APPENDIX H. AKARNG OPERATIONAL NOISE MANAGEMENT PLAN

ALASKA ARMY NATIONAL GUARD
OPERATIONAL NOISE
MANAGEMENT PLAN

July 2005

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INTRODUCTION

1.1 GENERAL.

One of the goals of the Department of the Army (DA) is to plan, initiate, and carry out actions and programs designed to minimize adverse impacts upon the quality of the human environment without impairing the Army's mission. In keeping with this goal, the Army established an Environmental Noise Management Program as the framework for the control of noise produced by Army activities since noise has been determined by the United States Congress, as recorded in the Noise Control Act of 1972, to "present danger to the health and welfare of this Nation's population" (PL 92-574 1972). The primary strategy for noise management is the Operational Noise Management Plan (ONMP).

1.1.1 HISTORY OF THE NOISE CONTROVERSY.

The advent of jet aircraft in the 1950's resulted in significantly greater noise levels around commercial airports that led to an intense outcry from the public. This public outcry caused Congress to revise the Federal Aid to Airports Act to make Federal aid contingent upon implementation of programs to resolve noise problems with surrounding neighborhoods. Subsequently, Congress passed the Noise Control Act of 1972 and the Quiet Communities Act of 1978. Under these laws, airports carried out noise control measures such as: outright purchase of adjoining land; work with local communities to ensure zoning which would permit only compatible uses; development of procedures for including noise information in the consumer disclosure documents provided when real estate is sold; altering run-up procedures and locations; and changing approach and takeoff patterns. At the present time, the Federal Aviation Administration (FAA) has specific requirements for community involvement in all airport planning.

The Federal Aid to Airports Act exempted military aircraft, as did portions of the Noise Control Act of 1972. However, the Noise Control Act and the Quiet Communities Act did contain language outlining the responsibilities of Federal agencies in protecting the public from unreasonable noise impacts. Specifically, these laws state that:

> *"Federal agencies shall, to the fullest extent consistent with their authority under federal laws administered by them, carry out the programs within their control in such a manner as to .... promote an environment for all Americans free from noise that jeopardizes their health and welfare."*

To comply with the intent of Congress, the Department of Defense (DOD) provided guidance to the military departments regarding the compatible use of public and private lands in the vicinity of military airfields. The DOD guidance (DODI 1977):

- Defined restrictions on the uses and heights of natural and man made objects in the vicinity of air installations.

- Defined restrictions on land use in the vicinity of air installations to assure compatibility with the characteristics, including noise of military operations.

- Provided policy as to the extent of the U.S. Government's interest in retaining or acquiring real property to protect the operational capability of active military airfields.

As a matter of general policy, the military departments were instructed to work toward achieving compatibility between air installations and the neighboring civilian communities through a compatible land use planning and control process conducted by the local civilian community.

Based upon the DOD guidance, DA developed its Environmental Noise Management Program that (ENMP) considers noise from all sources of military activities, not just military airfields. The Army's program is designed to (U.S. Army 1997):

- Control environmental noise to protect the health and welfare of military personnel and their dependents, Army civilian employees, and members of the public on lands adjacent to Army, Army Reserve, and Army National Guard installations.

- Reduce community annoyance from environmental noise, to the extent feasible, consistent with Army, Army Reserve, and Army National Guard training and materiel testing activities.

1.1.2 THE RISK TO MILITARY INSTALLATIONS.

It is an established fact that military installations tend to attract activity from the civilian sector. For example, sizeable new communities may grow up near an installation or existing communities may expand toward or around an installation's boundaries. This growth process can place severe limitations upon the ability of a military installation to support training and for assigned units to maintain an adequate level of readiness. As noise impacts from military activities increase upon the civilian communities, both litigation and/or political pressures that could result in degradation of the installation’s mission also increase. Not only does the number of complaints to installation commanders increase dramatically, but also the number of complaints to members of Congress.

As a consequence of adverse public reaction to military operations, some military installations have closed and others have had limitations placed upon the conduct of operations. One of the best examples of the degradation of mission performance due to encroachment occurred at the Naval Air Station (NAS), Los Alamitos, CA. When originally established during World War II, this NAS was in a rural area. With the postwar expansion

of southern California, Los Alamitos NAS was eventually surrounded with homes and the Navy could no longer routinely fly jet aircraft into this property. Today, the airfield serves the needs of the California Army National Guard (ARNG) and the U.S. Army Reserve, which compared to the Navy, operates relatively few noisy flights.

In the Army's case, the size of the explosives which were used in Combat Engineer field training at Fort Belvoir, VA, was severely restricted, making it necessary to move a portion of the training to a less urbanized area at Fort A.P. Hill, VA and Fort Leonard Wood, MO. In another case, limitations were placed upon the types of weapons which could be fired at Fort Dix, NJ, as well as the times the weapons could be fired (U.S. Army undated). In both of these cases, the limitations upon operational activities degraded the installations' capability to support essential training, resulting in the migration of the training missions to other installations.

More recently, the Senior Readiness Oversight Council, chaired by the Under Secretary of Defense concluded that:

> "Encroachment on DOD ranges and training areas is a serious and growing challenge to the readiness of U.S. Armed Forces."
>
> "Encroachment issues are many, are complex, and involve multiple federal, state and local agencies, as well as Congress and the public."
>
> "Further, the impact of encroachment is broad -- affecting our ability to execute realistic air, ground, and naval training across the nation, as well as beyond its borders."
>
> "The Department of Defense needs a comprehensive and coordinated approach to addressing encroachment issues. The approach should include an outreach strategy to increase public awareness of how essential, realistic and effective training is to the readiness of U.S. Armed Forces."

1.1.3 CONTENDING WITH THE RISK.

The consequences of ignoring the conflicts between noise generated on military installations and the desires of the civilian community regarding use of the land surrounding these installations can be grave. If the military fails to respond to the concerns of the civilian community, the ill will produced by such an approach is quite likely to result in unwillingness within the civilian community to work with the military to regulate land use. The community ill will can also result in political pressure or lawsuits that force unilateral concessions on the part of the military without any reciprocal concessions from the community.

In order to prevent the conflicts between military operations and civilian land use from reaching significant proportions, it is necessary for the Army to work with the local communities to prevent incompatible land use from occurring and to take reasonable steps on the installation to protect the community from noise. Since the regulation of land use on adjoining land is the authority of local communities, the military cannot solve these problems unilaterally. Rather, the military must work with local communities to establish the controls that will prevent noise problems.

1.1.4 THE ARMY'S OPERATIONAL MANAGEMENT PLAN.

The primary strategies for protecting the mission of military installations from the problems of noise incompatibility are long-range land use planning and being a responsible neighbor to its surrounding communities. The Operational Noise Management Plan (ONMP) addresses these issues in a proactive manner. Elements of the ONMP include noise levels assessment, education of the military and civilian community, management of noise complaints, mitigation of the noise and vibration, the "Fly Neighborly" program, and noise abatement procedures. The goal is to be a responsible neighbor to the communities surrounding AK ARNG sites.

1.2 PURPOSE.

The ONMP will document the noise environment at AK ARNG training sites. It will also provide a plan to manage this environment through operational planning and being a responsible neighbor.

1.3 OBJECTIVES.

The objectives of the ONMP are:

- Education of the military and civilian communities and improved communications between the two.
- Management of noise complaints to reduce the potential for conflict between the AK ARNG and the surrounding communities.
- Assessment of the compatibility of the noise environment with the existing and proposed land uses.
- Mitigation of the noise and vibration environments, where feasible, to increase land use compatibility.
- Use of noise abatement procedures.

1.4 CONTENT.

This report—

- Consists of a discussion and analysis of the AK ARNG and the surrounding communities and their relationships.
- Presents the ONMP concept, policies and methodologies.
- Analyzes the effects of the AK ARNG's noise.

SECTION TWO

NOISE MANAGEMENT

2.1 INTRODUCTION.

At many installations, the land use around the facility is not compatible with the noise environment. At others there is the potential for future incompatible development. To reduce the potential for conflict between the installation and surrounding communities, the Army developed the Operational Noise Management Plan (ONMP). In addition to a noise assessment, the plan includes education of both installation personnel and surrounding residents, management of noise complaints, mitigation of the noise and vibration, and noise abatement procedures.

The principal sources of noise at AK ARNG sites are aircraft noise and the firing of small arms weapons. Noise also results from tracked vehicle training and daily operations at the facilities. In the ONMP, the focus is on the types of training and operations which have the potential to negatively impact upon people either on or off of the installation. These types of activities include aircraft operations and weapons firing. Camp Carroll, Camp Denali and Bryant Army Heliport (BAHP) are located on Fort Richardson. Camp Carroll and Camp Denali are used for administrative purposes and do not have any operational noise concerns. BAHP noise sources include fixed-wing and rotary-wing aircraft noise. The AK ARNG also has 76 armories located throughout the state, but there are not any firing ranges or aircraft facilities located at the armories. There are also three Army Aviation Operations Facilities (AAOFs) located in AK. Each of the three, Juneau, Bethel, and Nome, are collocated with public airports. Stewart River Training Area (SRTA) noise sources include small arms, helicopters and vehicles.

The AK ARNG also utilizes active Army installations for weapons firing and aviation activity. The noise produced at these locations has been addressed in the Noise Management Plans that were developed for Fort Richardson, Fort Greely and Fort Wainwright in 2001.

An important element of the ONMP is education. This includes the education of both the noise producers and the noise receivers. The noise producers must be aware of all AK ARNG policies and regulations dealing with environmental noise. These include the locations of no-fly areas, noise-sensitive areas, and range safety procedures. The education of the noise producers will include the potential for adverse consequences to the AK ARNG's ability to perform and maintain its mission due to violations of the policies and regulations.

2.2 NOISE COMPLAINT MANAGEMENT.

The purpose of the Noise Complaint Management Program is to let people reporting complaints know that the AK ARNG cares about their concerns. The operations at AK ARNG sites rarely generate complaints. Also, in most cases, the courteous and honest treatment of the complainant will reduce the potential for future calls; letters to local, state, and federal government officials; and

formation of community action groups. There are two key words to a successful complaint management program. They are ***integrity*** and ***sensitivity***.

