	175	5.33%	56.54%	$36,706,963.68	10.46
800	169	5.15%	61.69%	$1,455,900.85	0.41
900	34	1.04%	62.72%	$159,096.80	0.05
1000	489	14.90%	77.63%	$23,260,835.75	6.63
2000	456	13.90%	91.53%	$22,983,988.87	6.55
3000	170	5.18%	96.71%	$26,340,157.28	7.51
4000	53	1.62%	98.32%	$173,691.00	0.05
5000	23	0.70%	99.02%	$26,162.00	0.01
>5000	32	0.98%	100.00%	$76,008.00	0.02
Total:	**3,281**			**$350,948,026.46**	

Source: AFSC 2003a
Note: These statistics are for those strikes where the altitude was known.

Table 4-6. USAF Wildlife Strikes by Month

Current as of January 14, 2003

Month	Count	% of Total	% Cumulative	Cost	% Cost
January	1,871	3.57%	3.57%	$28,897,477.66	4.70
February	1,862	3.56%	7.13%	$7,958,249.40	1.29
March	2,961	5.65%	12.78%	$31,020,244.03	5.04
April	4,790	9.15%	21.93%	$26,935,030.56	4.38
May	5,767	11.01%	32.94%	$49,639,448.53	8.07
June	3,919	7.48%	40.42%	$35,962,014.34	5.85
July	5,028	9.60%	50.02%	$40,870,064.85	6.64
August	6,223	11.88%	61.90%	$7,648,211.08	1.24
September	6,883	13.14%	75.04%	$321,317,154.05	52.23
October	7,378	14.09%	89.13%	$29,162,108.03	4.74
November	3,809	7.27%	96.40%	$16,587,276.01	2.70
December	1,885	3.60%	100.00%	$19,145,107.46	3.11
Total:	**52,376**			**$615,142,386.00**	

Source: AFSC 2003b

According to Buckley AFB, the most recent mishap on base was a Class C incident involving a C-26 running off of the runway in 2000; the last incident involving a helicopter was in 1991 when an OH-6 Cayuse hit an unlit tower southeast of Buckley AFB (Stalter 2003). There are no in-state data for CH-47 Chinook strikes.

Buckley AFB and USDA-WS personnel began conducting a one-year study, beginning June 2003 and have been extremely effective in identifying and reducing the BASH threat on the base. The USDA-WS studies the resident populations and seasonal influxes of migratory species in order to continually evaluate the BASH.

Buckley AFB has a few nuisance species which increase the bird/wildlife strikes hazard. There species are English house sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), common pigeons or rock doves (*Columba livia*), and mute swans (*Cygnus olor*). In addition, 50 CFR 21.43 excludes the need for a depredation permit for red-winged blackbirds (*Agelaius phoeniceus*), rusty blackbirds (*Euphagus carolinus*), Brewer's blackbirds (*Euphagus cyanocephalus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), brown-headed cowbirds (*Molothrus ater*),

common grackle (*Quiscalus quiscula*), and American crows (*Corvus brachyrhynchos*) when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

Fire Hazards and Public Safety. The Fire Department at Buckley AFB provides fire, crash, rescue, and structural fire protection at the base. The 460 ABW and 140 WG abide by a general safety policy relating to the performance of all activities at the base. Individuals, supervisors, managers, and commanders are expected to give full support to safety efforts. Safety awareness and strict compliance with established safety standards are expected.

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5. Environmental Consequences

5.1 Introduction

This section forms the scientific and analytic basis for the comparison of alternatives. It identifies the direct, indirect, and cumulative effects that would occur upon implementation of the COARNG's Proposed Action and alternatives to convert to the proposed assigned units (presented in Sections 2.0 and 3.0 of this EA) on each of the resource areas previously described in the Affected Environment (Section 4.0). Both beneficial and adverse effects are described. If no effects are identified for a particular resource area, that fact is mentioned.

5.2 Air Quality

The potential impacts on local and regional air quality conditions near a proposed federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in NAAQS "attainment" areas would be considered significant if the net increases in pollutant emissions from the federal action resulted in one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard.
- Expose sensitive receptors to substantially increased pollutant concentrations.
- Represent an increase of ten percent or more in an affected AQCR emissions inventory.

5.2.1 Proposed Action

BAFB is located within an attainment/maintenance area for O_3, CO, and PM_{10} and unclassifiable/attainment for all other criteria pollutants. Mobile sources such as vehicle emissions are generally not regulated and are not covered under existing permitting requirements by the CDPHE. The base has a history of complying with federal and state air regulations. The proposed CH-47 Chinook and UH-60 Black Hawk training mission exercises would be consistent with exercises currently conducted at the base. Therefore, there would be minor adverse effects on air quality from the Proposed Action associated with increased aircraft operations.

The Federal General Conformity Rule (40 CFR, Part 93) is applicable to the Proposed Action, since there are area is classified as an attainment/maintenance area for O_3, CO, and PM_{10}. An analysis has been completed to ensure that, given the changes in direct and indirect emissions of the O_3 precursors (NO_x and VOCs), PM_{10}, and CO, the Proposed Action would be in conformity with applicable CAA requirements. The emission calculations are collectively presented in Appendix C.

Aircraft Operations. Emissions from airfield operations at and near BAFB would be released primarily within the Metropolitan Denver Interstate AQCR. Calculations of airfield air pollutant emissions from both baseline and Proposed Action aircraft operations were based on the annual flight operational hours conducted by UH-1 Huey, UH-60 Black Hawk, and CH-47 Chinook helicopters at the BAFB airfield.

Air emissions associated with helicopter operations are generally proportional to the number of flight hours. The number of hours aircraft are actually in operation varies from year to year, primarily as a function of funding.

Table 5-1 provides calculations of emissions factors for the UH-1 Huey helicopter's various flight modes. Emission factors for SO_x are not available for this engine. Total emissions are calculated using the average time in mode (ground idle, flight idle, cruise, and military) for a typical UH-1 Huey sortie flight. The emission factors for the T400-CP-400 UH-1 Huey helicopter engine were used to calculate emissions.

Table 5-2 provides calculations of emissions factors for the UH-60 Black Hawk helicopter's various flight modes. Emission factors for SO_x are not available for this engine. Total emissions are calculated using the average time in mode (ground idle, flight idle, flight max, and overspeed) for a typical UH-60 Black Hawk sortie flight. The emission factors for the T700-GE-700 UH-60 Black Hawk helicopter engine were used to calculate emissions.

Table 5-3 provides calculations of emissions factors for the CH-47 Chinook helicopter's various flight modes. Pollutants reported in Table 5-3 include NO_x, VOC, PM_{10}, CO, and SO_x. Emission factors for PM_{10} and SO_x are not available for this engine. Total emissions are calculated using the average time in mode (idle, taxi, climb, and approach) for a typical CH-47 Chinook sortie flight. Most CH-47 Chinook models are equipped with two T55-L-712 engines; however, some CH-47 Chinooks would have the new T55-GA-714 engines. Emission factor data are not available for these models; therefore, the emission factors for the T55-L-11A CH-47 Chinook helicopter were used to

calculate emissions. Emissions have been calculated on the assumption that the CH-47 Chinook engines are all comparable.

Table 5-1. Emission Factors for UH-1 Huey Helicopter Flight Modes

Mode	Time in Mode (minutes)	NO_x (pounds/ hour)	VOC (pounds/ hour)	PM_{10} (pounds/ hour)	CO (pounds/ hour)	SO_x (pounds/ hour)
Ground Idle	8	0.42	1.44	N/A	4.11	N/A
Flight Idle	7	0.44	1.24	N/A	4.39	N/A
Cruise	6.8	1.39	0.05	N/A	0.75	N/A
Military	6.8	2.75	0.05	N/A	0.31	N/A
Average pounds per hour [1]	28.6	1.21	0.73	N/A	2.48	N/A

Source: USAF 2001

[1] Assumes that typical mission activity approximates the helicopter landing and takeoff cycles as published in USEPA 1999a and USAF 2001

Emission factors were used for T400-CP-400 UH-1 Huey helicopter engine.
The UH-1 Huey has one engine.
No emission factors were available for PM_{10} and SO_x.

Table 5-2. Emission Factors for UH-60 Black Hawk Helicopter Flight Modes

Mode	Time in Mode (minutes)	NO_x (pounds/ hour)	VOC (pounds/ hour)	PM_{10} (pounds/ hour)	CO (pounds/ hour)	SO_x (pounds/ hour)
Ground Idle	8	0.37	7.54	0.20	7.07	N/A
Flight Idle	7	3.78	0.19	0.63	2.63	N/A
Flight Max	6.8	4.82	0.29	1.31	2.21	N/A
Overspeed	6.8	6.08	0.28	1.84	2.18	N/A
Average pounds per hour [1]	28.6	3.62	2.29	0.96	3.66	N/A

Source: USAF 2001

[1] Assumes that typical mission activity approximates the helicopter landing and takeoff cycles as published in USEPA 1999a and USAF 2001

Emission factors were used for T700-GE-700 UH-60 Black Hawk helicopter engine.
The UH-60 Black Hawk has two engines.
No emission factors were available for PM_{10} and SO_x.

Table 5-3. Emission Factors for CH-47 Chinook Helicopter Flight Modes

Mode	Time in Mode (minutes)	NO_x (pounds/ hour)	VOC (pounds/ hour)	PM_{10} (pounds/ hour)	CO (pounds/ hour)	SO_x (pounds/ hour)
Idle/Taxi	15	0.8	4.0	N/A	29.5	N/A
Climb	6.8	18.6	0.2	N/A	14.5	N/A
Approach	6.8	9.1	0.3	N/A	12.9	N/A
Average pounds per hour [1]	28.6	7.01	2.22	N/A	21.99	N/A

Source: USEPA 1999a

[1] Assumes that typical mission activity approximates the helicopter landing and takeoff cycles as published in USEPA 1999a and USAF 2001.

Emission factors were used for T55-L-11A CH-47 Chinook helicopter engine.
The CH-47 Chinook has two engines.
No emission factors were available for PM_{10} and SO_x.

Table 5-4 shows the baseline (2001) and the Proposed Action's air emissions and compares the Proposed Action emissions to the total Metropolitan Denver Interstate AQCR emissions inventory. As shown in Table 5-4, criteria pollutant emissions associated with operation of the Proposed Action would be higher than the baseline emission from 2001. The Proposed Action would result in an overall decrease in aircraft at BAFB. However, UH-60 Black Hawk and CH-47 Chinook helicopters have higher emissions than UH-1 Huey helicopters.

Based on the emission calculations and analyses completed for the Proposed Action, it is clear that the net change in all criteria pollutants emissions would be minimal and well below General Conformity *de minimis* levels and the 10 percent regional significance requirements of the General Conformity Rule. As such, this federal action is exempt from a Conformity Determination and all other requirements that are specified under the General Conformity Rule and applicable regulations (40 CFR 93). Therefore, there would be no adverse impacts on air quality from the Proposed Action.

In addition to the six criteria pollutants, air quality can be affected by hazardous air pollutants (HAP). These are chemicals that might not be as widespread as the criteria pollutants but are potentially more toxic. USEPA is developing standards for various industrial sources that emit these pollutants. Many states have adopted their own rules or guidelines on emissions of HAPs and have been delegated authority to enforce USEPA standards. The number of regulated pollutants, as well as the applicable acceptable ambient limits, can vary from state to state. Hazardous pollutants such as volatile organic

solvents, greases, fuels, and oils would be used in the maintenance of CH-47 Chinook and UH-60 Black Hawk helicopters. However, the quantities would be very low, and the contribution to air degradation would be minimal. Therefore, there the Proposed Action would have minor adverse effects on HAP emissions.

Table 5-4. Net Air Emissions from the Proposed Action (tons)

Type of Aircraft	Number of Aircraft	Annual Flight Hours	NO_x	VOC	PM_{10}	CO
BASELINE (2001) AIRFIELD EMISSIONS						
UH-1	31	1843	1.11	0.67	N/A	2.28
UH-60	6	757	1.37	0.87	0.36	1.39
CH-47	0	0	0.00	0.00	N/A	0.00
Total	37		**2.48**	**1.54**	**0.36**	**3.67**
2003 [1]						
UH-1	6	2080	0.14	0.09	N/A	0.29
UH-60	10	1700	4.78	3.02	1.26	4.84
CH-47	7	300	2.10	0.67	N/A	6.60
Total	29		**+7.03**	**+3.77**	**+1.26**	**+11.73**
Metropolitan Denver Interstate AQCR Inventory - 1999 (tpy)			116,502	129,662	65,039	871,835
Percent (%) of Metropolitan Denver Interstate AQCR Inventory:			**0.0082%**	**0.0041%**	**0.0002%**	**0.0237%**
2004 AND BEYOND [1]						
UH-1	0	0	-1.11	-0.67	N/A	-2.28
UH-60	16	3000	9.49	6.00	2.51	9.61
CH-47	7	900	6.31	2.00	N/A	19.79
Total	23		**+14.68**	**+7.32**	**+2.51**	**+27.11**
Metropolitan Denver Interstate AQCR Inventory – 1999 (tpy)			116,502	129,662	65,039	871,835
Percent (%) of Metropolitan Denver Interstate AQCR Inventory:			**0.0147%**	**0.0068%**	**0.0003%**	**0.0473%**

Sources: USEPA 1999a, USEPA 1999b, USAF 2001, and Keohane 2003

[1] Flight operational hours for 2003 and 2004 are projected.

Emission factors were used for T400-CP-400 UH-1 Huey helicopter engine.
Emission factors were used for T700-GE-700 UH-60 Black Hawk helicopter engine.
Emission factors were used for T55-L-11A CH-47 Chinook helicopter engine.
The UH-1 Huey has one engine, and the UH-60 Black Hawk and CH-47 Chinook have two engines.
No emission factors were available for PM_{10} for UH-1 Huey and CH-47 Chinook helicopters.