The program will have integrity so that when installation officials tell the community something, the community will believe and trust them. Once you tell something to the community, they consider the information as your policy. For example, if you tell them that you will not fly after 11 p.m., then you must not fly after 11 p.m. If it is necessary to change this procedure, then you should explain to the community why you are changing the procedure before the change takes place.

The program will be sensitive to the community's concerns. The installation commanders will listen to determine what is annoying them. There may be a simple solution to the problem once the cause of the concern is discovered. The installation commanders will also be responsive to the community by telling them, for example, why the operation must be performed. The public's ***perception*** of the installation is ***their reality***.

A successful noise complaint management procedure will assist installation commanders in avoiding community action directed at their activities. Like the other elements of the ONMP, this procedure will be proactive. Its purposes are to reduce the potential of noise complaints by keeping the public informed about what is going to happen and to satisfy the complainants so that noise complaints do not escalate into political actions.

The potential of noise complaints is reduced by providing the news media with press releases when unusual operations are scheduled or when normal operations are scheduled to resume after a period of inactivity. The press release includes a telephone number that the community can use to receive additional information or to report a noise complaint.

The AK ARNG will respond to all complaints in a timely and polite fashion to reduce the potential of the complainants organizing into citizen action groups. These groups can address the complaint to higher levels of command and government. When the situation becomes political, the installation's mission can be impaired by unnecessary operational restrictions and resources spent reacting to political pressures.

A noise complaint procedure is required by Army Regulation (AR) 200-1 (U.S. Army 1997) to log and investigate all complaints. An effective procedure enables the AK ARNG to maintain a good relationship with the surrounding communities. In accordance with AR 200-1, the AK ARNG has established the following noise complaint SOP. Figure 2-1 depicts the noise complaint form that is used by the AK ARNG.

FIGURE 2-1. AK ARNG NOISE COMPLAINT

ALASKA NATIONAL SAAO
NOISE COMPLAINT QUESTIONNAIRE

INSTRUCTIONS: This questionnaire is to be used whenever a person contacts the State Army Aviation Officer's (SAAO) office concerning a noise complaint. The form contains a series of steps, each involving questions to be asked of the inquirer, along with directives to be followed for various types of answers.

Begin with step 1.
STEP 1. QUESTION: Are you calling to obtain information or to make a formal complaint concerning National Guard aircraft/operations? (CIRCLE ANSWER)

a. Information b. Complaint

If a, provide information, terminate interview, and file this form.
If b, go to step 2.

STEP 2. READ THE FOLLOWING STATEMENT TO THE INQUIRER:
"In order to help us avoid future noise disturbances, we have developed a series of questions designed to pinpoint the exact cause of your complaint. I would like to ask you several questions."

QUESTION: Are you willing to answer some questions about your complaint?
(CIRCLE ANSWER)
a. Yes b. No

If a, go to step 3
If b, terminate interview and file this form.

STEP 3. GATHERING BASIC DATA.
Question: What is your name, address, and telephone number?
Question: where are you located in relation to our post/airfield (CIRCLE ANSWER)

North	Northeast	East	Southeast
South	Southwest	West	Northwest

Question: When did the annoying (aircraft) noise occur?
FILL IN DATE
FILL IN TIME

Question: What was making the noise (CIRCLE ANSWER)

Aircraft Explosion Trucks Buses Machinery Other

If aircraft is circled, go to step 4.a.
If explosion is circled, go to step 4.b.
If anything else, continue.

Question: Is the noise source military or civilian? (CIRCLE ANSWER)
Military
Civilian

Question: Describe the source of noise (such as large Army truck without muffler).

Question: If a motor vehicle, what was its make? color? other distinguishing features
(If this report was other than aircraft terminate interview and file form)

STEP 4.A FOR AIRCRAFT ONLY
Question: Where were you when the aircraft flew over? (CIRCLE ANSWER)

Indoor Outdoors

Question: How did the noise affect you (CIRCLE ANSWER)

Startled me Woke me Frightened pet Disturbed livestock
Woke a child Rattled the house Interfered with conversation
Interfered with TV/Radio Other

Question: How many times did the disturbance occur (CIRCLE ANSWER)

Once Twice 3 to 7 times 7 to 15 times More than 16 times

Question: Did you see the aircraft? (CIRCLE ANSWER)
Yes No
If yes, go to step 4.a.1
If no, go to step 4.a.2

STEP 4.a.1 VISUAL DESCRIPTION OF AIRCRAFT.
Question: Which of the following best describes the design of the aircraft? (CIRCLE ANSWER)

Helicopter with one rotor Helicopter with two rotors
Helicopter, number of rotors unknown Plane with one propeller
Plane with two propellers Plane with four propellers
Plane with unknown number of propellers

Question: What color was the aircraft?

Question: Did it have a Red Cross or any other markings?

Question: In what direction was the aircraft flying?
(CIRCLE ANSWER)

North	Northeast	East	Southeast
South	Southwest	West	Northwest

Question: Any other information about the incident
(altitude, aircraft actions, etc.)

NOW TERMINATE THE INTERVIEW AND GO TO STEP 5.A.

STEP 4.A.2. AUDITORY DESCRIPTION OF AIRCRAFT.

Question: What kind of aircraft do you think made the noise? (CIRCLE ANSWER)

Small helicopter Large helicopter Small jet Large jet
Small propeller driven plane Large propeller driven plane

Question: What do you think the aircraft was doing?(CIRCLE ANSWER)

Landing Taking off Passing by Circling

NOW TERMINATE THE INTERVIEW AND GO TO STEP 5.A.

STEP 4.b. FOR BLASTS AND EXPLOSIONS ONLY:
Question: Where were you when the noise disturbed you? (CIRCLE ANSWER)

Indoors Outdoors

Question: How did the noise disturb you? (CIRCLE ANSWER)

Rattled windows	Startled me	Woke me	Frightened pet
Disturbed livestock	Woke a child	Shook the house	Cracked plaster
Broke a window	Other		

Question: How many blasts were disturbing? (CIRCLE ANSWER)

1 2 3 to 7 7 to 15 More than 16

Question: How closely spaced were these explosions? (CIRCLE ANSWER)

Close like a machine gun	Several all at once
5 to 10 minutes apart	More than 10 minutes apart

Question: How long did the disturbance last? (CIRCLE ANSWER)

Less than 5 minutes	5 to 30 minutes	30 minutes to 1 hour	1 to 2 hours
2 to 4 hours	4 to 8 hours	All day	All night

Question: Any other information about the incident:

NOW TERMINATE THE INTERVIEW AND GO TO STEP 5.b.

STEP 5.a. WEATHER DURING AIRCRAFT NOISE COMPLAINT.
CALL THE AIR FORCE WEATHER DETACHMENT AT ELMENDORF AIR FORCE BASE, PH# 552-4397, FOR A DESCRIPTION OF THE WEATHER DURING THE COMPLAINT PERIOD.

Circle the description which best fits the weather when the annoyance occurred:

Overcast, poor visibility	Cold and clear	Warm and Hazy	Other

Record the direction and speed of surface wind

XEROX A COPY OF THIS FORM, FILE ORIGINAL, AND SEND XEROXED COPY TO THE SAAO AND AIRFIELD COMMANDER.

STEP 5.B. WEATHER DURING BLAST NOISE COMPLAINT.
CALL THE ELMENDORF WEATHER DETACHMENT AT ph# 552-4397
TO GET THE FOLLOWING INFORMATION:

ALTITUDE (METERS)	TEMPERATURE (1/10k)	WIND SPEED (KNOTS)	WIND DIRECTION (10’S MILS)
SURFACE'			
200			
500			
1000			
1500			
2000			
2500			
3000			
3500			

IN ADDITION GET THE DESCRIPTION OF THE WEATHER FOR THAT TIME PERIOD:

Steady wind of 5-10 mph with gust in direction of complainant.
Clear with layering of smoke or fog.
Cold, hazy or foggy morning.
Day following a day when large extremes of temperature (about 20 degrees C) occurred between day or night.
Generally high barometer reading with low temperature.
Other

XEROX A COPY OF THIS FORM, FILE ORIGINAL, AND SEND XEROXED COPY TO SAAO AND THE AVN BATTALION CDR.

The AK ARNG has taken further steps in the handling of noise complaints to convey to the community that they truly do care about their impacts upon the community. Though noise complaints are very infrequent, they can occur in instances where pilots are forced to fly at low altitudes due to safety or weather conditions. For the past eighteen years, when a helicopter noise complaint was received, the AK ARNG has sent a pilot visit the complainant at their home. The pilot explains the type of training/mission that caused the complaint, and lets the complainant know that the AK ARNG strives to be good neighbors.

2.3 TRAINING ACTIVITIES WITH NOISE GENERATING POTENTIAL

AK ARNG training sites, armories, and Army Aviation Facilities will notify the Public Affairs Office (PAO) when training is scheduled that has the potential to impact neighbors. The PAO can then determine the best means to disseminate this information to the public. The PAO has the expertise to ensure that enough information is given out to notify neighbors about potential noise effects, while at the same time ensuring that there are no security risks posed by the information released.

Informing the PAO about upcoming training will also give the PAO the needed information to respond to people if they do call with a complaint or inquiry during the exercise. The following form will be used to notify the PAO of upcoming training:

FIGURE 2-2. AK ARNG TRAINING NOTIFICATION FORM

Training Noise Notification Form

Location:

Date (s):

Hours:

Unit:

Type of activity:

Place of Activity:

POC for Activity:

2.4 NOISE ASSESSMENT.

The Army ONMP provides a method for evaluating the effect of noise and the hazards associated with training operations that stem from activities at military installations. The purpose of the program is to identify land areas that are exposed to generally unacceptable noise levels. This information is then used to recommend uses for the land lying within these areas that are compatible with the needs of the civilian community and the Army.

Army installation commanders establish and maintain active programs to achieve the maximum feasible compatibility between the noise environment and noise-sensitive land uses, both off and on the installation. The program requires that all appropriate governmental bodies and citizens be fully informed whenever ONMP or other planning matters affecting the installation are under consideration. This includes a positive and continuous effort designed to:

- Provide information, criteria, and guidelines to federal, state, regional, and local planning bodies, civic associations, and similar groups.
- Inform such groups of the requirements of the operational activity and noise exposure.
- Describe the noise reduction measures which are being, or could be, used.
- Ensure that all reasonable, economical, and practical measures are taken to reduce or control the impact of noise-producing or hazardous activities so as to minimize the exposure of

populated areas. This must be done without jeopardizing the safety or effectiveness of military operations.