Although, Eagles Nest Wilderness Area, Rocky Mountain National Park, and Florissant Fossil Beds are located within 100 kilometers of BAFB, the Proposed Action would result in similar flight operations and missions to those currently being conducted. While the number of flight operations

would increase, the area of land covered would not. Therefore, the Proposed Action would not have an adverse effect on Class I or Class II areas.

5.2.2 Alternative to the Proposed Action

Table 5-5 shows the air emissions associated with the Alternative to the Proposed Action and compares the Alternative to the Proposed Action emissions to the total Metropolitan Denver Interstate AQCR emissions inventory. As shown in Table 5-5, increases in all criteria pollutant emissions associated with operation of this alternative would be minimal.

Based on the emission calculations and analyses completed for the Alternative to the Proposed Action, it is clear that the net change in all criteria pollutants emissions would be minimal and well below the 10 percent regional significance requirements of the General Conformity Rule. As such, this alterative is exempt from a Conformity Determination and all other requirements that are specified under the General Conformity Rule and applicable regulations (40 CFR 93). Therefore, there would be no adverse impacts on air quality from the Alternative to the Proposed Action. While the number of flight operations would slightly increase, the area of land covered would not. Therefore, the Alternative Proposed Action would not have an adverse effect on Class I or Class II areas.

5.2.3 No Action Alternative

Under the No Action Alternative, baseline conditions would remain as present and the conversion from the LUB to the GSAB would not occur. The drawdown of the UH-1 Huey helicopters would result in a decrease in helicopter operations. Therefore, minor beneficial effects would be anticipated as a result of the No Action Alternative on air quality.

Table 5-5. Net Air Emissions from Alternative to the Proposed Action (tons)

Type of Aircraft	Number of Aircraft	Annual Flight Hours	NOx	VOC	PM10	CO
BASELINE (2001) AIRFIELD EMISSIONS						
UH-1	31	1843	1.11	0.67	N/A	2.28
UH-60	6	757	1.37	0.87	0.36	1.39
CH-47	0	0	0.00	0.00	N/A	0.00
Total	37		**2.48**	**1.54**	**0.36**	**3.67**
2003 [1]						
UH-1	6	2080	0.14	0.09	N/A	0.29
UH-60	10	1700	3.41	2.16	0.90	3.46
CH-47	7	300	2.10	0.67	N/A	6.60
Total	29		**+5.66**	**+2.91**	**+0.90**	**+10.35**
Metropolitan Denver Interstate AQCR Inventory – 1999 (tpy)			116,502	129,662	65,039	871,835
Percent (%) of Metropolitan Denver Interstate AQCR Inventory:			**0.0082%**	**0.0041%**	**0.0002%**	**0.0237%**
2004 AND BEYOND [1]						
UH-1	0	0	-1.11	-0.67	N/A	-2.28
UH-60	16	3000	8.12	5.13	2.15	8.22
CH-47	14	1042	7.30	2.31	N/A	22.91
Total	30		**+14.30**	**+6.77**	**+2.15**	**+28.95**
Metropolitan Denver Interstate AQCR Inventory – 1999 (tpy)			116,502	129,662	65,039	871,835
Percent (%) of Metropolitan Denver Interstate AQCR Inventory:			**0.0156%**	**0.0071%**	**0.0003%**	**0.0521%**

Sources: USEPA 1999a, USEPA 1999b, USAF 2001, and Keohane 2003

[1] Flight operational hours for 2003 and 2004 are projected.

Emission factors were used for T400-CP-400 UH-1 Huey helicopter engine.
Emission factors were used for T700-GE-700 UH-60 Black Hawk helicopter engine.
Emission factors were used for T55-L-11A CH-47 Chinook helicopter engine.
The UH-1 Huey has one engine, and the UH-60 Black Hawk and CH-47 Chinook have two engines.
No emission factors were available for PM_{10} for UH-1 Huey and CH-47 Chinook helicopters.

5.3 Noise

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of a proposed action. Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased noise exposure to unacceptable noise levels).

The main issues concerning noise effects on humans are physiological effects (hearing loss and nonauditory effects), behavioral effects (speech or sleep interference and performance effects), and

subjective effects such as annoyance. Noise impacts would be considered adverse if increased noise levels affected sensitive noise receptors, land use compatibility, or would change annual noise contours.

5.3.1 Proposed Action

The Proposed Action is to utilize Buckley AFB as the primary location for operating CH-47 Chinook helicopters for the COARNG. It is anticipated that all CH-47 Chinook helicopter operations would be conducted at Buckley AFB and existing COARNG helicopter operating areas. The CH-47 Chinook helicopters would utilize Buckley AFB, Former Lowry Bombing Range, and Fort Carson as they currently do with the UH-1 Huey and UH-60 Black Hawk helicopters. Although there would be a decrease in the overall number of helicopters assigned to COARNG units operating at Buckley AFB, under the Proposed Action, the number of COARNG helicopter airfield operations would increase. The CH-47 Chinook helicopter would conduct more aircraft operations per aircraft than the UH-1 Huey helicopter. However, the acreage impacted under the proposed action is less. This is due to the fact that the CH-47 Chinook helicopter would be operating at higher altitudes than that of the UH-1 Huey helicopter. Table 5-6 depicts the change in acreage from the baseline to the Proposed Action.

Table 5-6. Baseline and Proposed Action Acreages

DNL (dB) Range	Existing	Proposed	Change	Percent Change
65 - 69	2,521	2,517	-4	-0.16%
70 - 74	1,405	1,387	-18	-1.28%
75 - 79	765	783	18	2.35%
80+	968	969	1	0.10%
Total	5,659	5,656	-3	-0.05%

Although the area exposed to a DNL of 65 dBA and greater would be slightly less, the type of land uses affected would not change under the Proposed Action when compared to the existing conditions.

SEL values resulting from aircraft overflights were calculated at the selected sensitive noise receptors within the vicinity of the airfield. Because sensitive noise receptors were not identified in the 1998 AICUZ Study, a qualitative analysis was completed by comparing the noise signature between the

CH-47, UH-1, and the UH-60. The CH-47 Chinook helicopter is very different from existing aircraft used by the COARNG. Depending on the configuration of the CH-47 Chinook helicopter (i.e., takeoff or approach), this helicopter produces the same or slightly higher SEL dB values as the UH-1 Huey or UH-60 Black Hawk. Although it has two large rotors with three blades each, it does not produce noise level that can be differentiated by the human ear. The human ear cannot differentiate between a change of a few decibels as noted in aircraft SEL dB values listed in Table 5-7, the only noticeable change affecting the people would be the visual operation of a different type of aircraft and possibly the increase in the number of aircraft operating at Buckley AFB. Table 5-7 depicts the differences in sound exposure levels between the three aircraft types.

Table 5-7. SEL dB Values for Existing and Proposed COARNG Aircraft Operating at Buckley AFB

Altitude (feet)	UH-1	UH-60		CH-47	
Power Settings	LFO (80 knots)	LFO Load (70 knots)	LFO Load (100 knots)	Takeoff (85 knots)	Approach (85 knots)
200	101.8	93.5	95.8	94.6	103.6
500	96.0	87.4	89.8	88.4	97.8
1000	91.4	82.5	85.0	83.3	93.3
2000	86.6	77.0	79.6	77.6	88.6
3150	83.1	72.9	75.7	73.4	85.2
5000	79.4	68.3	71.2	68.6	81.6

Note: Data provided by MENU108 data, which are actual aircraft overflight noise measurements, based on steady and level flight. These SEL values are shown at various altitudes for each aircraft type operating at a takeoff or approach power setting. Temperature equals 59 °F and relative humidity equals 70 percent for all SEL dB values presented.

Under the Proposed Action, CH-47 Chinook airfield operations would have a minimal effect on the sensitive noise receptors in the vicinity of Buckley AFB during times when other louder aircraft are not operating in the vicinity of Buckley AFB. This minimal impact would be temporary and would not result in any long-term noise effects.

5.3.2 Alternative to the Proposed Action

Under the Alternative to the Proposed Action, CH-47 Chinook operations are anticipated to double when compared to the Proposed Action, based on an increase to 14 CH-47 Chinook helicopters. All

other types of aircraft operations (i.e., F-16) would remain unchanged. Therefore, instead of two departures and two arrivals per day, the CH-47 Chinook would conduct four of each per day. Under the Alternative to the Proposed Action, the number of CH-47 Chinook airfield operations would increase to approximately 6,250 airfield operations per year when operating all 14 helicopters. The results from modeling indicate that the increase in CH-47 Chinook helicopter operations would not cause a dramatic change in the 65 dBA (DNL) noise contour. Although the CH-47 Chinook helicopter would be operating at higher altitudes than that of the UH-1 Huey helicopter, the number of CH-47 Chinook helicopter operations would increase ,as would the acreage impacted with 14 aircraft. Table 5-8 depicts the change in acreage from the baseline to the Alternative to the Proposed Action.

Table 5-8. Baseline and Alternative to the Proposed Action Acreages

DNL (dB) Range	Existing	Proposed	Change	Percent Change
65 - 69	2,521	2,527	6	0.24%
70 - 74	1,405	1,389	-16	-1.14%
75 - 79	765	783	18	2.35%
80+	968	969	1	0.10%
Total	5,659	5,668	9	0.16%

Due to the fact that the noise levels under the Alternative to the Proposed Action would not produce a substantial change in the 65 dBA (DNL) noise contour, and that the additional helicopter operations would have a minimal effect on the sensitive noise receptors in the vicinity of Buckley AFB, no effects on the noise environment at Buckley AFB would occur as a result of the implementation of this alternative.

5.3.3 No Action Alternative

Under the No Action Alternative, baseline conditions would remain the same at Buckley AFB. Due to the fact that the UH-1 Huey helicopter is coming to the end of its lifecycle, there would be a decrease in the number of helicopters operating at Buckley AFB, even though the CH-47 Chinook helicopters would not be operating at Buckley AFB. Therefore, slight beneficial impacts on noise at Buckley AFB would be anticipated with the implementation of the No Action Alternative.

5.4 Safety

Impacts were assessed based on direct effects from aircraft crashes (i.e., damage to aircraft and points of impact), as well as 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 from 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. As stated in Section 4.4.1, historical mishap databases enable the military to calculate the mishap rates for each type of aircraft. These rates are based on the estimated flying time that an aircraft is expected to be in the airspace, the accident rate per 100,000 flying hours for that aircraft, and the annual flying hours for that aircraft.

5.4.1 Proposed Action

Aircraft Safety. Historical data on UH-1 Huey helicopter mishaps are listed in Table 5-9, historical data on UH-60 Black Hawk are listed in Table 5-10, and historical data on CH-47 Chinook helicopter mishaps are listed in Table 5-11. The Proposed Action dictates an increase of only 142 flying hours per year over the FY 2001 baseline flights (2,600) (Keohane 2003). Therefore, minor adverse effects would be expected as a result of the Proposed Action.

Bird/Wildlife Aircraft Strike Hazard. Continued implementation of the 460 ABW and 140 WG BASH Reduction Plan would minimize conditions giving rise to incidents involving birds. Therefore, no adverse effects would be expected as a result of the Proposed Action.

Table 5-9. Historical Data on UH-1 Huey Mishaps (FY 92–FY 03)

Current as of June 8, 2003

Fiscal Year	Class A	Class B	Class C	Injury Count		Cost		
				Fatal	Non-Fatal	Damage	Injury	Total
FY 92	3	2	17	0	4	$4,438,405	$39,258	$4,477,663
FY 93	5	1	16	8	4	$7,034,011	$7,329,111	$14,363,122
FY 94	2	3	7	0	4	$3,521,136	$42,141	$3,563,277
FY 95	0	4	15	0	6	$2,519,774	$19,341	$2,539,115
FY 96	0	4	6	0	1	$1,523,374	$1,125	$1,524,499
FY 97	3	1	7	4	0	$4,305,846	$2,757,618	$7,063464
FY 98	0	0	1	0	0	$75,620	$0	$75,620
FY 99	1	1	3	0	3	$1,816,511	$229,336	$2,045,847
FY 00	1	0	0	2	2	$929,245	$2,080,000	$3,009,245
FY 01	0	1	1	0	0	$557,526	$0	$557,526
FY 02	0	0	2	0	0	$186,013	$0	$186,013
FY 03	0	0	0	0	0	$0	$0	$0

Source: ASC 2003

Table 5-10. Historical Data on UH-60 Black Hawk Mishaps (FY 92–FY 03)

Current as of June 8, 2003

Fiscal Year	Class A	Class B	Class C	Injury Count		Cost		
				Fatal	Non-Fatal	Damage	Injury	Total
FY 92	4	16	20	0	0	$2,520,436	$0	$2,520,436
FY 93	1	7	19	4	5	$8,465,036	$3,744,259	$12,209,295
FY 94	3	2	26	0	9	$14,388,672	$104,076	$14,492,748
FY 95	2	3	13	5	8	$15,224,291	$4,296,888	$19,521,179
FY 96	3	3	22	8	31	$16,172,610	$3,939,279	$20,111,889
FY 97	2	2	13	8	0	$10,110,958	$4,215,000	$14,325,958
FY 98	6	1	25	5	12	$32,305098	$4,214,949	$36,520,047
FY 99	3	3	27	10	6	$1,6946,066	$5,476,635	$22,422,701
FY 00	1	1	21	0	6	$8,223,558	$272,565	$8,506,123
FY 01	2	2	28	6	11	$24,614,140	$3,587,381	$28,201,521
FY 02	5	1	25	2	0	$20,354,730	$299,973	$20,654,703
FY 03	8	4	15	27	3	$52,609,244	$14,027,750	$66,636,994

Source: ASC 2003

Table 5-11. Historical Data on CH-47 Chinook Mishaps (FY 92–FY 03)

Current as of June 8, 2003

Fiscal Year	Class A	Class B	Class C	Injury Count		Cost		
				Fatal	Non-Fatal	Damage	Injury	Total
FY 92	0	1	6	0	0	$529,674	$0	$529,674
FY 93	1	1	10	0	1	$11,187,510	$16,880	$11,204,390
FY 94	2	2	8	4	0	$28,218,782	$2,740,960	$30,959,742
FY 95	2	0	7	6	22	$15,691,192	$3,231,569	$18,922,761
FY 96	2	0	15	5	0	$32,235,244	$3,863,257	$36,098,501
FY 97	1	3	11	0	2	$13,874,541	$42,254	$13,916,795
FY 98	0	2	17	0	5	$1,171,140	$20,356	$1,191,496
FY 99	1	1	10	0	0	$4,285,935	$480	$4,286,415
FY 00	0	1	11	0	0	$943,138	$0	$943,138
FY 01	0	2	5	0	0	$1,381,751	$0	$1,381,571
FY 02	7	3	14	8	18	$93,695,127	$4,695,624	$98,390,751
FY 03	4	1	5	0	0	$7,480,315	$0	$7,480,315

Source: ASC 2003

5.4.2 Alternative to the Proposed Action

Effects from the fielding of 14 CH-47 Chinooks and helicopter conversion would be the same as those described for the Proposed Action. Therefore, there would be no adverse impacts on safety from this alternative.

5.4.3 No Action Alternative

Under the No Action Alternative, baseline conditions would remain as present and the conversion from the LUB to the GSAB would not occur. The drawdown of the UH-1 Huey helicopter would result in a decrease in helicopter operations. Therefore, minor beneficial effects would be anticipated as a result of the No Action Alternative.

5.5 Mitigation Measures

Mitigation consists of actions that avoid, reduce or compensate for effects caused by a proposed action. For this reason, no mitigation measures will be necessary to reduce any impacts to below significant levels.

No additional mitigation measures would be needed as a result of implementing the Proposed Action or alternative. Criteria pollutants and HAPs would continue to be monitored as present under federal PSD regulations. Findings of the Buckley AFB AICUZ Study would continue to be used. BASH

Reduction Plans and BAMs would continue to aid in avoid Bird/Wildlife Aircraft strikes. For this reason, no mitigation measures will be necessary to reduce any impacts to below significant levels.

Further efforts to mitigate potential negative effects are not required at this time or in the foreseeable future.

5.6 Cumulative Effects

The CEQ defines cumulative effects as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions."

As previously noted, the COARNG operates an AASF at Buckley AFB. The COARNG is also proposing to construct a new AASF, however these two actions are independent therefore the proposed construction of a new AASF will be evaluated separately. Any cumulative effects of this Propose Action on the proposed construction of a new AAST would be addressed in that EA and therefore, are not examined in this EA.

Currently there are no foreseeable future developments that are being planned off-base that could have beneficial or negative impacts. However, the potential does exist that incremental impacts associated with the increased air emissions and noise emissions associated with this proposed action and alternatives could add to or effect a future action. At which time, additional NEPA analysis should be conducted to include the results of this EA.

Implementation of the Proposed Action or alternative would not be expected to result in cumulative effects. The proposed assigned unit activities would be confined to Buckley AFB or other facilities currently used for helicopter training operations. However, under the No Action Alternative, the COARNG would not be consistent with the Army's Transformation program to meet national security requirements.

6. Findings and Conclusions

6.1 Findings

This EA has been prepared to evaluate the potential effects on the natural and human environment associated with the proposed conversion of the LUB to the GSAB by the COARNG. The EA has examined the Proposed Action, Alternative to the Proposed Action, and No Action Alternative. The No Action Alternative is prescribed by CEQ regulations to serve as the baseline against which the Proposed Action and alternatives are analyzed. The following sections provide the findings and conclusions of the EA.

The EA has considered potential effects on a wide range of environmental resources and conditions. Several environmental resources and conditions have not been evaluated in detail because the Proposed Action would not affect those resources and conditions. These include airspace, land use, geological resources and soils, water resources, biological resources, socioeconomics, environmental justice, hazardous materials and wastes, and cultural resources.

Environmental resources evaluated in detail include air quality, noise, and safety. Potential effects concerning these resources should the Proposed Action or alternative be implemented include the following:

- *Air Quality.* Minor adverse effects would be expected. Emissions would increase under the Proposed Action but would not exceed *de minimis* levels. HAPs emissions would contribute minimally to air degradation.

- *Noise.* Minor adverse effects on sensitive noise receptors would be expected. These minor effects would be temporary and not result in any long-term noise effects.

- *Safety.* Minor adverse effects on safety would be expected because flight operations would increase slightly. Harmful effects would be avoided through use of the Buckley AFB BAM and BASH Reduction Plan.

Under the No Action Alternative, baseline conditions would remain as present for air quality, noise, and safety. The drawdown of the UH-1 Huey helicopter would result in a decrease in helicopter operations. Therefore, minor beneficial effects would be anticipated as a result of the No Action Alternative on all three resource areas. However, COARNG would not be consistent with the Army's Transformation program to meet national security requirements.

Mitigation consists of actions that avoid, reduce, or compensate for effects caused by a Proposed Action. Under the Proposed Action or alternative, further mitigation would not be required.

6.2 Conclusions

Analyses in the EA show that implementation of the Proposed Action would not result in significant environmental effects. Issuance of a FNSI would be appropriate, and an Environmental Impact Statement would not be required before the Proposed Action may be implemented.

7. References

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DoA 2001 — Department of Army. 2001. Army Aviation Transformation and Modernization Plan (AATMP). 07 September 2001.

FICON 1992 — Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August 1992.

Keohane 2003 — LtCol Keohane. 2003. Written communication regarding baseline and proposed flight operational numbers per fiscal year. 17 June 2003.

NPS 1994	National Park Service (NPS). 1994. Report to Congress. Report on Effects of Aircraft Overflights on the National Park System Prepared Pursuant to Public Law 100-91, The National Parks Overflights Act of 1987. 12 September 1994.
Stalter 2003	Stalter, J. 2003. Personal communication from Mr. Jeff Stalter (CIV) and Mr. Gus Hare (e^2M) regarding Buckley Air Force Base aircraft mishaps. 24 June 2003.
USAF 2001	U.S. Air Force (USAF). 2001. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. July 2001.
USEPA 1972	U.S. Environmental Protection Agency (USEPA). 1972. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Publication No. 550/9-74-004, Washington, D.C
USEPA 1999	U.S. Environmental Protection Agency (USEPA). 1999. AP-42 Volume II, Off-Highway Mobile Sources, Table II-1-8. September 1999.

8. List of Preparers

This EA has been prepared under the direction of COARNG, NGB, and the U.S. Army. Individuals who contributed to the preparation of this document are listed below.

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9. Distribution List

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APPENDIX A

AGENCY CONSULTATION LETTERS

Mr. Horst Greczmiel
Council on Environmental Quality (CEQ)
360 Old Executive Office Building, NW
Washington, DC 20501

Dear Mr. Greczmiel:

The Department of the Army, National Guard Bureau, and Colorado Army National Guard (COARNG) are preparing an Environmental Assessment of the Conversion to a General Support Aviation Battalion at Buckley Air Force Base (AFB), Colorado. The Description of Proposed Action and Alternatives (DOPAA) and the Agency Coordination Distribution List are included with this correspondence as Attachments.

The environmental impact analysis process for this proposal is being conducted by the COARNG in accordance with the Council on Environmental Quality guidelines pursuant to the requirements of the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500-1508) for implementing the procedural provisions of the National Environmental Policy Act (42 United States Code [U.S.C.] 4321 et seq.) and 32 CFR 651, *Environmental Analysis of Army Actions*, we request your participation by reviewing the attached DOPAA and solicit your comments concerning the proposal and any potential environmental consequences. Please provide written comments or information regarding the action at your earliest convenience but no later than 15 days from the receipt date of this letter. If there are any additional agencies that you feel should review and comment on the proposal, please include them in your distribution of this letter and the attached materials.

Please address questions concerning or comments on the proposal to our consultant, engineering-environmental Management, Inc. (e^2M). The point-of-contact at e^2M is Mr. Gustin Hare. He can be reached at (210) 348-6000. Please forward your written comments to Mr. Hare, in care of e^2M, Inc., 506 E. Ramsey, Suite 3, San Antonio, Texas 78216. Thank you for your assistance.

Sincerely,
engineering-environmental Management, Inc.

Gustin Hare
Project Manager

Attachments:
1. DOPAA
2. Distribution List

Colorado State Parks

1313 Sherman Street, Room 618 • Denver, Colorado 80203 • Phone (303) 866-3437• FAX (303) 866-3206 • **www.parks.state.co.us**

September 16, 2003

E^2M
506 E. Ramsey, Suite 3
San Antonio, TX 78216

Attention: Mr. Gustin Hare

Dear Sir:

Thank you for the opportunity to review the "Environmental Assessment of Conversion to General Support Aviation Battalion at Buckley Air Force Base, Colorado".

At this time Colorado State Parks has no comments or concerns with the Proposed Action in relation to this Environmental Assessment.

If you need additional information feel free to contact our High Plains Regional Manager David Giger at 303-866-3203 x331.

Sincerely,

Lyle Laverty, Director
Colorado State Parks

cc: David Giger, High Plains Region Manager

Gustin Hare

From: Allen.Dana@epamail.epa.gov
Sent: Thursday, September 18, 2003 2:56 PM
To: ghare@e2m.net
Subject: EA Scoping Issues for Buckley

EPA has just a few issues that should be addressed in the environmental assessment for conversion of Buckley Air Force Base to General Support Aviation Battalion:

> Noise appears to be the main issue. What are they sensitive receptors to noise impacts, i.e., residences, nursing homes? How will noise from the base and training areas change as a result of the conversion. Will there be any noise abatement measures added or continued to reduce noise impacts such as limiting the hours of flight or areas of fight.
> We understand that there will be some building changes as a result of the conversion addressed in a later environmental assessment. We recommend that the Air Force increase the efficiency of NEPA by combining connected and/or related actions into the same NEPA analysis.
> If some of the building changes become incorporated into this environmental analysis, EPA is typically concerned with wetland/riparian and water quality impacts on these types of projects. For example, run off from maintenance and deicing activities can have major impacts on water quality.

A more direct address for Region 8 NEPA is:

Dana Allen
allen.dana@epa.gov
NEPA Program (303)
312-6870, Fax (303) 312-6897
EPA Region 8 (EPR-N)
999 18th Street, Suite 300
Denver, Colorado 80202-2466

DEPARTMENT OF MILITARY AND VETERANS AFFAIRS
ENVIRONMENTAL OFFICE
6848 SOUTH REVERE PARKWAY
CENTENNIAL, COLORADO 80112-6709

23 September 2003

Ms. Dana Allen
Environmental Protection Agency, Region 8 (EPR-N)
999 18th Street, Suite 300
Denver, Colorado 80202-2466

Dear Ms. Allen:

Reference your email dated 18 September 2003 regarding the Environmental Assessment for Aviation Transformation of the Colorado Army National Guard Light Utility Battalion stationed at Buckley Air Force Base.

The noise impacts of the proposed action will be minimal. Currently, Buckley Air Force Base operates fixed wing F-16 aircraft as well as UH-1 Huey's and UH-60 Blackhawks. The end result of the proposed action will be a net loss of Colorado Army National Guard aircraft, as the UH-1 will be removed over the next two years. Noise abatement measures will continue by limiting the number of night operations.

The Environmental Assessment for the new Army Aviation Support Facility (AASF) will be completed in early 2004. The transformation and construction activities were analyzed separately because the National Guard Bureau completed the nationwide Programmatic Environmental Assessment for Aviation Transformation in September of 2003 resulting in the Colorado Army National Guard receiving CH-47's in early fiscal year 2004. The referenced Environmental Assessment will be completed ahead of the construction Environmental Assessment to support the incoming CH-47's. The Environmental Assessment for the AASF construction will address cumulative impacts of the aircraft operations and the construction of the new facility.

If you have any further questions please contact me at (303) 677-8902.

Sincerely,

Jeff Stalter
Environmental Data Analyst
Colorado Army National Guard

Page 4-3, 4.1.5. Please reference and provide a summary of the results of the phone interviews or other commentary/documentation with the Service and the Colorado Division of Wildlife received in this section. It is not quite clear why there are no sensitive species issues with the proposed action.

Page 5-9, 5.3.2. Second line states"All type of aircraft operations would remain unchanged". Do you mean "All *other* types of aircraft operations would remain unchanged"?

In general, we found the document to be well-written. All the wildlife-related impacts, however, occur in the safety section (how wildlife impacts the proposed action) and it is not clear whether the proposed action has an overall or cumulative impact on wildlife. We might assume the BAM and BASH reduction plan mitigates this but we recommend stating it more clearly in the biological resources section.

Thank you for the opportunity to comment on the draft EA. Since you have not requested section 7 consultation under the ESA, including concurrence with any effects determinations provided for Federally listed species, we are not concurring with the information as provided. If the Service can be of further assistance, please contact Bruce Rosenlund of the Colorado Fish and Wildlife Management Assistance Office at (303) 275-2393.

Sincerely,

Susan C. Linner
Colorado Field Supervisor

cc: FWS, B. Rosenlund
FWSR6/ES, S. Vana-Miller

City of Aurora

Planning Department
15151 E. Alameda Parkway
Aurora, Colorado 80012
Phone: 303-739-7250
Fax: 303-739-7268
www.auroragov.org

September 24, 2003

Mr. Gustin Hare
e^2M, Inc.
506 E. Ramsey, Suite 3
San Antonio, TX 78216

Dear Mr. Hare:

Re: Draft Environmental Assessment of Conversion to General Support Aviation Battalion at Buckley AFB

The City of Aurora, Colorado, appreciates the opportunity to comment on the Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the Conversion to General Support Aviation Battalion by the Colorado Army National Guard (COARNG) at Buckley Air Force Base, Colorado.