The ONMP considers the land areas, with noise-sensitive land uses, that are exposed to generally unacceptable noise levels. There are three noise zones, Noise Zones III (NZ III), II (NZ II) and I (NZ I). The zones are developed using computer models. Noise-sensitive land uses include, but are not limited to, residences, schools, medical facilities, and churches.

2.4.1 NOISE ZONE DESCRIPTIONS.

- **NOISE ZONE III.** NZ III consists of the area around the source of the noise in which the day-night sound level (DNL) is greater than 75 decibels, A-weighted (dBA) for aircraft, vehicle, and small arms range noise, and greater than 70 decibels, C-weighted (dBC) for noise from weapon systems larger than 20-mm and demolitions. The noise level within NZ III is considered so severe that noise-sensitive land uses should not be considered therein.

- **NOISE ZONE II.** NZ II consists of an area where the day-night sound level is between 65 and 75 dBA or between 62 and 70 dBC. Exposure to noise within this area is considered significant and use of land within NZ II should normally be limited to activities such as industrial, manufacturing, transportation and resource production. However, if the community determines that land in NZ II areas must be used for residential purposes, then noise level reduction (NLR) features should be incorporated into the design and construction of the buildings. A discussion of NLR features is included in Appendix A.

- **NOISE ZONE I.** NZ I includes all areas around a noise source in which the day-night sound level is less than 65 dBA or less than 62 dBC. This area is usually suitable for all types of land use activities. But, this does not guarantee that training noise will not be heard in these areas.

Note: During the examination of the environmental noise attributable to AK ARNG operations, DNL will always refer to A-weighted DNL (ADNL) to describe small arms weapons firing, aircraft, vehicle, etc. A more detailed description of the noise environment and the methodology used in noise evaluation is provided at Appendix A.

LAND USE GUIDELINES.

The Federal Interagency Committee on Urban Noise (FICUN) (FICUN 1980) has developed land use guidelines for areas on and/or near noise producing activities, such as highways, airports, and firing ranges. The ONMP uses these guidelines. By projecting these zones onto an area map, land use guidelines can be used to help planners develop compatible land

uses (Appendix B).

2.4.2 SMALL ARMS RANGE NOISE (WEAPONS < 20 MM).

The soldiers in the AK ARNG must be proficient in small arms firing. Much of this training takes place at the small arms ranges located at Fort Richardson (FRA) and Fort Wainwright (FWA). The noise assessments for AK ARNG small arms firing at FRA and FWA were included in the Noise Management Plans that were developed for U.S. Army Alaska (USARAK) in 2001. Small arms activity also takes place at Stewart River Training Area.

At locations where small arms firing is too infrequent to generate Noise Zones using the SARNAM computer model, the peak levels of individual shots fired can be used to analyze noise impacts. Hede and Bullen (1982) interviewed Australians living near a civilian small arms range and found that none were seriously affected when the linear peak level was below 85 dB. Shooting at this range was confined almost exclusively to weekends, mainly in the afternoons, with approximately 150,000 shots fired annually. Hede and Bullen concluded, "it would appear then, that a mean unweighted peak sound pressure level around 85 dB would be a reasonable criterion for land-use planning. At this level approximately 10% of a residential population would be expected to be seriously affected." In a later study at a more active military range in Williamstown, Hede and Bullen confirmed this limit with a caveat. Their research group wrote: "it should be assumed that the 85 dB LPEAK criterion will only be valid for Williamstown up to 1,000,000 rounds per year. For other rifle ranges, the criterion should hold provided that there are no substantial, and particularly sudden, increases over the long-term average activity for a given range (O'Loughlin et al., 1986)."

The LPEAK for the M-16 rifle at several azimuths and distances are shown in Tables 2-1. The zero degree azimuth is the direction of fire, while the 180^{o} azimuth is directly behind the weapon.

TABLE 2-1. PREDICTED PEAK FOR M-16 (5.56 mm) RIFLE.

	Predicted Level, dBP Azimuth		
Distance, meters	**0^{o}**	**90^{o}**	**180^{o}**
50	135-150	112-127	102-117
100	113-128	106-121	95-110
200	106-121	99-114	89-104
400	93-108	86-101	78-93
800	85-100	77-92	69-84
1600	75-90	67-82	59-74

The range of levels shown in the tables is caused by changes in the sound propagation conditions between the source and receiver. The primary cause of the range in levels is the

wind direction. The lower numbers approximate the levels expected when the receiver is upwind of the source, and the higher numbers when the receiver is downwind. The levels listed in the tables do not include any reduction in the noise caused by natural or man-made terrain between the source and receiver, such as hills or berms. The tables are useful in conveying two pieces if information. Firstly, the direction of fire will have a large difference on the noise level. Secondly, the impact of small arms noise is relatively localized. Under most weather conditions, when you are 800 meters from the range, levels should not be high enough to be considered annoying.

2.4.3 AIRCRAFT NOISE.

As with small arms noise, aircraft noise can also be assessed by two means. Noise zones can depict areas where noise-sensitive land uses would be incompatible with aircraft operations. But, the levels of operations at the AK ARNG AASF and AAOFs are not high enough to generate Zone II or Zone III noise contours that extend beyond the airfield properties. But, an infrequent helicopter overflight may cause annoyance, and possibly lead to complaints.

Scandinavian Studies (Rylander 1974 and Rylander 1988) looked at the correlation between maximum overflight noise levels and annoyance levels. The subjects in the study were exposed to between 50 and 200 aircraft overflights per day. Though the AK ARNG have fewer daily operations, the data can provide some indication of the percent of people who might be annoyed. Rylander found that a good predictor of annoyance at airfields is the maximum level of the three noisiest events.

The maximum noise levels (U.S. Air Force 1977, U.S. Air Force 1978 and U.S. Air Force 1990) for U.S. Army aircraft are listed in Table 2-2. These maximum levels are compared with the levels listed in Table 2-3 to determine the percent of the population that would consider itself highly annoyed.

TABLE 2-2. MAXIMUM NOISE LEVELS OF AIRCRAFT.
Slant Distance Maximum Level, dBA*

Feet	UH-60	C-23	C-27J
200	91	89	96
500	83	81	87
1,000	76	74	80
2,000	69	66	72
5,000	58	54	60
10,000	48	44	50

TABLE 2-3. PERCENTAGE OF POPULATION HIGHLY ANNOYED FROM AIRCRAFT NOISE.

Maximum Level, dBA	Percentage Highly Annoyed
70	5
75	13
80	20
85	28
90	35

2.5 AVIATION SAFETY.

In addition to noise concerns, Army Regulation 200-1 Chapter 7, states that when planning for the noise environment, two other land use determinants; accident potential and hazards to air navigation, should be addressed. Two examples are the erection of structures that protrude into the airspace or release of substances into the air that can impair visibility. Officials in the civilian communities around AK ARNG training sites and airfield facilities should be concerned with the obstruction height criteria. It is essential that civilian officials regulate the use of this off-post land to provide for the safety of both military and civilian aircraft.

OBSTRUCTIONS TO AIR NAVIGATION. Construction of towers within the training area vicinities directly affects aircraft procedures and indirectly impacts upon the local community. Towers present an air navigation hazard that must be avoided by aircraft for safety reasons. Improper location of tower sites may result in change of flight procedures such as rerouting air corridors and routes, alteration of departure/landing directions and traffic patterns, or closure of remote landing sites. These alterations could result in an increased noise impact upon the local community.

OTHER HAZARDS.

In addition to physical obstructions that can be erected within the airspace, there are other uses that can also create conditions hazardous to aircraft operations. Such uses include:

- Activities that release substances into the air, such as steam, dust, or smoke, which can impair the visibility of aircrew members. Some examples of such activities are industrial plants, refineries, quarries, and sand or gravel pits.

- Objects that produce light emissions, either direct or indirect (reflective), which could interfere with the vision of aircrew members. Some examples are high intensity strobe lights, extensive areas of glass such as those found in many modern office buildings, and highly reflective artificial surfaces.

- Activities that produce emissions capable of interfering with aircraft communications or navigational systems.

- Activities that tend to attract birds or waterfowl, particularly in large numbers. Such activities include the operation of sanitary landfills, the maintenance of feeding stations, and growing certain types of vegetation; e.g., grain and cornfields.

2.6 NOISE MITIGATION.

Public attitude surveys have shown that noise is considered an "enemy" in urban, suburban, and even rural areas. It is often rated worse than crime, litter, and abandoned buildings, since it seems to infiltrate homes and minds incessantly. As the public, in general, has become less tolerant of noise, the noise from military unique sources - artillery, low-level jet operations, helicopters, and small arms firing has increased both in intensity and frequency. Even though the military departments have made concerted efforts to reduce the noise from training and operations, weapons platforms and systems have become larger and louder.

In its efforts to be a good neighbor, the AK ARNG has adopted the following noise mitigation measures:

- No fly areas have been established around known noise-sensitive areas.

- Flight routes have been delineated such that overflying of populated areas is avoided.

- Noise is considered in all National Environmental Policy Act (NEPA) documents.

2.7 ANNOYANCE FROM NOISE

Even though AK ARNG operations are not frequent enough to generate noise contours outside of AK ARNG facilities, people living near AK ARNG sites may occasionally be annoyed and could complain about the noise environment. The amount of annoyance also depends on the time of day the noise takes place, the background noise environment, and whether the person is indoors or outdoors at the time. The annoyance and complaint potential from single events, such as a helicopter flyover, is highly subjective.

The usual complaint pattern is that economic activity unrelated to the installation stimulates increased population and development in the vicinity. Segments of the new population are not economically dependent on the installation, and tend to be annoyed by the noise or other aspects of the government presence. The noise from the helicopters provides a specific and undeniable object to complain about. As time goes on, people reporting complaints become more articulate and eventually address their concerns to higher levels of command and government. When the situation becomes political, the installation's mission can be jeopardized.