Project Overview:

It is our understanding that the proposed conversion from a Light Utility Battalion to a General Support Aviation Battalion will involve the following:

- Planned phase out of the 31 existing UH-1 Huey helicopters
- Addition of 10 UH-60 Black Hawk helicopters to the existing 6 Black Hawk aircraft
- Addition of seven CH-47 Chinook helicopters
- Training missions would involve a variety of utility and cargo aircraft missions for both the offensive and defensive roles
- Planned operations involve air assault, air movement, command & control, casualty evacuation, combat search & rescue, stability & support, combat service & support, and fueling.

The Planning Department staff has reviewed the above-referenced document and has the following comments:

Concerns - Potential for Increased Noise and Change in Noise Contours:

There are specific concerns regarding potential community noise impacts associated with helicopter operations. While there will be a reduction in the total number of aircraft from 37 to 23, the number of helicopter operations is proposed to increase. It is also our understanding that the Chinook helicopters tend to produce more noise than either the Blackhawk or Huey helicopters. The EA document appears to dismiss the potential noise impacts associated with increased operations of noisier aircraft without presenting adequate data or proposing any mitigation.

Noise Model and Operation Times - The submittal did not include noise contours modeled for the proposed helicopter operations. Increased operations of louder, more numerous and more powerful/heavy helicopters (the dual rotor Chinook) will increase the "noise signature" of helicopter operations at Buckley. This, combined with an undefined arrival and departure flight path, may cause the existing calculated Air Installation Compatible Use Zone (ACUIZ) noise contours from 1998 to expand. In calculating noise contours, standard practice as prescribed by the FAA is to weight nighttime operations with an additional 10-decibel "penalty". This is due to the impacts of noise on sleep patterns. Areas in Aurora likely to experience increased noise impacts would be those directly east and west of the base and not aligned with noise contours previously modeled for jet aircraft operations. Expanded actual noise contours could negatively impact city residents, businesses, property owners, schools and other uses characterized by higher occupancy levels. New modeled noise contours should be compared to noise models of current helicopter operations at Buckley.

Flight Paths - It is not clear that a preferred flight path has been proposed for the new helicopter operations. For comparison purposes, the City has previously worked with the Aurora Medical Center to establish a standard flight path for helicopter operations associated with the hospital. The flight path is generally aligned with I-225. To mitigate the increased noise anticipated from a larger size helicopter proposed for Buckley (Chinook), and considering that helicopter operations are dissimilar to jet aircraft operations, a preferred flight path specifically for helicopters would be desirable. The flight path could be for normal operations such as training and exercises. An initial flight path alignment concept is the E-470 roadway between I-70 on the north and I-25 on the south.

Specific Comments of the Draft EA:

Page 5-6 – Table 5-5: The total number of helicopters at Buckley AFB in 2003 is not correct. Based on the data presented in the table, the total number of aircraft should be 23, not 29. The air emissions data presented in this table are confusing. We suggest showing total actual emissions by year in one line and then showing the net emissions increase (NEI) in a second line. (Total emissions minus Baseline emissions equal NEI for a given year.) The data presented in the appendix appears to be correct and should correspond with the data presented in the text of the document.

Page 5-7, line 20 (Section 5.2.3): The word *drawdown* is confusing in its current context. Suggest replacing the word "drawdown" with "planned retirement" or "phased retirement".

Page 5-8, Table 5-6: See comments for Table 5-5 above.

Page 5-9, Section 5.3.1, 1st paragraph: Suggest reworking the last three sentences of this paragraph to eliminate the confusion created by the current sentence order. The sentence beginning in line 9 states that UH-1 operations would decrease; however, this sentence immediately follows the statement that helicopter operations would increase.

Page 5-9, Section 5.3.1, 2nd paragraph: Based on the noise impact criteria listed on the previous page, a change in the annual noise contour would be considered an adverse impact.

Page 5-9, 3rd paragraph: Operation of louder aircraft at an increased frequency would change the annual 65 dBA contour which would constitute an adverse impact. Mitigation of this adverse impact should be discussed in this EA.

Page 5-9, 4th paragraph: This paragraph is confusing. Noise from the operations of the CH-47 Chinook aircraft should be considered independently from the noise of "other louder aircraft". The combination of the noise from the Chinook and "other louder aircraft" should be discussed under Cumulative Impacts. It is unclear how the Proposed Action consisting of a permanent reassignment of louder aircraft to BAFB would constitute a "temporary" and "minimal impact" without "any long-term noise effects."

Page 5-10, 1st paragraph beginning in Line 2: The noise impact criteria listed on page 5-8 indicate that a change in the annual noise contours would be considered an adverse impact.

Pages 5-11 and 5-12 – Tables 5-7, 5-8, and 5-9: Please explain what Classes A, B, and C refer to.

Page 5-13, Section 5.5: The Army National Guard needs to consider mitigation for the adverse noise impact associated with the increase in operations of louder aircraft. Potential mitigation could include ensuring that aircraft adhere to established flight corridors, particularly over urban areas and adding noise insulation and windows to homes affected by the change in the dBA contour.

Page 5-13, Section 5.6, Cumulative Impacts: The combination of the noise from the Chinook and "other louder aircraft" mentioned in the 4th paragraph on page 5-9 should be discussed in this section.

Page 6-1, section 6.1 – Findings – Noise: Please explain how the noise impacts are temporary. The Proposed Action would result in the permanent assignment of noisier aircraft to the base and would increase the 65 dBA contour.

Page 6-2 – top of page: Mitigation of the noise impacts should be discussed here as well.

Appendix B – Noise: The results of the noise modeling should be presented in the appendix. Please show a map of where the 65 dBA contour would be affected by the increased operations of noisier aircraft.

Appendix C – Air Quality Calculations: The numbers presented in the appendix appear to be correct. These numbers should be consistent with those presented in the text of the document. (See comments on Table 5-5.)

The City is concerned over the method used to transmit the proposal. The COARNG's contractor sent an undated cover letter, which was not on letterhead stationery, to the Mayor's office, including a copy of the "Description of Proposed Action and Alternatives" for the EA. The document that was sent did not contain sufficient information to adequately evaluate the proposed action. A copy of the draft EA had to be specifically requested in order to complete the review.

Before the City can endorse the proposed action, we would like to meet in order to discuss our concerns over potential increases in aircraft noise levels.

Sincerely,

Denise M. Balkas, A.I.C.P.
Director of Planning

DMB/jai/bb
cc: Mayor Paul E. Tauer
Kathy Green, Council Member
Ronald S. Miller, City Manager
Nancy Freed, Deputy City Manager of Operations
George Zierk, Deputy City Attorney
Ricky Bennett, Police Chief
Casey Jones, Fire Chief
Jim A. Ives, Environmental Program Supervisor
Jeff Stalter, Colorado Department of Military Affairs
Col. Allen Kirkman Jr., Commander Buckley AFB
John Spann, Buckley AFB Public Affairs

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City of Aurora

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November 18, 2003

Mr. Jeff Statler
Environmental Data Analyst
Colorado Department of Military & Veterans Affairs
6848 South Revere Parkway
Centennial, CO 80112-6709

Dear Mr. Statler:

Re: Draft Environmental Assessment of Conversion to a General Support Aviation Battalion at Buckley AFB

The City of Aurora, Colorado, would like to retract the comments in the letter dated September 24, 2003, addressed to Mr. Gus Hare regarding the above-referenced document. It is our understanding that the document, which we had reviewed and prepared comment on was an internal working draft that had accidentally been released by your consultant to the City. We appreciated the opportunity to have met with you and your colleagues on October 29, 2003, concerning the Draft Environmental Assessment (EA) for the Conversion to General Support Aviation Battalion by the Colorado Army National Guard (COARNG) at Buckley Air Force Base, Colorado. At this meeting, we discussed the official EA and cleared up the confusion over the inadvertent release of the draft document.

Project Overview:

It is our understanding that the proposed conversion from a Light Utility Battalion to a General Support Aviation Battalion will involve the following:

- Planned phase out of the 31 existing UH-1 Huey helicopters
- Addition of 10 UH-60 Black Hawk helicopters to the existing 6 Black Hawk aircraft
- Addition of seven CH-47 Chinook helicopters
- Training missions would involve a variety of utility and cargo aircraft missions for both the offensive and defensive roles
- Planned operations involve air assault, air movement, command & control, casualty evacuation, combat search & rescue, stability & support, combat service & support, and fueling.

The current document appears to have addressed several of our concerns that were expressed in the October 24th letter. Based on our meeting and the Planning Department staff's review of the above-referenced document, we do, however, have the following comments:

Concerns Over Increased Aircraft Noise:

There are still some specific concerns regarding potential community noise impacts associated with the proposed helicopter operations. While the number of helicopters will be less, the number of helicopter operations or flights is proposed to increase. We concur with the assessment that during times when other louder aircraft are operating in the vicinity of Buckley AFB, the helicopter operations will have minimal effect on noise levels. However, when there are no other aircraft operating other than the helicopters, the single event overflights and resulting sound exposure levels (SELs) will create a perceptible noise source. These impacts are generally expected to be temporary, subjective annoyances. We recognize the importance of the military mission and the fact that the associated adverse noise impacts are anticipated to be minor and will not result in any long-term noise effects. There will also be a slight increase in the 65 dBA (NL) contour which has been defined in the EA as an adverse impact. Specific comments on the EA noise sections follow:

Section 2.2 Operations, Pages 2-3 through 2-4: This section states that principal departure and arrival corridors are to the northwest, southeast and due west and due east. This explanation is supported by Figure 2-2, COANG Flight Tracks. Planning staff suggests that this data would be more valuable to the city if estimates of distribution of operations were assigned to the departure and arrival corridors.

Section 4.3 Noise, Page 4-15: This text is confusing in that it states that noise levels in excess of 65 dBA (DNL) do not exist for Buckley operations. The text goes on to state that land use areas or residences in the proximity to Buckley AFB are not within the 65 dBA (DNL) contour area. The ACUIZ map currently in use by the Planning Department includes the 65 dBA (DNL) contour, which in fact extends beyond the base area and impacts residentially zoned land. The areas are generally located at 14th Avenue and Ventura Street, and east of Himalaya Street north and south of 6th Avenue. This discrepancy should be explained.

Specific Comments of the Draft EA:

Section 4.2.2 Air Quality - Existing Conditions, Page 4-10:

- As a suggestion, much of the existing text can be deleted. The text should simply describe the current air quality status of the region and state that Buckley AFB has a Title V Permit.
- The Denver metropolitan area is classified as attainment/maintenance for ozone, carbon monoxide, and PM_{10}. The description in the text is incorrect.
- Buckley AFB is a major source for oxides of nitrogen (NOx) and sulfur dioxide (SO_2) and was originally issued Title V Operating Permit Number 95OPAR118 on August 28, 1997. The permit was renewed on July 1, 2002. Buckley is, however, not a synthetic minor source as stated in the text. The term synthetic minor has been used in regard to the Prevention of Significant Deterioration (PSD) status and not for the Base operating permit status.

Section 5-2 Air Quality, Page 5-1: The Denver metropolitan area is not an "attainment" area as stated in the text. It is classified as "attainment/maintenance" for ozone, carbon monoxide,

and PM_{10}, and is therefore subject to the General Conformity requirements. In the significance criteria, it is therefore more appropriate to compare emissions from the proposed project to the General Conformity de minimis thresholds of 100 tons/year, than to compare the emissions to the 1999 regional emissions inventory.

Section 5-2 Air Quality, Page 5-1, last paragraph: The discussion of the PSD requirements is only applicable to stationary sources and is therefore not applicable to the proposed project. This entire paragraph could be deleted.

Section 5-2.1 Proposed Action, Page 5-2, first paragraph: Again, the attainment classification for the Denver region is incorrect.

Section 5-2.1 Proposed Action, Page 5-2, second paragraph: The General Conformity rule is applicable to the proposed project since the base is located in an attainment/maintenance area. The General Conformity rule applies in all "nonattainment" areas, as well as, "attainment/maintenance" areas.

Table 5-4, Page 5-5: Project emissions should be compared with the General Conformity de minimis thresholds rather than to the regional emission inventory.

Tables 5-4 and 5-5, Pages 5-5 & 5-7: For the year 2003, emissions are calculated for the CH-47 aircraft even though the total number of annual flight hours is listed as zero. This seems counter-intuitive and is not explained in the text.

The City of Aurora appreciates the opportunity to have reviewed the draft EA. We look forward to receiving the Final Environmental Assessment and would ask that it address the issues raised in this correspondence.

Sincerely,

Denise M. Balkas, A.I.C.P.
Director of Planning

DMB/jai/bb
cc: Mayor Ed Tauer
Kathy Green, Council Member
Ronald S. Miller, City Manager
Nancy Freed, Deputy City Manager of Operations
George Zierk, Deputy City Attorney
Ricky Bennett, Police Chief
Casey Jones, Fire Chief
Jim A. Ives, Environmental Program Supervisor
Col. Allen Kirkman Jr., Commander Buckley AFB
John Spann, Buckley AFB Public Affairs

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
755 Parfet Street, Suite 361
Lakewood, Colorado 80215

IN REPLY REFER TO:
ES/CO: Buckley/Chinook EA
Mail Stop 65412

JAN - 9 2004

Mr. Jeff Stalter
Colorado Department of Military Affairs
6848 South Revere Parkway
Centennial, Colorado 80112-6709

Re: Review of the Draft Environmental Assessment (EA) of Conversion to General Support Aviation Battalion at Buckley Air Force Base, Colorado

Dear Mr. Stalter:

The U.S. Fish and Wildlife Service (Service) received the subject document and request for comments from you via email on December 2, 2003. The comments below have been prepared under the provisions of the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327) and the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.).

Page 2-5, Training Locations. Fort Carson total acreage figure is 137,403.75. If there is additional acreage added because of some off post aviation facilities, please specify. We believe the correct name of the "Pueblo Depot Activity" should be "Pueblo Chemical Depot".

Page 2-6, 2.3. It is stated that the removal and fielding would take place over a period of several years; then the last sentence says it would be completed in FY 2005.

Page 3-1, Alternatives Considered. We recommend adding a section 3.5 "Alternatives Considered but Rejected" or some other such wording, giving a short explanation as to why the fielding is not being done at Fort Carson or another military base, or a new facility being built. Even though these decisions are made at a higher level, we suggest you explain that they were considered and are not viable alternatives for whatever reasons (e.g., Fort Carson already over-taxed, too many impacts from a new facility, etc.).

Page 4-2, 4.1.3. Change Principal to Principle.

DOCUMENT REVIEW COMMENTS

DOCUMENT REVIEWED:	EA FOR CONVERSION TO GENERAL SUPPORT AVIATION BATTALION BUCKLEY AIR FORCE BASE, COLORADO
REVIEWER'S NAME:	USFWS C/O BRUCE ROSENLUND
DATE REVIEWED	13 JANUARY 2004
OFFICE SYMBOL:	COARNG-ENV
PHONE NUMBER:	303-677-8902

No.	*Section*	*Pg*	*Line #*	*Comment*	*Response*
1	Training locations	2+-5		Ft. Carson total acreage figure is 137,403.75. If there is additional acreage added because of some off-post aviation facilities, please specify. We believe the correct name of the "Pueblo Depot Activity" should be "Pueblo Chemical Depot".	Acreages changed. Text revised for correct name of the PCD.
2	2.3	2-6		It is stated that the removal and fielding would take place over a period of several years; then the last sentence says it would be completed in FY 2005.	Text revised to state that the removal and fielding would be completed in FY 2005.
3	Alternatives Considered	3-1		Recommend adding section 3.5 "alternatives considered but rejected" or some other such wording, giving a short explanation why the fielding is not being done at Ft. Carson or another military base, or a new facility being built. Even though these decisions are made at a higher level, we suggest you explain that they were considered and are not viable alternatives for whatever reasons.	The aircraft must be fielded where the COARNG currently has the infrastructure. The infrastructure currently exists at the Army Aviation Support Facility located at BAFB.
4	4.1.3	4-2		Change principal to principle	Text revised
5	4.1.5	4-3		Please reference and provide a summary of the results of the phone interviews or other commentary/documentation with the Service and the Colorado Division of Wildlife received in this section. It is not quite clear why there are no sensitive species issues with the proposed action.	A request for comments was originally sent to the USFWS in July 2003 with no response. A section regarding sensitive species (raptors, burrowing owl) at BAFB and the potential impacts has been added.
6	5.3.2	5-9		Second line states, "all type of aircraft operations would remain unchanged". Do you mean, "All *other* types of aircraft operations would remain unchanged"?	Text revised.

No.	Section	Pg	Line #	Comment	Response
7	General			Wildlife related impacts occur in the safety section (how wildlife impacts the proposed action) and it is not clear whether the proposed action has an overall or cumulative impact on wildlife. We might assume that the BAM and BASH reduction plan mitigates this but we recommend stating it more clearly in the biological resources section.	Biological resources section has been updated to include impacts of the proposed action on wildlife. Current sections have been revised to explain, in more detail, how the BAM and BASH plans mitigate impacts to wildlife.

Gustin Hare (e2M)

To: Stalter, Jeff (CIV)
Subject: RE: Response to comments

-----Original Message-----
From: Bruce_Rosenlund@fws.gov [mailto:Bruce_Rosenlund@fws.gov]
Sent: Monday, January 26, 2004 4:36 PM
To: Stalter, Jeff (CIV)
Cc: Susan_Linner@fws.gov; romeror@carson.army.mil
Subject: Re: Response to comments

Mr. Stalter:

Thank you for the below information, and corrections.

Based upon the updated information received on 14 January 2004, we concur with the EA for Conversion to General Support Aviation Battalion Buckley Air Force Base, Colorado.

If you need additional information, or have questions, please contact Bruce D. Rosenlund, Project Leader, Colorado Fish and Wildlife Assistance Office,
Rm 496, Lakewood, Colorado 80215. Telephone 303 275-2393.

-----Original Message-----
From: Stalter, Jeff (CIV)
Sent: Monday, January 14, 2004 1:36 PM
To: Bruce_Rosenlund@fws.gov [mailto:Bruce_Rosenlund@fws.gov]
Subject: Response to comments

Bruce,

Attached is the response to USFWS comments to the EA that was recently reviewed. If the USFWS is comfortable blessing this action based off our response to comments then the EA can be submitted to National Guard Bureau for final approval. Once approved I will forward a final copy of the EA for your office. If the USFWS does decide to bless this action all I need is an email from yourself and I will incorporate the letter I received, the response matrix and the email into the final EA.

This action is very important to the Colorado Guard. There is a net loss of aircraft and although the number of operations has the potential to increase the likelihood of that happening is slim to none.

Again, I would like to thank you for the timely review and all of your help with this EA review. Also, could you forward me the procedure for requesting sec 7 consultation with the Service as we have several other EA's that are being prepared and will heading your way. Thanks.

Jeff Stalter
NEPA Coordinator
Environmental Data Analyst
Colorado Army National Guard
303-677-8902
<<USFWS review comment.doc>>
(See attached file: USFWS review comment.doc)

DEPARTMENT OF MILITARY AND VETERANS AFFAIRS
ENVIRONMENTAL OFFICE
6848 SOUTH REVERE PARKWAY
CENTENNIAL, COLORADO 80112-6709

COARNG-ENV 07 April 2004

MEMORANDUM FOR RECORD

SUBJECT: Meeting with City of Aurora regarding CH-47 fielding at Buckley Air Force Base

1. Members of the COARNG and the City of Aurora met on 29 October 2003 to discuss the draft EA for the fielding of the CH-47 Chinook helicopters at the AASF stationed at Buckley Air Force Base.

2. Representatives of the City of Aurora discussed concerns regarding noise and air quality impacts. They also shared concerns with the way in which they received the draft EA for review. COARNG staff explained that it was mix up and that the draft the City received was an internal document not ready for outside agency review.

3. The Representatives of the City understood and COARNG staff members explained the proposal and went into great detail regarding noise issues.

4. At the conclusion of the meeting the City Representatives did not have any concerns regarding the proposal and did not see the implementation of the proposed action to be an issue. The City Representatives said that they would retract their first letter and submit another letter with additional comments.

5. The second letter, dated 18 November 2003, did retract the City's earlier comments and added some additional comments that they would like to have addressed in the EA. The letter ended with the comment that they look forward to the final draft, indicating that so long as we address the comments contained within the letter the City accepted the proposed action.

6. The comments received from the City of Aurora were addressed and a response matrix was added to the final EA.

FOR THE CHIEF, ENVIRONMENTAL BRANCH:

Jeff M. Stalter
NEPA Coordinator,
Environmental Data Analyst
Colorado Army National Guard

Comment Response Matrix for City of Aurora Planning Department Comments on the Environmental Assessment of Proposed Conversion to General Support Aviation Battalion at Buckley AFB, Colorado						
#	Location			Comment	Reviewer	COARNG's Response
	Page	Line	Section			
1	2-3 to 2-4	--	2.2, Operations	This section states that principal departure and arrival corridors are to the northwest, southeast and due west and due east. This explanation is supported by Figure 2-2, COANG Flight Tracks. Planning staff suggests that this data would be more valuable to the city if estimates of distribution of operations were assigned to the departure and arrival corridors.	Denise Balkas, Director of Planning	All aircraft operations estimates of distribution on the various different flight tracks are a function of the NOISEMAP 6.5 modeling software. This data can be provided directly to the City of Aurora.
2	4-15	--	4.3, Noise	This text is confusing in that it states that noise levels in excess of 65 dBA (DNL) do not exist for Buckley operations. The text goes on to state that land use areas or residences in proximity to Buckley AFB are not within the 65 dBA (DNL) contour area. The AICUZ map currently in use by the Planning Department includes the 65 dBA (DNL) contour which in fact extends beyond the base area and impacts residentially zoned land. The areas are generally located at 14th Avenue and Ventura Street, and east of Himalaya Street north and south of 6th Avenue. This discrepancy should be explained	Denise Balkas, Director of Planning	Text revised per comment. The UH-1N has a different noise footprint than the CH-47, however, the increased footprint would not have an affect in the over 65 dBA (DNL) noise contour at the base. Land use section was revised per comment.

Comment Response Matrix for City of Aurora Planning Department Comments on the Environmental Assessment of Proposed Conversion to General Support Aviation Battalion at Buckley AFB, Colorado						
#	Location			Comment	Reviewer	COARNG's Response
	Page	Line	Section			
3	4-10	--	4.2.2 Air Quality, Existing Conditions	▪ As a suggestion, much of the existing text can be deleted. The text should simply describe the current air quality status of the region and state that Buckley AFB has a Title V Permit. ▪ The Denver metropolitan area is classified as attainment/maintenance for ozone, carbon monoixed, and PM_{10}. The description in the text is incorrect. ▪ Buckley AFB is a major source for oxides of nitrogen (NO_x) and sulfur dioxide (SO_2) and was originally issued Title V Operating Permit Number 95OPAR118 on August 28, 1997. The permit was renewed on July 1, 2002. Buckley is, however, not a synthetic minor sources as stated in the text. The term synthetic minor has been used in regard to the Prevention of Significant Deterioration (PSD) status and nor for the Base operating permit status.	Denise Balkas, Director of Planning	▪ Comment noted. ▪ Comment incorporated. ▪ Air quality section revised to address changes.
4	5-1	--	5-2, Air Quality	The Denver metropolitan area is not an "attainment" area as stated in the text. It is classified as "attainment/maintenance" for ozone, carbon monoxide, and PM_{10}, and is therefore subject to the General Conformity Requirements. In the significance criteria, it is therefore more appropriate to compare emissions from the proposed project to the General Conformity de minimis thresholds of 100 tons/year, than to compare the emissions to the 1999 regional emissions inventory.	Denise Balkas, Director of Planning	Air quality section revised to address changes.

Comment Response Matrix for City of Aurora Planning Department Comments on the Environmental Assessment of Proposed Conversion to General Support Aviation Battalion at Buckley AFB, Colorado						
#	Location			Comment	Reviewer	COARNG's Response
	Page	Line	Section			
5	5-1	Last par.	5-2, Air Quality	The discussion of the PSD requirements is only applicable to stationary sources and is therefore not applicable to the proposed project. This entire paragraph could be deleted.	Denise Balkas, Director of Planning	Comment incorporated.
6	5-2	1st par.	5-2.1, Proposed Action	Again, the attainment classification for the Denver regions is incorrect.	Denise Balkas, Director of Planning	Comment incorporated.
7	5-2	2nd par.	5-2.1, Proposed Action	The General Conformity rule is applicable to the proposed project since the base is located in an attainment/maintenance area. The General Conformity rule applies in all "nonattainment" areas, as well as, "attainment/maintenance areas."	Denise Balkas, Director of Planning	Comment incorporated.
8	5-5	--	Table 5-4	Project emissions should be compared with the General Conformity de minimis thresholds rather than to the regional emission inventory.	Denise Balkas, Director of Planning	Air quality section revised to address changes.
9	5-5 & 5-7	--	Table 5-4 and 5-5	For the year 2003, emissions are calculated for the CH-47 aircraft even though the total number of annual flight hours is listed as zero. This seems counter-intuitive and is not explained in the text.	Denise Balkas, Director of Planning	Comment noted and flight hours included.

APPENDIX B

PUBLIC PARTICIPATION AND COMMENT RESPONSE

The following Notice of Availability was published in the Denver Post and Rocky Mountain News on 14 October 2003 for release of the Draft EA. In addition, the Privacy Advisory (shown below) was presented in the Cover Sheet of the Draft EA. Tear sheets of the Notices of Availability are provided here in Appendix B. No public comments were received during either of the public comment periods.

PUBLIC NOTICE

Notice of Availability
Draft Environmental Assessment of
Conversion to General Support Aviation Battalion at
Buckley Air Force Base, Colorado

COLORADO ARMY NATIONAL GUARD – Colorado Army National Guard has prepared a Draft Environmental Assessment (EA) of Conversion to General Support Aviation Battalion stationed at Buckley Air Force Base, Colorado. The analysis considered potential effects of the proposed action on twelve resource areas: airspace, land use, geological resources and soils, water resources, biological resources, socioeconomics, environmental justice, hazardous materials and waste management, cultural resources, air quality, noise, and safety.

Copies of the Draft EA showing the analysis are available for review at the following locations:

- *Aurora Public Library*
  14949 E. Alameda Parkway
  Aurora, CO 80012
  303-739-6600
- *Denver Public Library*
  10 W. Fourteenth Ave. Pkwy.
  Denver, CO 80204-2731
  720-865-1111

Public comments on the Draft EA will be accepted for 15 days from the date of this publication.

Written comments and inquiries on the Draft EA should be directed to the Colorado Army National Guard Public Affairs Office, Colorado Department of Military and Veterans Affairs, 6848 South Revere Parkway, Centennial, Colorado 80112-6709, (303) 677-8850.

PRIVACY ADVISORY

Your comments on this EA are requested. Letters or other written comments provided may be published in the EA. Comments will normally be addressed in the EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public comment period or to fulfill requests for copies of the EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the EA. However, only the names of the individuals making comments and specific comments will be disclosed; personal home addresses and phone numbers will not be published in the EA.

Ancient Puebloans organized convoys

MAIZE FROM PAGE 1A

ing levels depending on the age of rock. Researchers around the globe have used the isotope in tooth enamel to determine the origin of buried human remains and have analyzed strontium's presence in ancient river beds to track the flow of long-gone rivers. Strontium can be swept, as dust, by the wind. It trickles through water, laces soil and becomes concentrated in plants plucked from that soil.

The dried Chaco Canyon corn cobs, as well, reflected the unique isotopic signature of the soil in which they were grown. The signature in corn found in Chaco was a perfect match for soil that lay 50 miles away, at the base of the Chuska Mountains, and flood plains 55 miles to the north. Next, the tracing technique will be tried on deliberately burned corn cobs that are the bulk of what is recovered at the archaeological sites.