Individual response of community members to noise depends on many factors. Some of these factors are the characteristics of the noise, including the intensity and spectral characteristics, time of day, duration, repetitions, abruptness of onset or cessation, and the noise climate or background noise against which a particular noise event occurs. Social surveys show that the following are all factors related to annoyance and/or complaints:

- The degree of interference of the noise with activity.
- The previous experience of the community with the particular noise.
- The time of day during which the intruding noise occurs.
- Fear of personal danger associated with the activities of the noise sources.
- Socioeconomic status and educational level of the community.
- The extent the people believe that the noise output could be controlled.
- Beliefs about the importance of the noise source.
- General noise sensitivity.
- The amount of insulation from sound in the home.

2.8 OTHER CONSIDERATIONS.

Feasible noise mitigation is also investigated during the National Environmental Policy Act (NEPA) process for new operations and proposed changes in existing operations. Computer modeling of new training sites offers the prospect of predicting whether the proposed action will be compatible with adjacent land use. This is a proactive technique in that it offers the opportunity to eliminate sites from consideration before the undesirable effects of noise ever become a factor. It also allows the installation to minimize the noise impact when designing sites.

2.9 SUMMARY.

This section provided a discussion of the ONMP. The purpose of the ONMP is to assist the AK ARNG in managing its noise environment, with a minimal impact on its mission, while being a good neighbor. The ONMP includes noise assessment, education, complaint management, and noise mitigation. The environmental impacts of activities at AK ARNG sites may at times extend beyond the military property boundaries. Therefore, officials at the AK ARNG depend upon the goodwill and cooperation of the civilian sector to promote public support for and understanding of the AK ARNG's mission requirements.

SECTION THREE

STEWART RIVER TRAINING AREA

3.1 LOCATION.

Stewart River Training Area (SRTA) is located on the Seward Peninsula in the foothills of the Kigluaik Mountains (Figure 3-1). The site is located approximately 23 miles north of Nome and is accessed via Glacier Creek Road from Nome. The 24,160 acre training site is leased by the AK ARNG from the Alaska Department of Natural Resources (DNR) (SR INRNMP/EA).

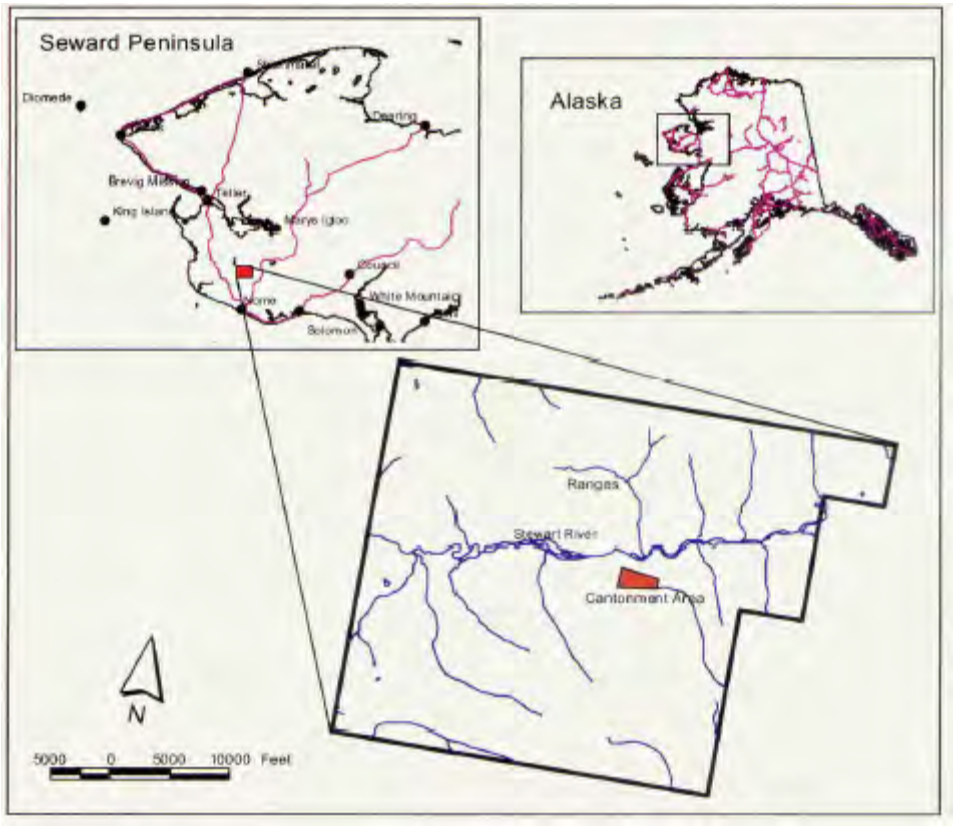

FIGURE 3-1. STEWART RIVER TRAINING AREA LOCATION

3.2 SRTA HISTORY.

The AK ARNG began using SRTA in 1987 under temporary use permits. Small numbers of troops have used the site sporadically over the years, with most training occurring during the winter months. The Alaska DNR issued a five-year land use permit (No. 20679) to the AK ARNG in 1997 for training activities on approximately 9,727 acres of state-owned land. This permit was replaced by a lease agreement (ADL No. 415960) between the State of Alaska and the AK ARNG beginning April 6, 1998 and ending on April 5, 2023. The lease grants use of 24,160 acres.

3.3 STEWART RIVER MISSION AND TRAINING.

The mission of the SRTA is to provide an adequate range training facility in western Alaska. SRTA is used for ground activities and small arms weapon training and individual qualifying for the 1st Battalion 297th Infantry (Scout). Units using SRTA access the site via Small Units Support Vehicles (SUSVs), snowmobiles with sleds, and all terrain vehicles (ATV's) with trailers or sleds, depending on time of the year. The site can also be accessed by air from Nome, using UH-60 Blackhawk helicopters.

The SRTA is the only facility of its type in western Alaska capable of providing individual and crew served weapons training and qualification opportunities for an infantry/scout company. Four ranges and their associated range firing fans are located on the site, covering approximately five percent of the total land area of the site. Ranges at the site include:

- MI 6 Zero Range and Pistol Qualification and Familiarization
- M16 Qualification Range
- M60 I0-meter/Machine Gun Transition Range
- Sniper Range (zero, targets to 1000-meters)(INRMP/EA)

3.4 NOISE ENVIRONMENT.

Existing noise levels on and adjacent to SRTA are dominated by small arms firing on ranges (pistol, rifle, machine gun, and sniper rifle), aircraft operations (UH-60 Black Hawk), and limited use of SUSVs, Off Road Vehicles (ORVs), or snowmobiles. Most concentrated noise levels occur within the flight path from Nome or on the access route from Nome to the Cantonment Area and firing ranges. (INRMP). Most of the training site area south of the Stewart River, excluding the Cantonment area, is designated foot maneuver area. There is no live fire within the foot maneuver area.

Over the years 1997-2000, the average training site usage was 373 mandays per year, with an average of 60,000 rounds of ammunition fired on the ranges per year. Noise contours are generated based on annual average noise levels. When the noise dose from the rounds are averaged, the levels are below the threshold of a Noise Zone II or Noise Zone III contour. Therefore, according to Federal Guidelines (FICUN 1980), the noise produced at SRTA is compatible with surrounding land use. Even if annual average noise levels are disregarded and peak levels are looked at, there are not any noise-sensitive land uses close enough to the training site to be affected by the noise. Table 2-1 listed the peak noise levels for small arms weapons firing.

3.5 NOISE EFFECTS.

There are no seasonal use houses located within five miles of the training site, and no year-round housing within 10 miles. All land within 20 miles of the training site is uninhabited tundra with a few scattered fishing camps that are seasonally occupied along the Nome River. Most residential

land use is located more than 20 miles south in the city of Nome. Even though SRTA is remotely located, the AK ARNG notifies local communities when live fire training will be taking place. Notice is given through use of mail, radio, and notices placed in local post offices. Given the advanced notice of training, and the lack of habitation near SRTA, the risk of noise complaints is extremely low. The noise levels from training at SRTA are compatible with Federal Guidelines (FICUN 1980).

SECTION FOUR

AK ARNG AIRCRAFT NOISE

4.1 INTRODUCTION

The AK ARNG's 207th Aviation Brigade has 24 UH-60 Blackhawks and 8 C-23 Sherpas based throughout Alaska. The aircraft are utilized for a variety of missions. Of the 74 AK ARNG armories located throughout the state, only six are accessible by road. AK ARNG helicopter units are used to transport more than 2,000 soldiers annually to training. Also, AK ARNG are sometimes called into service to help with search and rescue missions. They rescue an average of 80 people annually.

The AK ARNG has one Army Aviation Support Facility (AASF) and four Army Aviation Operation Facilities (AAOF) (Figure 4-1). To be an AASF, the facility must provide maintenance and/or modification of ARNG equipment and provide operation and logistical support for 8 or more ARNG aircraft. If there are less aircraft, the facility is classified as an AAOF. The AASF is located at Bryant Army Heliport. Three of the AAOFs, Junea, Bethel and Nome, are collocated with commercial airports. The fourth, located at Wainwright Army Airfield, is addressed in the Fort Wainwright Noise Management Plan which was completed in 2001.