At the time of the corn's harvest, there were no wheeled vehicles. America's horses had gone extinct, and explorers were hundreds of years from reintroducing the species. While there were small dogs, Indians didn't use them as pack animals, Cordell added.

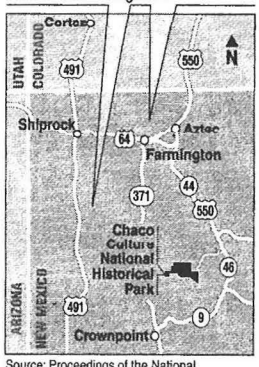
People imported the corn on their backs.

Benson, a U.S. Geological Survey researcher who was lead author of the paper, wouldn't say whether voluntary or slave labor was used. "We didn't want to get political," he said.

Relying on well-marked foot trails, ancient Puebloans didn't just import maize to feed a population that swelled during ritual ceremonies. They imported turquoise for ornaments, ceramics, chert for

Researchers trace Chaco Canyon history

Ancient Puebloans who built and used Chaco Canyon's mysterious great houses carried maize on their backs more than 50 miles, Colorado researchers say. Scientists used trace elements to pinpoint soil where the ancient corn was grown.



Source: Proceedings of the National Academy of Sciences

The Denver Post

about individual farmers or households where your own property or your own territory was your livelihood," CU's Cordell said.

From the Navajo standpoint, a being called the Great Gambler gave order in Mesoamerica, dictating the movement of material and asking for monumental construction projects in the middle of desert that couldn't support humans, said John Stein, a co-author on the Proceedings of the National Academy of Sciences paper.

During the equinox and solstice, the sun's rays and shadows were

INSIDE STORY

"I'm Craig," Holm gently began. "We're here to get you out of here . . . How ya doing? Talk to me." Rod mumbled incoherently.

Rescuer Craig Holm

LUCAS M. GILMAN/ASSOCIATED PRESS

Craig Holm, a Jenny Lake ranger, clips into the god ring, which is attached to a litter, as Ranger Marty Vidak calls in a helicopter during rescue training last month in Grand Teton National Park, Wyo.

Teetering between life and death, climber shows grit

Last of three parts

Rod was too weak to tell Holm

The following Notice of Availability was published in the Denver Post and Rocky Mountain News on 22 March 2004 for release of the Draft FNSI and Final EA. Tear sheets of the Notices of Availability are provided here in Appendix B. No public comments were received during the public comment period.

PUBLIC NOTICE

Notice of Availability
Final Environmental Assessment and Draft Finding of No Significant Impact of Conversion to General Support Aviation Battalion at Buckley Air Force Base, Colorado

COLORADO ARMY NATIONAL GUARD – Colorado Army National Guard has prepared a Final Environmental Assessment (EA) and Draft Finding of No Significant Impact (FNSI) of Conversion to General Support Aviation Battalion stationed at Buckley Air Force Base, Colorado. The analysis considered potential effects of the proposed action on twelve resource areas: airspace, land use, geological resources and soils, water resources, biological resources, socioeconomics, environmental justice, hazardous materials and waste management, cultural resources, air quality, noise, and safety.

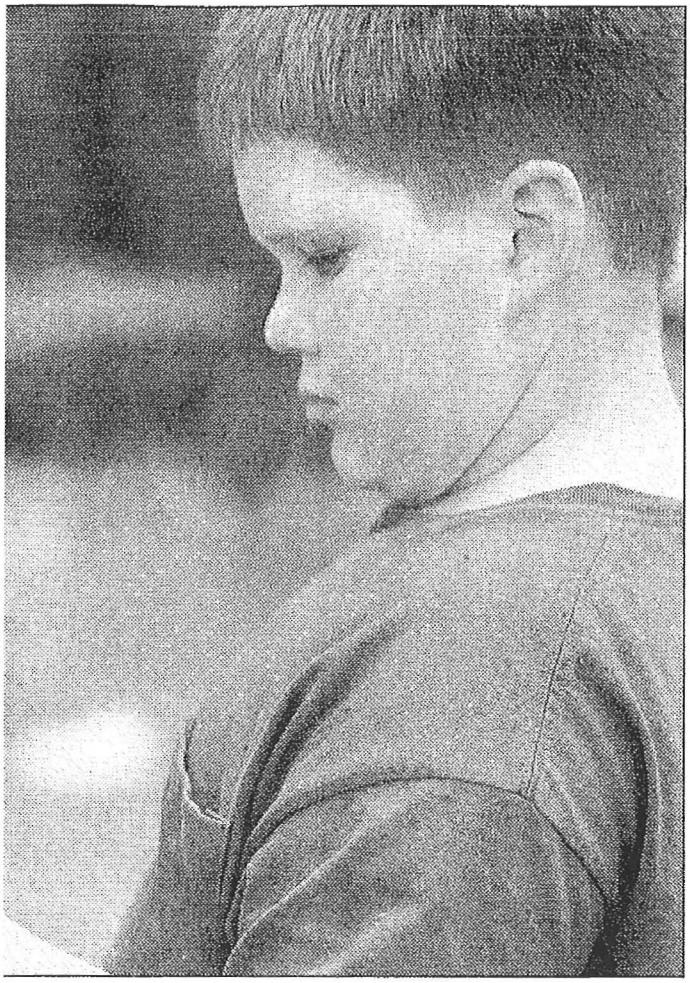
Copies of the Final EA and Draft FNSI showing the analysis and proposed approval are available for review at the following locations:

- *Aurora Public Library*
  14949 E. Alameda Parkway
  Aurora, CO 80012
  303-739-6600
- *Denver Public Library*
  10 W. Fourteenth Ave. Pkwy.
  Denver, CO 80204-2731
  720-865-1111

Public comments on the Final EA and Draft FNSI will be accepted for 15 days from the date of this publication.

Written comments and inquiries on the Final EA and Draft FNSI should be directed to the Colorado Army National Guard Public Affairs Office, Colorado Department of Military and Veterans Affairs, 6848 South Revere Parkway, Centennial, Colorado 80112-6709, (303) 677-8850.

EXAS DOG SHOW



Associated Press / **Joyce Marshall**

f his family's Gordon setter Sunday while grooming the ub's 94th All-Breed Dog Show in Fort Worth, Texas.

der God' key eigh Pledge law

of the "undeniable his- that the nation was individuals who be- ," an empirical state- ses no threat to the church and state.

o the Christian Legal up of lawyers, judges s, the Pledge has a gious cast, and prop- group's brief says the God" support the con- ed government, serv-

reciting the Pledge is a way of proclaiming "our reliance on God" and of "humbly seeking the wisdom and blessing of divine providence." This letter, clearly in some conflict with the current official view, concluded by expressing the wish that "the Almighty continue to watch over the United States of America."

Americans United for Separation of Church and State and other organizations that oppose the ad-

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Mystery elk illness may restrict hunting season

Associated Press

ROCK SPRINGS, Wyo. — Hunters have been flooding the state Game and Fish Department with calls asking how a mysterious ailment that has killed hundreds of elk will affect the next hunting season in south-central Wyoming.

Game and Fish officials are considering hunting restrictions in the area outside Rawlins where the elk have died, but no decisions have been made yet.

"We do not set seasons without the people's input," Game and Fish spokeswoman Lucy Diggens said.

In part because of the hunters' concerns, the department has scheduled a series of public meetings before recommendations about changes are presented to the Game and Fish Commission.

Biologists have ruled out many possibilities for the ailment, which causes elk to slump to the ground until they die of thirst or from predators, or Game and Fish Department employees put them down.

"I'm not sure when it's going to stop," Diggens said.

All typical viruses and bacteria have been ruled out as causes, along with malnutrition and poisoning from the water or air.

The leading theory is the elk were poisoned by eating lichen.

Lichen from the 50-square-mile area is being fed to healthy elk at the Sybille Research Center outside Wheatland to see if they fall ill, too. Results from those tests have not come in yet.

Experts say that except for elk herds killed by extreme winter conditions, the die-off is unprecedented in Wyoming or anywhere else.

Return: Patriarch expected to recover

Continued from 4A

Family members were tense. Hours earlier, the Cessna made an emergency landing in St. Louis because of problems with the machine that pumped oxygen into the 67-year-old's lungs, said Nabiyar's son, Jawad, 37.

Jawad stood silently, clutching his fists and watching the plane land and roll toward an ambulance set to take Nabiyar to University Hospital.

As the plane's door opened, the family — including his wife of 41-years, Ozra, and two granddaughters — rushed to see Nabiyar waking on a stretcher inside.

"I'm so happy," Ozra said, shortly after kissing every family member on the cheek. "So many months have passed without him. We all thank Senator Allard."

oped pneumonia and landed in a U.S. military hospital in northern Kabul. Fluid was building in his lungs, but doctors didn't have the equipment to help him, so he was flown to Landstuhl Regional Medical Center near a U.S. Army post in Germany.

"The hospital in Germany did a wonderful job with my father, (but) we almost lost him a couple of times," Jawad said. "They are a great first-care hospital for military purposes, but the doctors told me we had to get him out of there so he could get therapy."

The Army tried to fly him home three times in January; twice he was too sick and then the flight was canceled because of bad weather.

Because Nabiyar wasn't working for the Army or for a company, his

"Afghanistan had a Communist government at the time, and they wanted me to fight my own countrymen," many of whom were engaged in guerrilla warfare against the Communists, Jawad said. Many of his cousins fought the Soviets and, later, the Taliban.

The ultra-fundamentalist Muslims rewrote textbooks, closed all of the girls' schools and "demolished the education system," Jawad said. "Only the boys were going to school, and they were not learning anything except religion."

Jawad came to New York City as a refugee and spent two years studying architecture at the New York Institute of Technology. Ten years later, his father, mother, two sisters and a brother joined him.

Today, Jawad does carpentry

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APPENDIX C

NOISE TERMINOLOGY AND ANALYSIS METHODOLOGY

Noise Terminology and Analysis Methodology

This Appendix presents a detailed discussion of noise and its effects on people and the environment. An assessment of aircraft noise requires a general understanding of how sound is measured and how it affects people in the natural environment. The purpose of this Appendix is to address public concerns regarding aircraft noise impacts.

Section B.1 is a general discussion on the properties of noise. Section B.2 summarizes the noise metrics discussed throughout this Environmental Assessment (EA). Section B.3 provides federal land use compatibility guidelines that are used in applying aircraft noise impacts to land use planning in the airport environment.

C.1 GENERAL

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only source of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise, and typically are singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

Sound is a physical phenomenon, and consists of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant or unpleasant depends largely on the listener's current activity, past experience, and attitude toward the source of that sound. It is often true that one person's music is another person's noise.

The measurement and human perception of sound involves two basic physical characteristics, intensity and frequency. The intensity is a measure of the strength or amplitude of the sound vibrations and is expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder is the perception of that sound. The second important physical characteristic is sound frequency which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

The loudest sounds which can be detected comfortably by the human ear have intensities which are 1,000,000,000,000 times larger than those of sounds which can just be detected. Because of this vast

range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB, and}$$

$$80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB}$$

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB}$$

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

An important facet of decibel addition arises later when the concept of time-average sound levels is introduced to explain Day-Night Average Sound Level (DNL). Because of the logarithmic units, the time-average sound level is dominated by the louder levels that occur during the averaging period. As a simple example, consider a sound level which is 100 dB and lasts for 30 seconds, followed by a sound level of 50 dB which also lasts for 30 seconds. The time-average sound level over the total 60-second period is 97 dB, not 75 dB.

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels.

The minimum change in the time-average sound level of individual events which an average human ear can detect is about 3 dB. A change in sound level of about 10 dB is usually perceived by the

average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds.

Sound frequency is pitch measured in terms of hertz (Hz). The normal human ear can detect sounds which range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally well by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for the varied frequency sensitivity of people, we use the A-weighted scale that approximates the average, healthy human ear. The A-weighting de-emphasizes the low and high frequency portion of the noise signal and emphasizes the mid-frequency portion. Sound levels measured using A-weighting are most properly called A-weighted sound levels while sound levels measured without any frequency weighting are most properly called sound levels. However, since most environmental impact analysis documents deal only with A-weighted sound levels, the adjective "A-weighted" is often omitted, and A-weighted sound levels are referred to simply as sound levels. In some instances, the author will indicate that the levels have been A-weighted by using the abbreviation dBA or dB(A), rather than the abbreviation dB, for decibel. As long as the use of A-weighting is understood to be used, there is no difference implied by the terms "sound level" and "A-weighted sound level" or by the units dB, dBA, and dB(A). The A-weighting function de-emphasizes higher and especially lower frequencies to which humans are less sensitive. Because the A-weighting is closely related to human hearing characteristics, it is appropriate to use A-weighted sound levels when assessing potential noise effects on humans and many terrestrial wildlife species. In this document, all sound levels are A-weighted and are reported in dB.

Sound levels do not represent instantaneous measurements but rather averages over short periods of time. Two measurement time periods are most common – 1 second and 1/8 of a second. A measured sound level averaged over 1 second is called a slow response sound level; one averaged over 1/8 of a second is called a fast response sound level. Most environmental noise studies use slow response measurements, and the adjective "slow response" is usually omitted. It is easy to understand why the proper descriptor "slow response A-weighted sound level" is usually shortened to "sound level" in environmental impact analysis documents.