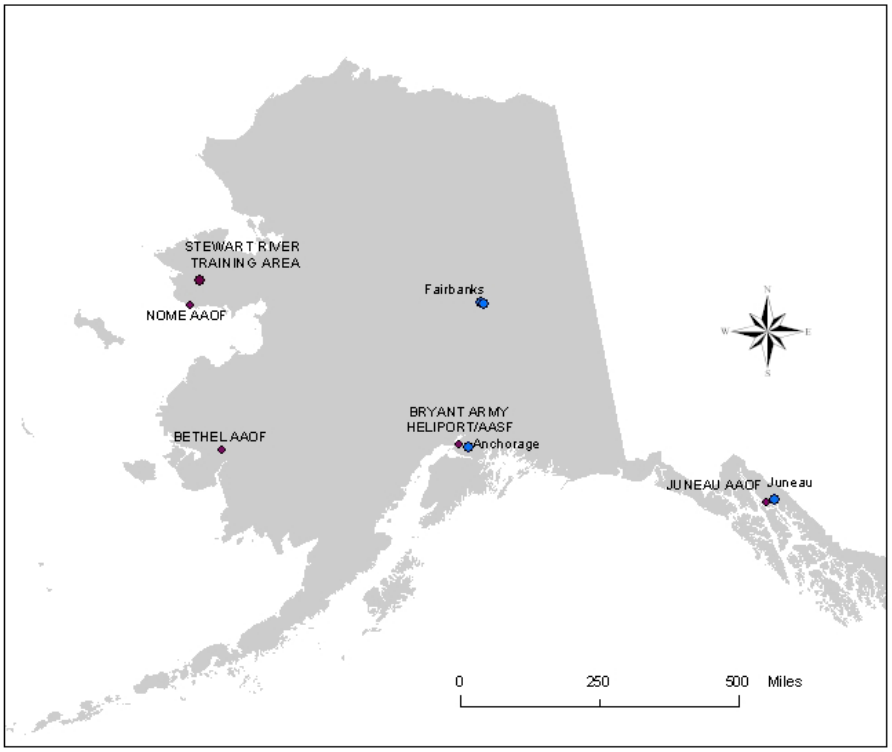

FIGURE 4-1. LOCATION OF AK ARNG AVIATION FACILITIES

FIGURE 4-2. UH-60 BLACKHAWK HELICOPTERS

FIGURE 4-3. C-23 SHERPA

4.2 BRYANT ARMY HELIPORT.

The AASF is at Bryant Army Heliport (BAHP) which is located on Fort Richardson, adjacent to Camp Denali. The site is approximately 7 miles from downtown Anchorage (Figure 4-4). Since 1995, it has been solely operated by the AK ARNG. The BAHP has helicopter and fixed-wing activity. In 1998, USACHPPM completed an Environmental Noise Consultation (USACHPPM 1998) which evaluated noise impacts of possible future scenarios at BAHP. One of the scenarios included the replacement of the UH-1 with the UH-60 and the continuation of C-23 operations. This future scenario is representative of the current conditions at BAHP. The operations in Table 4-1 were entered into NOISEMAP, but the number of annual operations was not enough to generate a Noise Zone II or III contour.

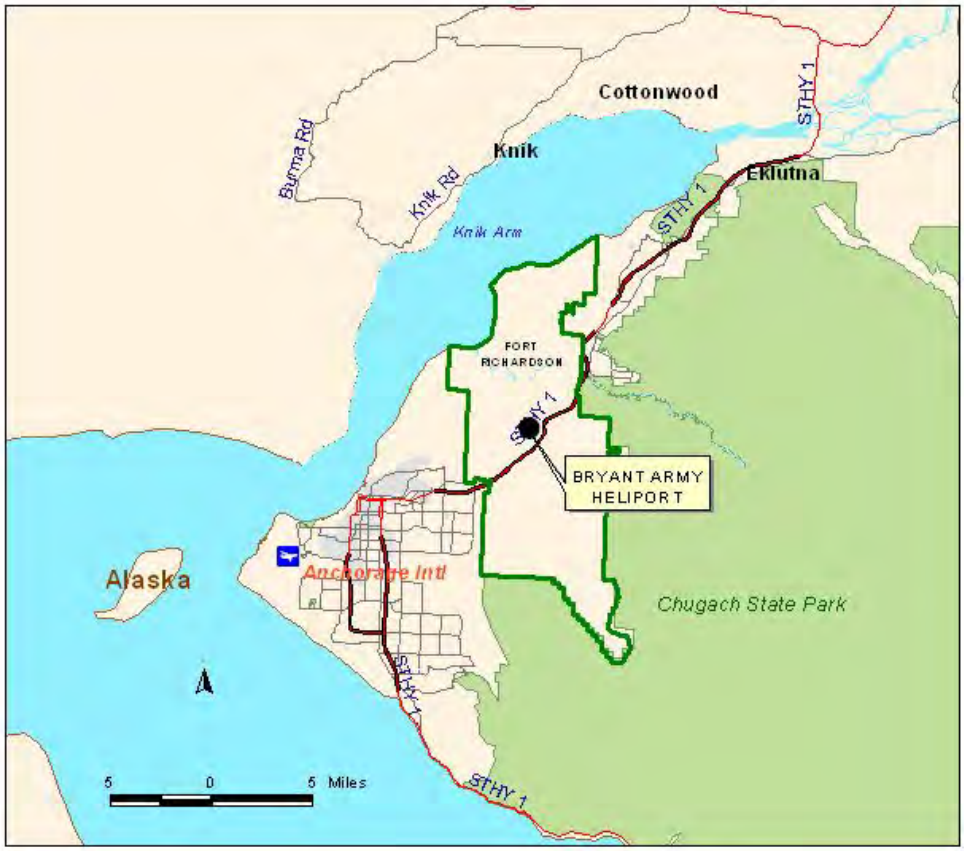

FIGURE 4-4. LOCATION OF BRYANT ARMY HELIPORT

TABLE 4-1. AIRCRAFT OPERATIONS AT BAHP

Type of Aircraft	Number of Operations	
	Daytime	Nighttime
UH-60 (Sikorsky Helicopter)	594	298
C-23 (Sherpa, fixed-wing transport aircraft)	219	109

There are plans to acquire the C-27J fixed-wing aircraft as well. The C-27J is similar to a C130, but has the capability of landing on short, unpaved runways (Figure 4-5). Also, the engines are the same type as found on the C-130, but the C-27J has two engines, whereas the C-130 has four. The noise levels for the C-27J are listed in Table 2-2.

FIGURE 4-5. AN ALENIA/LOCKHEED-MARTIN C-27J SPARTAN

USARAK Regulation 95-1 defines the policies and procedures that are established for the use of BAHP. The regulation designates Anchorage, Eagle River, Palmer, Knik Glacier Valley, and all other built-up areas as “densely populated areas”. These areas are not to be overflown at altitudes less than 1,000 feet Above Ground Level (AGL), weather permitting; otherwise they must maintain an altitude of 500 feet when off post except when is designated low level training areas.

Operations at BAHP involve both closed-pattern work and training over Training Area 4 which is located to the west on the other side of Knik Arm. Test flights avoid all populated areas and airport traffic areas. BAHP has set traffic patterns which are depicted in USARAK Regulation 95-1. Helicopter traffic in the flight patterns will fly at 1,000 feet Mean Sea Level (MSL) and fixed-wing

traffic will fly at 1,400 feet MSL.
There are no urban or residential areas in the immediate vicinity of the airfield. The nearest noise-sensitive receptor is the John F. Kennedy School, over a half mile to the southwest. Very few noise complaints are received from aircraft operations. Pilots are briefed on flight routes which are delineated with consideration of residences. As long as safety allows, the pilots fly at high enough altitudes to avoid noise impacts on the community. There are rare occasions when weather conditions change after take-off which necessitates pilots returning to the heliport at altitudes that are low enough to annoy neighbors. As discussed earlier, in the rare instances when complaints are received, the AK ARNG sends a pilot to the complainant's home. This demonstrates the commitment of the AK ARNG to being responsible neighbors.

4.3 JUNEAU AAOF.

Juneau is located 570 air miles southeast of Anchorage, Alaska, and (approximately) 970 air miles northwest of Seattle, Washington. Juneau is accessible only by sea and/or air, as there is no road or railroad access. The Juneau AAOF is located at the Juneau International Airport (JIA) (Figure 4-6). The Airport is situated nine miles northwest of downtown Juneau. Land uses in the vicinity of the airport include residential, light commercial, general commercial, industrial and rural reserve. The airport includes a paved 8,457' long by 150' wide runway and a seaplane landing area. JIA is served by two passenger service air carriers, Alaska Airlines and AirONE, a single air cargo carrier, Evergreen, and 11 air taxi operators. According to the JIA Control Tower, air carrier operations increased from 6,388 in 1986 to 7,814 in 1995. Air taxi operations in 1986 accounted for 58,653 operations, more than doubling to 127,371 by 1995 (Table 4-2).

FIGURE 4-6. LOCATION OF JUNEAU AAOF

TABLE 4-2. AIR TRAFFIC ACTIVITY AT THE JIA FROM 1975 TO 1995.

AIR TRAFFIC ACTIVITY, 1976 - 1996
Juneau International Airport

Annual Operations	*1976*	*1981*	*1986*	*1991*	*1995*
Air Carrier	5,889	6,251	6,388	6,544	7,814
Air Taxi (Fixed Wing and Helicopter)	4,177	34,922	58,653	72,406	127,371
General Aviation	43,550	51,053	44,482	35,629	34,774
Military	399	1,192	1,744	1,107	1,103
TOTAL	54,015	93,418	111,267	115,686	171,062
Instrument Operations	N/A	7,917	8,769	6,172	9,798

Source: Federal Aviation Administration, Juneau Control Tower 1976 - 1995 and operator statistics. (Helicopter operations are doubled from ATCT counts, based on counting practices. This assumes that about 50% of actual helicopter operations are counted by the ATCT.)

Currently, the AK ARNG has two UH-60 Blackhawk helicopters assigned to Juneau as well as, on a transient basis, C-123 Sherpas, C-130s, C-12s, and other executive transport type aircraft. East of the Juneau Glacier Valley Fire Station is an apron that was constructed in 1989. It is paved and can accommodate aircraft up to the size of C-130 aircraft. The AK ARNG has constructed a large aircraft hangar at this location to support both fixed and rotor winged aircraft. Military activity at the Airport also includes occasional visits by other military aircraft, such as the F-14, F-15, F-16, and F-18. The Airport also handles larger military aircraft such as the C-5, C-130, and KC-135. As shown in Table 4-3, total annual military operations have ranged from a low of 978 in 1992 to a high of 1,151 in 1994. According to the JIA Master Plan, military operations are projected to remain static at 1,000 operations per year through 2015 (www.juneau.lib.ak.us/airport/environ/pdf/Chapter3.pdf).

TABLE 4-3. MILITARY AIRCRAFT ACTIVITY AT JIA

MILITARY ACTIVITY PROJECTION
Juneau International Airport

	Year	Military Operations
Historical		
	1992	978
	1993	1,074
	1994	1,151
	1995	1,103
Projected		
	2000	1,000
	2005	1,000
	2015	1,000

Sources: Historical - FAA Juneau ATCT. Projected - The Airport Technology and Planning Group, Inc., July 1997.

SOURCE: http://www.juneau.lib.ak.us/airport/draftpln.php

The JIA has a master plan which includes noise contours for all operations. A noise exposure study prepared in conjunction with the Master Plan showed that only one residence was located within the Noise Zone II contour (>65 ADNL). Other land uses within the higher noise area were compatible land uses such as commercial/industrial, natural resource, or public uses. It should be noted that these contours contained within the JIA Master Plan included all airport operations, not just those of the AK ARNG.