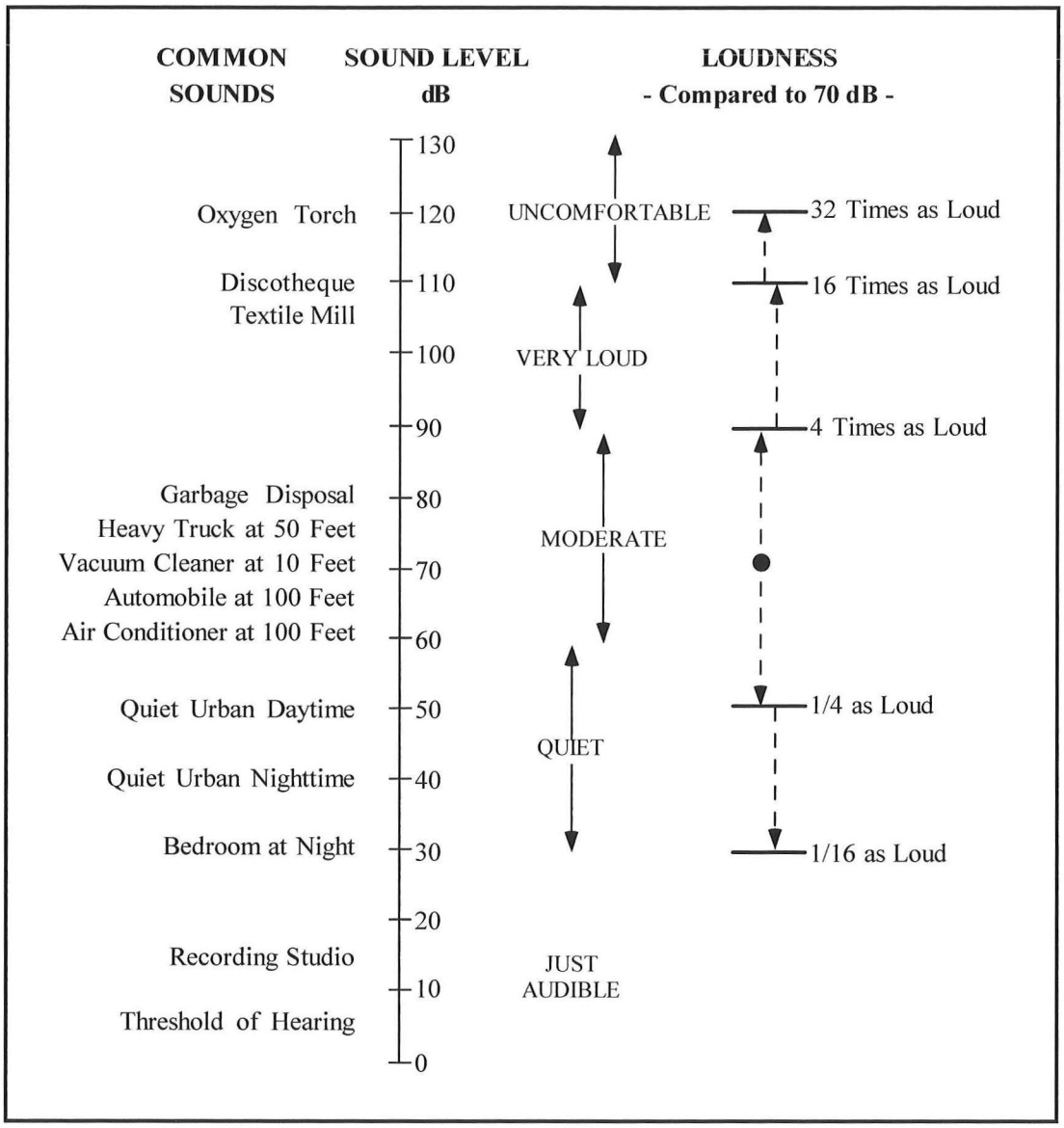
C.2 NOISE METRICS

A "metric" is defined as something "of, involving, or used in measurement." As used in environmental noise analyses, a metric refers to the unit or quantity that measures or represents the effect of noise on people. Noise measurements typically have involved a confusing proliferation of noise metrics as individual researchers have attempted to understand and represent the effects of

noise. As a result, past literature describing environmental noise or environmental noise abatement has included many different metrics. Recently, however, various federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analyses documents, and both the Department of Defense (DoD) and the Federal Aviation Administration (FAA) have specified those which should be used for federal aviation noise assessments. These metrics are as follows.

C.2.1 Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or LA_{max}. The typical A-weighted levels of common sounds are shown in Figure C-1. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.



Source: Harris 1979

Figure C-1. Typical A-Weighted Sound Levels of Common Sounds

C.2.2 Sound Exposure Level

Individual time-varying noise events have two main characteristics: 1) a sound level which changes throughout the event, and 2) a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The sound exposure level (abbreviated SEL or LAE) combines both of these characteristics into a single metric.

Sound exposure level is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise event. Since aircraft overflights usually last longer than one second, the SEL of an overflight is usually greater than the maximum sound level of the overflight.

Sound exposure level is a composite metric which represents both the intensity of a sound and its duration. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Because the SEL and the maximum sound level are both A-weighted sound levels expressed in dBs, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

C.2.3 Day-Night Average Sound Level

Time-average sound levels are the measurements of sound levels which are averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period.

For the evaluation of community noise effects, and particularly aircraft noise effects, the day-night average sound level (abbreviated DNL or L_{dn}) is used. Day-night average sound level averages aircraft sound levels at a location over a complete 24-hour period, with a 10-dB adjustment added to those noise events which take place between 10:00 p.m. and 7:00 a.m. (local time) the following morning. This 10-dB "penalty" represents the added intrusiveness of sounds which occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

Ignoring the 10-dB nighttime adjustment for the moment, DNL may be thought of as the continuous A-weighted sound level which would be present if all of the variations in sound level which occur over a 24-hour period were smoothed out so as to contain the same total sound energy.

Day-night average sound level provides a single measure of overall noise impact, but does not provide specific information on the number of noise events or the individual sound levels which occur during the day. For example, a DNL of 65 dB could result from a very few noisy events, or a large number of quieter events.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. Scientific studies and social surveys which have been conducted to appraise community annoyance to all types of environmental noise have found the DNL to be the best measure of that annoyance. Its use is endorsed by the scientific community (American National Standards Institute [ANSI] 1980, 1988; U.S. Environmental Protection Agency [USEPA] 1974; Federal Interagency Committee on Urban Noise [FICUN] 1980; Federal Interagency Committee on Noise [FICON] 1992).

There is, in fact, a remarkable consistency in the results of attitudinal surveys about aircraft noise conducted in different countries to find the percentages of groups of people who express various degrees of annoyance when exposed to different levels of DNL. This is illustrated in Figure C-2, which summarizes the results of a large number of social surveys relating community responses to various types of noises, measured in DNL.

Figure C-2 is taken from Schultz (1978) and shows the original curve fit. A more recent study has reaffirmed this relationship (Fidell et al. 1991). Figure C-3 shows an updated form of the curve fit (Finegold et al. 1992) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors which influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

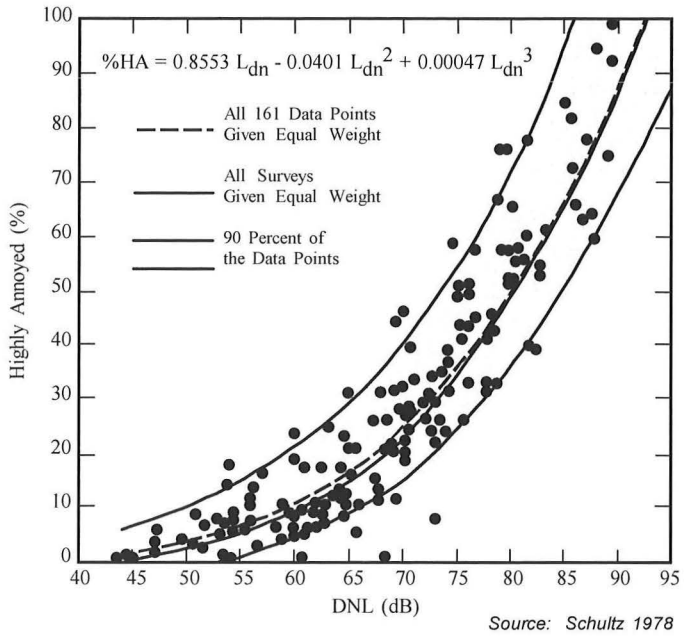
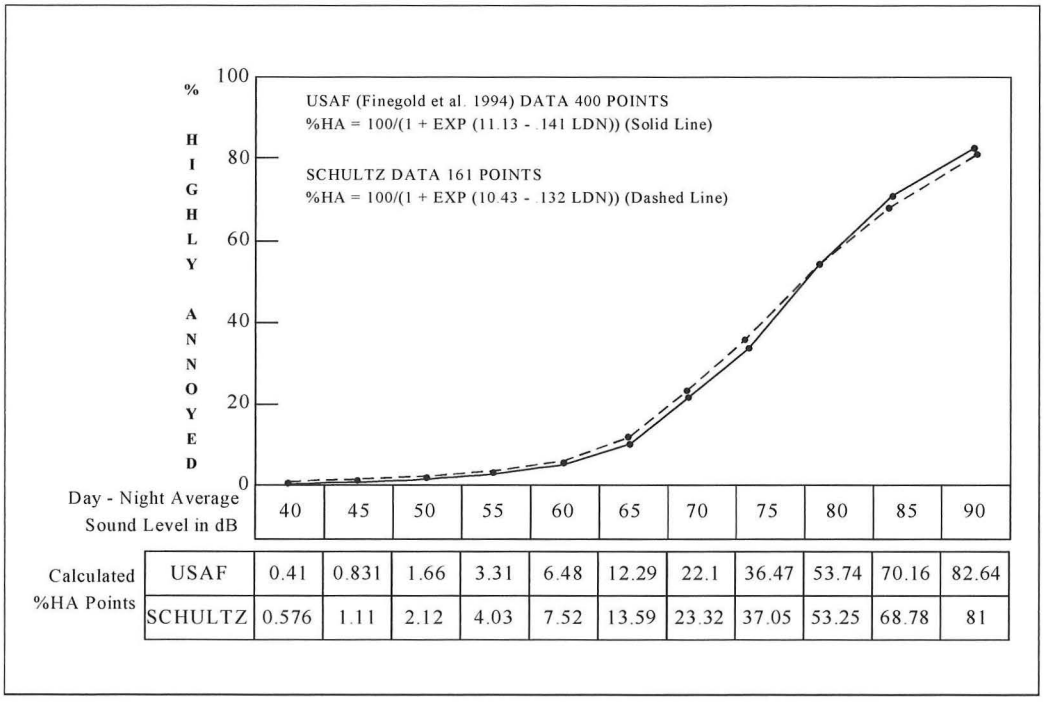


Figure C-2. Community Surveys of Noise Annoyance



	40	45	50	55	60	65	70	75	80	85	90
USAF	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

Sources: Schultz 1978 and Finegold et al. 1994

Figure C-3. Response of Communities to Noise and Comparison of Original Schultz 1978 and Current AF Curve Fits

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events. A National Aeronautics and Space Administration (NASA) study (Fields and Powell 1985) reported the reactions of individuals in a community to daily helicopter overflights, ranging from 1 to 32 per day. The stated reactions to infrequent helicopter overflights correlated quite well with the daily time-average sound levels over this range of numbers of daily noise events.

The use of DNL has been criticized recently as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based on the inherent feeling that people react more to single noise events and not as much to "meaningless" time-average sound levels.

Time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.5 dB. Assume, as a second example, that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of events. This is the basic concept of a time-average sound metric, and specifically the DNL.

C.3 LAND USE COMPATIBILITY

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL. In June 1980, an *ad hoc* Federal Interagency Committee on Urban Noise (FICUN) published guidelines for considering noise in land use planning (FICUN 1980). These guidelines related DNL to compatible land uses in

urban areas. The committee was composed of representatives from the DoD, Department of Transportation, Department of Housing and Urban Development; the USEPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines to make recommendations to the local communities on land use compatibilities.

The FAA included the committee's guidelines in the Federal Aviation Regulations (Harris 1984). These guidelines are reprinted in Table C-1, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (see Notes in Table C-1), they provide the best means for evaluating noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL (L_{dn} values) above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions.

In 1990, the FICON was formed to review the manner in which aviation noise effects are assessed and presented. This group released its report in 1992 and reaffirmed the use of DNL as the best metric for this purpose (FICON 1992).

Analyses of aircraft noise impacts and compatible land uses around DoD facilities are normally made using NOISEMAP (Moulton 1992). This computer-based program calculates DNL at many points on the ground around an airfield and draws contours of equal levels for overlay onto land-use maps of the same scale. The program mathematically calculates the DNL of all aircraft operations for a 24-hour period, taking into consideration the number and types of aircraft, their flight paths and engine thrust settings, and the time of day (daytime or nighttime) that each operation occurs.

Day-night average sound levels may also be measured directly around an airfield, rather than calculated with NOISEMAP; however, the direct measurement of annualized DNL is difficult and costly since it requires year-round monitoring or careful seasonal sampling. NOISEMAP provides an accurate projection of aircraft noise around airfields.

NOISEMAP also has the flexibility of calculating sound levels at any specified ground location so that noise levels at representative points under flight paths can be ascertained. NOISEMAP is most accurate for comparing "before and after" noise impacts which would result from proposed airfield changes or alternative noise control actions, so long as the various impacts are calculated in a consistent manner.

Table C-1. Land Use Compatibility Guidelines with Yearly Day-Night Average Sound Levels

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVELS IN DECIBELS					
	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals & nursing homes	Y	25	30	N	N	N
Churches, auditoria, & concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business, & professional	Y	Y	25	30	N	N
Wholesale & retail-building materials, hardware, and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic & optical	Y	Y	25	30	N	N
Agriculture (except livestock) & forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming & breeding	Y	Y(6)	Y(7)	N	N	N
Mining & fishing, resource production & extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas & spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits & zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, & camps	Y	Y	Y	N	N	N
Golf courses, riding stables, & water recreation	Y	Y	25	30	N	N

Key:
Y (Yes) = Land use and related structures compatible without restrictions.
N (No) = Land use and related structures are not compatible and should be prohibited.
NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25 or 30 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.
Notes:
(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements often are stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.
(5) Land-use compatible, provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25 dB.
(7) Residential buildings require an NLR of 30 dB.
(8) Residential buildings not permitted.

Source: USDOT 1984 and FAA 1985

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APPENDIX D

AIR QUALITY CALCULATIONS

BASELINE AIR EMISSIONS (2001)

Aircraft	NO_x	VOC	PM_{10}	CO
UH-1	1.11	0.67	N/A	2.28
UH-60	1.37	0.87	0.36	1.39
CH-47	0.00	0.00	N/A	0.00
Total	**2.48**	**1.54**	**0.36**	**3.67**

PROPOSED ACTION (DELTA CHANGE)
NET EMISSIONS CHANGES FROM AIRCRAFT OPERATIONS (TONS)

	NO_x	VOC	PM_{10}	CO
2003				
UH-1	0.14	0.09	N/A	0.29
UH-60	4.78	3.02	1.26	4.84
CH-47	2.10	0.67	N/A	6.60
Total	7.03	3.77	1.26	11.73
Projected (2004 and beyond)				
UH-1	-1.11	-0.67	N/A	-2.28
UH-60	9.49	6.00	2.51	9.61
CH-47	6.31	2.00	N/A	19.79
Total	14.68	7.32	2.51	27.11

General Conformity Regional Significance Thresholds (10% of regional budget)
Since future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Metropolitan Denver Interstate AQCR Target Year Emissions Budgets

	Point and Area Sources Combined				
Year	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
1999	116,502	129,662	871,835	65,039	37,394

Source: USEPA-AirData NET Tier Report (http://www.epa.gov/air/data/nettier.html). Site visited on 9/11/03

Determination Significance (Significance Threshold = 10%)

	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
Minimum -1999	116,502	129,662	871,835	65,039	37,394
2003 Emissions	9.51	5.31	1.63	15.40	N/A
Proposed Action %	**0.0082%**	**0.0041%**	**0.0002%**	**0.0237%**	**N/A**

	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
Minimum -1999	116,502	129,662	871,835	65,039	37,394
2004 & Beyond Emissions	17.16	8.86	2.87	30.78	N/A
Proposed Action %	**0.0147%**	**0.0068%**	**0.0003%**	**0.0473%**	**N/A**

BASELINE AIR EMISSIONS (2001)

Aircraft	NO_x	VOC	PM_{10}	CO
UH-1	1.11	0.67	N/A	2.28
UH-60	1.37	0.87	0.36	1.39
CH-47	0.00	0.00	N/A	0.00
Total	**2.48**	**1.54**	**0.36**	**3.67**

ALTERNATIVE TO PROPOSED ACTION (DELTA CHANGE)
NET EMISSIONS CHANGES FROM AIRCRAFT OPERATIONS (TONS)

	NO_x	VOC	PM_{10}	CO
2003				
UH-1	0.14	0.09	N/A	0.29
UH-60	3.41	2.16	0.90	3.46
CH-47	2.10	0.67	N/A	6.60
Total	5.66	2.91	0.90	10.35
Projected (2004 and beyond)				
UH-1	-1.11	-0.67	N/A	-2.28
UH-60	8.12	5.13	2.15	8.22
CH-47	7.30	2.31	N/A	22.91
Total	14.30	6.77	2.15	28.85

General Conformity Regional Significance Thresholds (10% of regional budget)
Since future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Metropolitan Denver Interstate AQCR Target Year Emissions Budgets

	Point and Area Sources Combined				
Year	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
1999	116,502	129,662	871,835	65,039	37,394

Source: USEPA-AirData NET Tier Report (http://www.epa.gov/air/data/nettier.html). Site visited on 9/11/03

Determination Significance (Significance Threshold = 10%)

	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
Minimum -1999	116,502	129,662	871,835	65,039	37,394
2003 Emissions	5.66	2.91	0.90	10.35	N/A
Proposed Action %	**0.0049%**	**0.0022%**	**0.0001%**	**0.0159%**	**N/A**

	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	PM10 (tpy)	SO2 (tpy)
Minimum -1999	116,502	129,662	871,835	65,039	37,394
2004 & Beyond Emissions	14.30	6.77	2.15	28.85	N/A
Proposed Action %	**0.0123%**	**0.0052%**	**0.0002%**	**0.0444%**	**N/A**

UH-1 Emission Rates

Mode	Time in Mode (minutes)	Fuel Flow (lb/hr)	NO_x (lb/hr)	VOC (lb/hr)	PM_{10} (lb/hr)	CO (lb/hr)	SO_x (lb/hr)
Ground Idle	8	138	0.42	1.44	N/A	4.11	N/A
Flight Idle	7	143	0.44	1.24	N/A	4.39	N/A
Cruise	6.8	283	1.39	0.05	N/A	0.75	N/A
Military	6.8	412	2.75	0.05	N/A	0.31	N/A
Average lb/hr [a]	28.6	238.85	1.21	0.73	N/A	2.48	N/A

Source: USAF 2001. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. July 2001.

[a] Assumes that typical mission activity approximates the helicopter LTO cycles as published in AP-42 and USAF 2001.

UH-1 AF IERA Emission Factors

Mode	Time in Mode (minutes)		NO_x (lb/1000gal)	VOC (lb/1000gal)	PM_{10} (lb/1000gal)	CO (lb/1000gal)	SO_x (lb/1000gal)
Ground Idle	8		3.05	10.42	N/A	29.78	N/A
Flight Idle	7		3.08	8.65	N/A	30.71	N/A
Cruise	6.8		4.9	0.18	N/A	2.64	N/A
Military	6.8		6.68	0.13	N/A	0.75	N/A

Source: USAF 2001. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. July 2001.

UH-60 Emission Rates

Mode	Time in Mode (minutes)	Fuel Flow (lb/hr)	NO_x (lb/hr)	VOC (lb/hr)	PM_{10} (lb/hr)	CO (lb/hr)	SO_x (lb/hr)
Ground Idle	8	133	0.37	7.54	0.20	7.07	N/A
Flight Idle	7	500	3.78	0.19	0.63	2.63	N/A
Flight Max	6.8	589	4.82	0.29	1.31	2.21	N/A
Overspeed	6.8	706	6.08	0.28	1.84	2.18	N/A
Average lb/hr [a]	28.6	467.48	3.62	2.29	0.96	3.66	N/A

Source: USAF 2001. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. July 2001.

[a] Assumes that typical mission activity approximates the helicopter LTO cycles as published in AP-42 and USAF 2001.

UH-60 AF IERA Emission Factors

Mode	Time in Mode (minutes)		NO_x (lb/1000gal)	VOC (lb/1000gal)	PM_{10} (lb/1000gal)	CO (lb/1000gal)	SO_x (lb/1000gal)
Ground Idle	8		2.78	56.67	1.48	53.18	N/A
Flight Idle	7		7.56	0.37	1.26	5.25	N/A
Flight Max	6.8		8.18	0.49	2.22	3.75	N/A
Overspeed	6.8		8.61	0.39	2.6	3.09	N/A

Source: USAF 2001. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. July 2001.

CH-47 Emission Rates

Mode	Time in Mode (minutes) (minutes)		NO_x (lb/hr)	VOC (lb/hr)	PM_{10} (lb/hr)	CO (lb/hr)	SO_x (lb/hr)
Idle/Taxi	15.0	-	0.8	4.0	N/A	29.5	N/A
Climb	6.8	-	18.6	0.2	N/A	14.5	N/A
Approach	6.8	-	9.1	0.3	N/A	12.9	N/A
Average lb/hr [a]	28.6	-	7.01	2.22	N/A	21.99	N/A

Source: USEPA 1998. Compilation of Air Emission Factors, USEPA Report AP-42, Table II-1-8.

[a] Assumes that typical mission activity approximates the helicopter LTO cycles as published in AP-42 and USAF 2001.

AIR QUALITY EMISSIONS FROM PROPOSED ACTION

2001 - Baseline Year Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	1.11	0.67	N/A	2.28	N/A
UH-60	1.37	0.87	0.36	1.39	N/A
CH-47	0.00	0.00	N/A	0.00	N/A
Total	2.48	1.54	0.36	3.67	N/A

2003 Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	1.26	0.76	N/A	2.57	N/A
UH-60	6.15	3.89	1.63	6.23	N/A
CH-47	2.10	0.67	N/A	6.60	N/A
Total	9.51	5.31	1.63	15.40	N/A

Projected - 2004 and beyond Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	0.00	0.00	N/A	0.00	N/A
UH-60	10.86	6.86	2.87	10.99	N/A
CH-47	6.31	2.00	N/A	19.79	N/A
Total	17.16	8.86	2.87	30.78	N/A

Number of Assigned Aircraft

Type of Aircraft	2001	2003	Projected
UH-1	31	12	0
UH-60	6	10	16
CH-47	0	2	7
Total	37	24	23

Flight Operational Hours per Aircraft				Total Flight Operational Hours		
Type of Aircraft	2001	2003	Projected	2001	2003	2004 & 5
UH-1	59.5	173.3	0.0	1,843	2,080	0
UH-60	126.2	170.0	187.5	757	1,700	3,000
CH-47	0.0	150.0	128.6	0	300	900
Source: COARNG				2600	3780	2742

2001 - Baseline Year

UH-1 total airfield operations by year.
- 31 assigned aircraft
- 1 engines each
- T400-CP-400 engine model

UH-60 total airfield operations by year.
- 6 assigned aircraft
- 1 engines each
- T700-GE-700 engine model

CH-47 total airfield operations by year.
- 0 assigned aircraft
- 2 engines each
- T55-L-11A engine model

2003

UH-1 total airfield operations by year.
- 12 assigned aircraft
- 1 engines each
- T400-CP-400 engine model

UH-60 total airfield operations by year.
- 10 assigned aircraft
- 2 engines each
- T700-GE-700 engine model

CH-47 total airfield operations by year.
- 2 assigned aircraft
- 2 engines each
- T55-L-11A engine model

Projected

UH-1 total airfield operations by year.
- 0 assigned aircraft
- 1 engines each
- T400-CP-400 engine model

UH-60 total airfield operations by year.
- 16 assigned aircraft
- 2 engines each
- T700-GE-700 engine model

CH-47 total airfield operations by year.
- 7 assigned aircraft
- 2 engines each
- T55-L-11A engine model

AIR QUALITY EMISSIONS FROM ALTERNATIVE TO THE PROPOSED ACTION

2001 - Baseline Year Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	1.11	0.67	N/A	2.28	N/A
UH-60	2.74	1.73	0.72	2.77	N/A
CH-47	0.00	0.00	N/A	0.00	N/A
Total	3.85	2.40	0.72	5.06	N/A

2003 Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	1.26	0.76	N/A	2.57	N/A
UH-60	6.15	3.89	1.63	6.23	N/A
CH-47	2.10	0.67	N/A	6.60	N/A
Total	9.51	5.31	1.63	15.40	N/A

Projected - 2004 and beyond Emissions (tons per year)

Aircraft Type	NO_x	VOC	PM_{10}	CO	SO_x
UH-1	0.00	0.00	N/A	0.00	N/A
UH-60	10.86	6.86	2.87	10.99	N/A
CH-47	7.30	2.31	N/A	22.91	N/A
Total	18.16	9.17	2.87	33.90	N/A

Number of Assigned Aircraft

Type of Aircraft	2001	2003	Projected
UH-1	31	12	0
UH-60	6	10	16
CH-47	0	2	14
Total	37	24	30

Flight Operational Hours per Aircraft				Total Flight Operational Hours		
Type of Aircraft	2001	2003	Projected	2001	2003	2004 & 5
UH-1	59.5	173.3	0.0	1,843	2,080	0
UH-60	126.2	170.0	187.5	757	1,700	3,000
CH-47	0.0	150.0	74.4	0	300	1,042
Source: COARNG				2600	3780	2742

2001 - Baseline Year

UH-1 total airfield operations by year.
31 assigned aircraft
1 engines each
T400-CP-400 engine model

UH-60 total airfield operations by year.
6 assigned aircraft
2 engines each
T700-GE-700 engine model

CH-47 total airfield operations by year.
0 assigned aircraft
2 engines each
T55-L-11A engine model

2003

UH-1 total airfield operations by year.
12 assigned aircraft
1 engines each
T400-CP-400 engine model

UH-60 total airfield operations by year.
10 assigned aircraft
2 engines each
T700-GE-700 engine model

CH-47 total airfield operations by year.
2 assigned aircraft
2 engines each
T55-L-11A engine model

Projected

UH-1 total airfield operations by year.
0 assigned aircraft
1 engines each
T400-CP-400 engine model

UH-60 total airfield operations by year.
16 assigned aircraft
2 engines each
T700-GE-700 engine model

CH-47 total airfield operations by year.
14 assigned aircraft
2 engines each
T55-L-11A engine model

METROPOLITAN DENVER INTERSTATE AQCR TIER REPORT, COLORADO
http://www.epa.gov/air/data/nettier.html?st~CO~Colorado
site visited on 9/11/03

		NOx (tpy)		VOC		CO		PM0		SO2	
STATE	COUNTY	AREA EMISSIONS	POINT EMISSIONS	AREA EMISSIONS	POINT EMISSIONS	AREA EMISSIONS	POINT EMISSIONS	AREA EMISSIONS	POINT EMISSIONS	AREA EMISSIONS	POINT EMISSIONS
CO	Adams Co	14,197	15,841	16,066	5,727	119,118	2,297	12,625	2,048	833	21,683
CO	Arapahoe Co	14,742	746	22,080	2,247	157,386	595	13,009	522	948	68
CO	Boulder Co	9,021	3,223	12,739	1,918	92,970	455	6,522	969	569	3,005
CO	Clear Creek Co	1,754	54	1,335	39	16,935	72	1,796	75	69	4
CO	Denver Co	22,980	5,234	27,565	3,259	205,510	956	9,642	590	1,587	4,243
CO	Douglas Co	9,389	50	8,667	408	93,353	140	7,229	231	506	83
CO	Gilpin Co	639	0	540	0	4,573	0	987	0	40	0
CO	Jefferson Co	16,031	2,601	23,836	3,236	176,676	799	8,183	611	897	2,859
		88,753	27,749	112,828	16,834	866,521	5,314	59,993	5,046	5,449	31,945