The above information shows that the noise attributed to military operations at Juneau is insignificant compared to the activity that occurs at JIA. In 1998, CHPPM modeled just the AK ARNG operations taking place at JIA. The number of operations was too low to generate a Noise Zone II or Noise Zone III off of the runway (CHPPM 1998). Today, the number of operations has not increased and are still too low generate a noise contour. The noise from operations at the Juneau AAOF are compatible with Federal Guidelines (FICUN 1980).

4.4 BETHEL AAOF.

The City of Bethel has a population of approximately 4,500 and is the largest town in western Alaska. It lies on the north bank of the Kuskokwim River approximately 60 miles from where the river flows into Kuskokwim Bay in the Bering Sea. It is 390 miles west of Anchorage. Bethel is surrounded by extensive low-lying tundra with numerous lakes, ponds and streams. The terrain is flat to the north for a distance of about 70 miles before a range of low hills is encountered. This area covers 96,000 square miles of western Alaska and is accessible year-round only by air, with a brief period of maritime access during the summer.

The Bethel AAOF is located at the Bethel Municipal Airport, approximately three miles west of town (Figure 4-7). The Bethel Airport is the regional transportation center, and is served by a number of passenger airlines, cargo carriers, and numerous air taxi services. Bethel is the third busiest airport in Alaska. It runway is 6,400' long by 150' wide asphalt runway and 1,850' long by 75' wide gravel crosswind runway. In 2003, the airport averaged 334 operations per day with only one percent of these being military (www.airnav.com/airport/PABE).

The AK ARNG has two UH-60 Blackhawk helicopters stationed at Bethel. In 1998, noise modeling was run for existing AK ARNG operations at Bethel AAOF (USACHPPM 1998). The 3,133 yearly operations were not enough to generate a Noise Zone II or III which extended beyond the runway. Since that time, the numbers of operations have not increased and the UH-1 helicopters which were stationed at Bethel have been replaced with the quieter UH-60s. Therefore, there are still not enough operations to generate noise contours. The AAOF is in an area which is zoned industrial. The combination of a low number of operations with the low-density land use creates a very low risk of noise complaints. Also, residents surrounding the AAOF support the helicopter operations realizing that the AARNG is often called to support rescue missions for the community. The noise levels from operations at Bethel AAOF are compatible with Federal Land Use Guidelines (FICUN 1980).

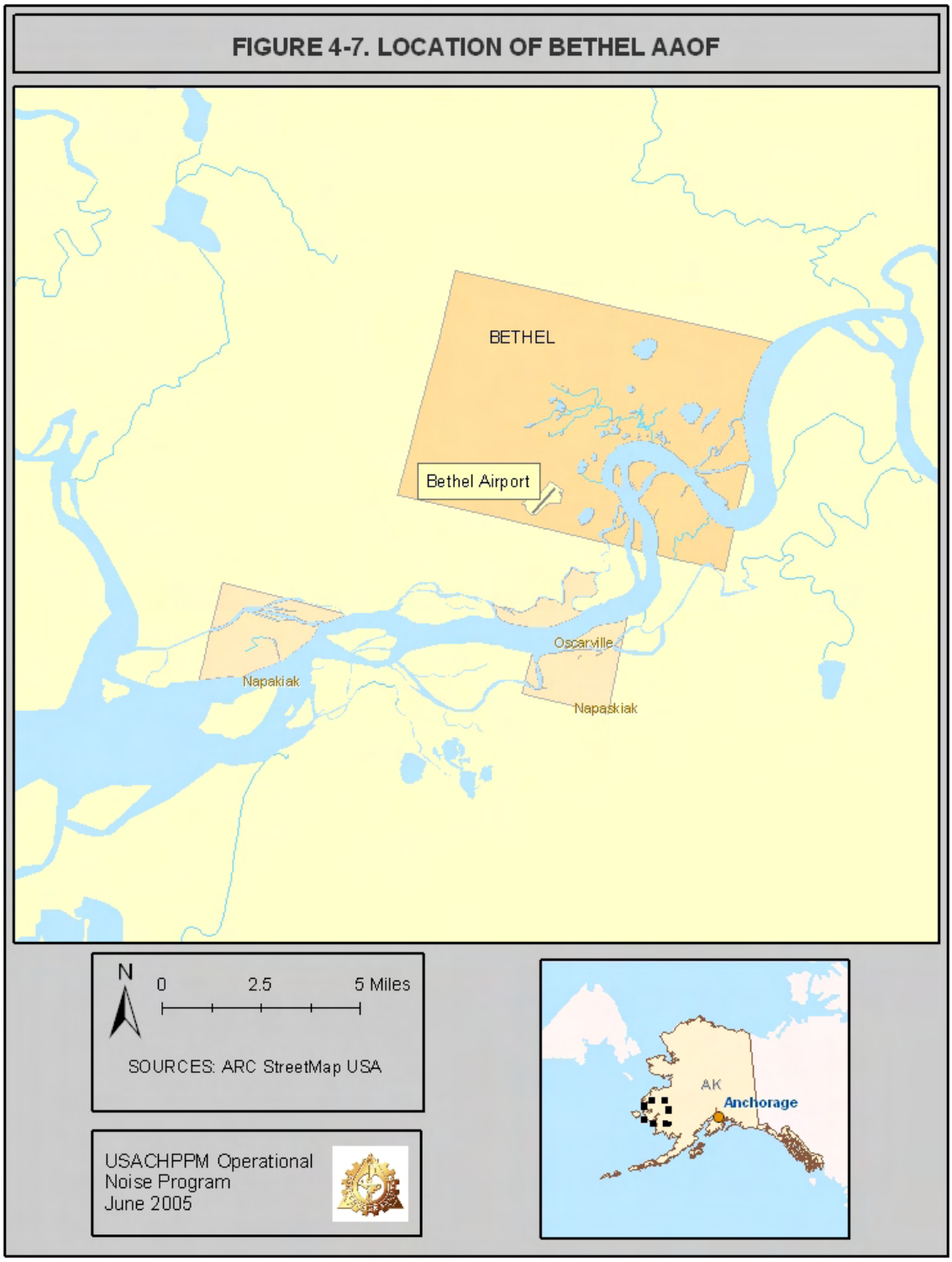
FIGURE 4-7. LOCATION OF BETHEL AAOF
BETHEL
Bethel Airport
Napakiak
Oscarville
Napaskiak
N
0
2.5
5 Miles
SOURCES: ARC StreetMap USA
USACHPPM Operational
Noise Program
June 2005
AK
Anchorage

4.5 NOME AAOF.

The City of Nome is located on the south side of the Seward Peninsula and is approximately 550 miles from both Anchorage and Fairbanks. The community is accessible only by air except for a short, ice-free period during the summer months when freight and commercial goods arrive by ocean barge. Nome is a regional center of transportation for surrounding villages. The population of the city is 3,500 with about 9,000 people in the area.

The Nome AAOF is located at the Nome Airport (formerly called Nome Mark's Field). The Nome airport is about two miles from downtown in a land use district that is classified as Industrial (Figure 4-8). The Nome Airport has two paved runways, one is 6,001' long and 150' wide, and the other is 5,576' by 150' wide. Scheduled jet flights are available, as well as charter and helicopter services. Alaska Airlines provides year-round, daily service between Nome and Anchorage.

The AK ARNG is authorized two UH-60 Blackhawks at the Nome AAOF. Military operations account for approximately 5% of the total operations at the airport (www.airnav.com/airport/PAOM). A noise assessment was completed in 1998 which included modeling of aircraft operations at the AAOF. The assessment included 3,133 AK ARNG yearly operations (USACHPPM 1998). The modeling results showed that 3,133 operations per year were not enough to generate a Noise Zone II or III contour that extended beyond the runway. Currently, the numbers of operations have not increased and therefore are still not enough to generate a noise contour. Noise levels from AK ARNG operations at Nome are compatible with Federal Guidelines (FICUN1980).

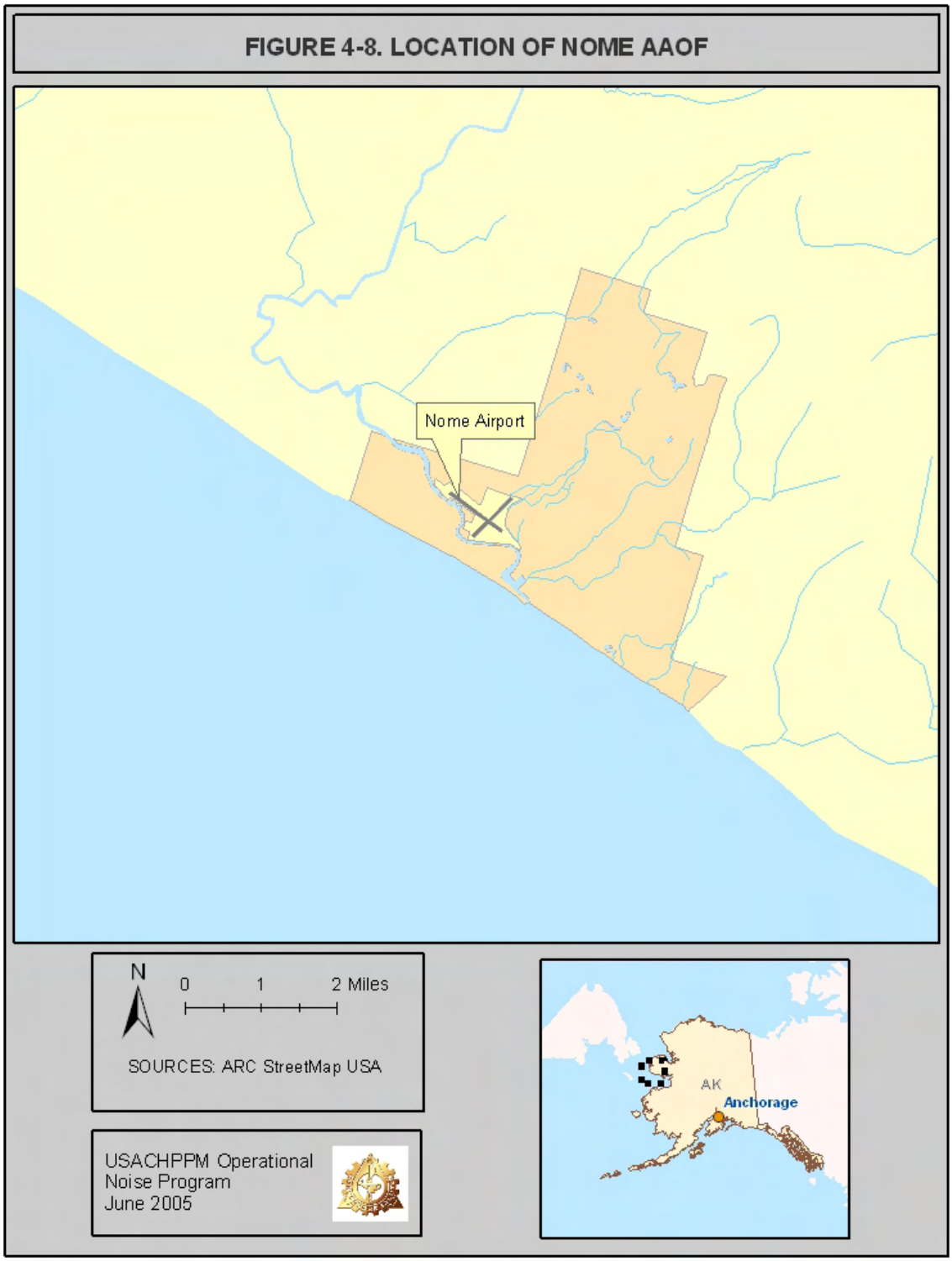
FIGURE 4-8. LOCATION OF NOME AAOF
Nome Airport
N
0
1
2 Miles
SOURCES: ARC StreetMap USA
USACHPPM Operational
Noise Program
June 2005
AK
Anchorage

FIGURE 4-9. UH-60 BLACKHAWK AT NOME

Photo by Angus Mazonna
WATCHFUL EYE — The Army National Guard protects and serves Nome and the surrounding Norton Sound region with state-of-the art equipment. This Blackhawk helicopter is seen flying over the Bering Sea at dusk as it returns to Nome from a village mission. SOURCE: http://nugget.nomenugget.com/20021121/

4.6 SUMMARY.

At each of the AK ARNG aviation facilities, the number of operations is not enough to generate a Noise Zone II or Noise Zone II beyond the immediate runway vicinity. Therefore, average noise levels at all locations are compatible with Federal Guidelines. But, people may complain due to an individual event even though the average noise levels are compatible with land use guidelines.

The risk of noise complaints from individual aircraft operations is low at AK ARNG sites for a combination of reasons. Firstly, the three AAOFs are located at airports where their operations are only a small portion of the total activity. Once they leave the AAOF, they climb to altitudes that mitigate noise levels on the ground and avoid overflying of populated areas. Designated training areas and landing zones, such as portions of Tongass National Forest, are remote from population centers and no-fly zones have been established around noise-sensitve areas. When there is a complaint received, they are handled such that they do not escalate further.

APPENDIX A

DESCRIPTION OF THE NOISE ENVIRONMENT, NOISE EVALUATORS AND NOISE CONTOURING PROCEDURES

A.1 INTRODUCTION.

Noise is defined as unwanted sound. Sound is the variation of air pressure about a mean (atmospheric) pressure. These changes in the atmospheric pressure [100,000 Pascals (14.7 pounds per square inch) (psi)] vary from approximately 0.0006 Pascals for a whisper at 2 meters to 1,000 Pascals for firing an M16 rifle at the firer's ear. Because of this large range of sound pressure, and the fact that the human ear responds more closely to a logarithmic scale rather than a linear scale, sound pressure level is defined as 20 times the common logarithm of the ratio of the sound pressure to the reference pressure (0.00002 Pascal). The sound pressure level is measured in decibels (dB). For example, if the sound pressure doubles from 0.2 to 0.4 Pascals, the level increases by 6 dB from 80 to 86 dB.

A characteristic of environmental noise is that it is not steady, but varies in amplitude from one moment to the next. To account for these variations in the sound pressure level with time, and to assess environmental noise in a consistent and practical manner, a statistical approach has been used to reduce the time-varying levels to single numbers. The currently accepted single-number evaluators are the equivalent sound level (LEQ) and the day-night level (DNL).

The physical basis of the noise system is the noise source, path, and receiver relationship. Noise emanates from a source, travels along a path, and is perceived by the receiver. The affect of noise on the receiver can be considered the focal point of the entire system.

Before a noise problem can be resolved, however, the nature and intensity of the noise must be quantified. Because of the different types of noise, e.g., fixed- and rotary-wing aircraft flyovers, ground run-up, and explosive detonations, a weighting system was developed to measure these various types of noise.

In environmental noise, the sound pressure level is usually measured using one of the frequency networks of the sound level meter. Since the human ear is more sensitive to sounds of 1,000 Hertz and above than sounds of 125 Hertz and below, it is appropriate to apply a weighting function to the noise spectrum, which will approximate the response of the human ear. The A-weighting frequency network of the sound level meter de-emphasizes the lower frequency portion of the noise spectrum to approximate the human ear's response to the noise. This A-weighting frequency response is specified by an American National Standards Institute (ANSI) standard (ANSI 1983). Thus, the A-weighting of the frequency content of the noise signal has been found to have an excellent correlation with the human subjective judgment of annoyance of the noise. The sound pressure levels measured using the A-weighting network are expressed as dBA.

To assess the additional annoyance caused by low frequency vibration of structures, the C-weighting network is used to evaluate the impulsive noise from all weapons larger than small arms. This weighting is also specified by the standard. The sound pressure levels measured using the C-weighting network are expressed as dBC.

A.2 HISTORY OF NOISE EVALUATORS.

Before the mid 1970's, every organization had its own set of preferred environmental noise evaluators. This resulted in a wide variety of evaluators. Since each evaluator was developed for a specific purpose, a noise environment measured with one evaluator could not be compared with an environment measured using another evaluator.

In carrying out its responsibilities under the Noise Control Act of 1972 (PL 92-574 1972), the U.S. Environmental Protection Agency (EPA) recommended the adoption of a single environmental noise evaluator, the LEQ and its 24-hour version, DNL. The Department of Defense, along with most other U.S. Government agencies followed the EPA recommendation. The DNL is the most widely accepted descriptor for environmental noise (FAA 1990) because of the following characteristics:

- The DNL is a measurable quantity.
- The DNL is simple to understand and use by planners and the public who are not familiar with acoustics or acoustical theory.
- The DNL provides a simple method to compare the effectiveness of alternative scenarios.
- The DNL is a "figure of merit" for noise impacts which is based on communities' reactions to environmental noise.
- The DNL is the best measure of noise exposure to identify significant impacts on the quality of the human environment.
- By Federal interagency agreement, the DNL is the best descriptor of all noise sources for land use compatibility planning.
- The DNL is the only metric with substantial body of scientific survey data on the reactions of people to noise.

In recommending the DNL, the EPA noted that most noise environments are characterized by repetitive behavior from day to day, with some variation imposed by differences between weekday and weekend activity, as well as seasonal variation. To account for these variations, an annual average is used.

Since annoyance is caused by long-term dissatisfaction with the noise environment, the annual average is an excellent predictor of the average community annoyance when there is not a large variation in the day-to-day or season-to-season DNL. The annual DNL is not a good predictor of noise complaints, since complaints represent the person's immediate dissatisfaction with the noise environment.

Currently, there are no guidelines for judging the land use compatibility for single noise events. Although much of the early work on annoyance was done on single events, each study was designed differently, and the results cannot be combined in a systematic fashion to form a statistically-valid sample. Most of these studies were either done inside a laboratory or, if done outdoors, in controlled settings. Only recently has equipment become available which would allow subjects to register their annoyance if single events are experienced during their routine activities. There is not enough of this information available to support setting standards on single events.

For impulsive noise, the Department of the Army uses the C-weighted DNL. The use of C-weighting is based on the findings of the National Academy of Sciences Committee on Hearing, Bioacoustics and Biomechanics (CHABA) (CHABA 1981). Studies have been performed by the U.S. Army Construction Engineering Research Laboratory (USACERL) (U.S. Army 1984) to define the average annoyance as a function of the C-weighted DNL. The ANSI (ANSI 1986) has endorsed this method for predicting the annoyance caused by impulsive noise.

Recent research by the USACERL (Schomer 1994) confirms what Luz and Lewis (Luz 1979) previously found. Annoyance from impulsive noise does not increase at the same rate as annoyance from continuous noise. It increases twice as fast. That is, if an increase in the continuous noise level causes the annoyance to double, the same increase in the impulsive noise level will cause the annoyance to increase fourfold. At a sound exposure level (SEL) of 103 decibels (dB) the annoyance from continuous and impulsive noise is equal.

A.3 LEQ/DNL NOISE EVALUATORS.

The LEQ is defined as the equivalent steady state sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound during the same period. The LEQ is an energy average. The energy average puts more emphasis on the higher sound pressure levels than the arithmetic average. The LEQ is usually computed for a 1-minute, 10-minute, 30-minute, 1-hour, 8-hour or 24-hour segment of environmental noise.

To assess the added annoyance of the environmental noise during the nighttime hours (2200 - 0700 hours), the DNL is used. The DNL is the 24-hour LEQ, with a 10 dB penalty added to the nighttime levels.

By using the LEQ and DNL, the three important determinants of noise annoyance can be described by using a single number. The three determinants are the intensity of the noise event, the duration of the noise event, and the number of times the noise event takes place. Numerous laboratory and field

studies have confirmed that the tradeoff between intensity, duration and number is adequately described by averaging the total acoustical energy.

A.4 NOISE CONTOURS.

Noise contours for all noise sources are generated using the A- or C-weighted DNL. The contours are computed by averaging over the time period of interest, the acoustical energy from the operations of the set of noise sources of interest. The averaging period is usually a busy day, a training cycle, or a year. The contours, representing the boundaries between the noise zones, are constructed by connecting points of equal acoustical energy.

For example, the contours for an airfield are computed by averaging at many points the acoustical energy arriving at these points from aircraft operations. A 10 dB penalty is added to all nighttime operations. The contours for the airfield are constructed by connecting all points having a total acoustical energy equal to 65 dBA and connecting all points equal to 75 dBA.

A.4.1. AIRCRAFT NOISE.

The single event noise levels for AK ARNG aircraft activity were generated using the NOISEMAP 7.0 computer program database. This program was developed for the US Air Force by Wyle Laboratories (U.S. Air Force 1990).

A.4.2. SMALL ARMS NOISE.

Small arms noise contours are generated using the Small Arms Range Noise Assessment Model (SARNAM) (Pater 1999). It incorporates the latest available information on weapons noise source models (including directivity and spectrum), sound propagation, effects of noise mitigation and safety structures (walls, berms, ricochet barriers), and community response protocols for small arms noise. SARNAM uses a more suitable noise metric than has been previously used for small arms in the US. It includes an extensive selection of weapons in the source library, can handle multiple ranges of various types, and is designed to maximize user productivity. The graphical output shows noise contours and range boundaries and can also display installation features. There were not enough operations to generate contours using SARNAM.

APPENDIX B
GUIDELINES FOR COMPATIBLE LAND USE

B.1 GUIDELINES FOR CONSIDERING NOISE IN LAND USE PLANNING AND CONTROL. (FICUN 1980)

		NOISE ZONES/ADNL LEVELS						
		NZ I		NZ II		NZ III		
SLUCM No.	LAND USE	0-55	55-65	65-70	70-75	75-80	80-85	85 +
10	**RESIDENTIAL**							
11	Household Units	Yes	Yes*	25[1]	30[1]	No	No	No
12	Group Quarters	Yes	Yes*	25[1]	30[1]	No	No	No
13	Residential Hotels	Yes	Yes*	25[1]	30[1]	No	No	No
14	Mobile Home Parks or Courts	Yes	Yes*	No	No	No	No	No
15	Transient Lodgings	Yes	Yes*	25[1]	30[1]	35[1]	No	No
16	Other Residential	Yes	Yes*	25[1]	30[1]	No	No	No
20,30	**MANUFACTURING**							
21	Food & Kindred Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
22	Textile Mill Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
23	Apparel/Other Finished Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
24	Lumber & Wood Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
25	Furniture & Fixtures	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
26	Paper & Allied Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
27	Printing, Publishing & Allied Industries	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
28	Chemicals & Allied Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
29	Petroleum Refining & Related Industries	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
31	Rubber & Misc Plastic Products - Manufac	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
32	Stone, Clay & Glass Products - Manufac	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
33	Primary Metal Industries	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No

SLUCM No.	LAND USE	NOISE ZONES/ADNL LEVELS NZ I 0-55	NZ I 55-65	NZ II 65-70	NZ II 70-75	NZ III 75-80	NZ III 80-85	NZ III 85+
20,30	**MANUFACTURING continued**							
34	Fabricated Metal Products - Manufac	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
35	Professional, Scientific & Controls	Yes	Yes	Yes	25	30	No	No
39	Miscellaneous Manufacturing	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
40	**TRANSPORT, COMMS & UTIL**							
41	Railroad, Rapid Rail Transit & Street Rail	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
42	Motor Vehicle Transportation	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
43	Aircraft Transportation	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
44	Marine Craft Transportation	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
45	Highway & Street Right-of-Way	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
46	Automobile Parking	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
47	Communications	Yes	Yes	Yes	25[5]	30[5]	No	No
48	Utilities	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
49	Other Transportation, Comms & Utilities	Yes	Yes	Yes	25[5]	30[5]	No	No
50	**TRADE**							
51	Wholesale Trade	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
52	Retail - Building Materials, Hardware/ Farm	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
53	Retail - General Merchandise	Yes	Yes	Yes	25	30	No	No

SLUCM No.	LAND USE	NOISE ZONES/ADNL LEVELS NZ I 0-55	NZ I 55-65	NZ II 65-70	NZ II 70-75	NZ III 75-80	NZ III 80-85	NZ III 85 +
50	**TRADE continued**							
54	Retail - Food	Yes	Yes	Yes	25	30	No	No
55	Retail - Auto, Marine, Aircraft & Parts	Yes	Yes	Yes	25	30	No	No
56	Retail - Apparel & Accessories	Yes	Yes	Yes	25	30	No	No
57	Retail - Furniture, Furnishings & Equipment	Yes	Yes	Yes	25	30	No	No
58	Retail - Eating & Drinking Facilities	Yes	Yes	Yes	25	30	No	No
59	Other Retail Trade	Yes	Yes	Yes	25	30	No	No
60	**SERVICES**							
61	Finance, Insurance & Real Estate Services	Yes	Yes	Yes	25	30	No	No
62	Personal Services	Yes	Yes	Yes	25	30	No	No
62.4	Cemeteries[11]	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[6]
63	Business Services	Yes	Yes	Yes	25	30	No	No
64	Repair Services	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
65	Professional Services	Yes	Yes	Yes	25	30	No	No
65.1	Hospitals, Nursing Homes	Yes	Yes[*]	25[*]	30[*]	No	No	No
65.1	Other Medical Facilities	Yes	Yes	Yes	25	30	No	No
66	Contract Construction Services	Yes	Yes	Yes	25	30	No	No
67	Government Services	Yes	Yes[*]	Yes[*]	25[*]	30[*]	No	No
68	Educational Services	Yes	Yes[*]	25[*]	30[*]	No	No	No
69	Miscellaneous Services	Yes	Yes	Yes	25	30	No	No

SLUCM No.	LAND USE	NOISE ZONES/ADNL LEVELS NZ I 0-55	NZ I 55-65	NZ II 65-70	NZ II 70-75	NZ III 75-80	NZ III 80-85	NZ III 85+
70	**CULTURAL, ENTERTAINMENT & REC**							
71	Cultural Activities, Including Churches	Yes	Yes*	25*	30*	No	No	No
71.2	Nature Exhibits	Yes	Yes*	Yes*	No	No	No	No
72	Public Assembly	Yes	Yes	Yes	No	No	No	No
72.1	Auditoriums, Concert Halls	Yes	Yes	25	30	No	No	No
72.11	Outdoor Music Shells, Amphitheaters	Yes	Yes*	No	No	No	No	No
72.2	Outdoor Sports Arenas, Spectator Sports	Yes	Yes	Yes[7]	Yes[7]	No	No	No
73	Amusements	Yes	Yes	Yes	Yes	No	No	No
74	Recreational Activities	Yes	Yes*	Yes*	25*	30*	No	No
75	Resorts, Groups & Camps	Yes	Yes*	Yes*	Yes*	No	No	No
76	Parks	Yes	Yes*	Yes*	Yes*	No	No	No
79	Other Cultural, Entertainment & Recreation	Yes	Yes*	Yes*	Yes*	No	No	No
80	**RESOURCE PRODUCT & EXTRACT**							
81	Agriculture (Except Livestock)[11]	Yes	Yes	Yes[8]	Yes[9]	Yes[10]	Yes[10]	Yes[10]
81.5-81.7	Livestock Farming & Animal Breeding	Yes	Yes	Yes[8]	Yes[9]	No	No	No
82	Agricultural Related Activities[11]	Yes	Yes	Yes[8]	Yes[9]	Yes[10]	Yes[10]	Yes[10]
83	Forestry Activities & Related Services[11]	Yes	Yes	Yes[8]	Yes[9]	Yes[10]	Yes[10]	Yes[10]
84	Fishing Activities & Related Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	NOISE ZONES/ADNL LEVELS						
	NZ I		NZ II		NZ III		
SLUCM No. LAND USE	0-55	55-65	65-70	70-75	75-80	80-85	85 +
80 RESOURCE PRODUCT & EXTRACT continued							
85 Mining Activities & Related Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes
89 Other Resource Production & Extraction	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Legend:

SLCUM	Standard Land Use Coding Manual
Yes	Land use and related structures compatible without restrictions.
No	Land use and related structures are not compatible and should be prohibited.
ADNL	A-weighted day-night sound level
NZ	Noise Zone
Yes[x]	(Yes with restrictions) Land use and related structures generally compatible; see footnotes.
25, 30, 35	Land use and related structures generally compatible; measures to achieve noise level reduction (NLR) of 25, 30 or 35 must be incorporated into design and construction of structure.
25[*], 30[*], 35[*]	Land use generally compatible with NLR; however, measures to achieve an overall NLR do not necessarily solve noise difficulties; additional evaluation is warranted.
NLR	Noise level reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

Footnotes:

[*] The designation of these uses as "compatible" in this zone reflects individual Federal agencies' consideration of general cost and feasibility factors as well as past

community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

1 (a) Although local conditions may require residential use, it is discouraged in 65-70 ADNL and strongly discouraged in 70-75 ADNL. The absence of viable alternative development options should be determined and an evaluation indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones should be conducted prior to approvals.
(b) Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB (65-70 ADNL) and 30 dB (70-75 ADNL) should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels.
(c) NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level transportation sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2 Measures to achieve NLR of 25 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 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 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.

5 If noise-sensitive, use indicated NLR; if not, use is compatible.

6 No buildings.

7 Land use compatible provided special sound reinforcement systems are installed.

8 Residential buildings require a NLR of 25.

[9] Residential buildings require a NLR of 30.

[10] Residential buildings not permitted.

[11] In areas with ADNL greater than 80, land use not recommended, but if community decides use is necessary, hearing protection devices should be worn by personnel.

APPENDIX C

GLOSSARY OF TERMS, ACRONYMS & ABBREVIATIONS

C.1 GLOSSARY OF TERMS.

A-Weighted Sound Level, A-Level (AL) - The ear does not respond equally to sounds of all frequencies, but is less efficient at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound pressure level of a noise containing a wide range of frequencies in a manner approximating the response of the ear, it is necessary to reduce, or weight, the effects of the low and high frequencies with respect to the medium frequencies. Thus, the low and high frequencies are de-emphasized with the A-weighting.

The A-scale sound level is a quantity, in decibels, read from a standard sound-level meter with A-weighting circuitry. The A-scale weighting discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. The A-scale sound level measures approximately the relative "noisiness" or "annoyance" of many common sounds.

Aircraft - Fixed-wing (FW) (Airplane) and rotary-wing (RW) (Helicopter).

Average Sound Level - The mean-squared sound exposure level of all events occurring in a stated time interval, plus ten times the common logarithm of the quotient formed by the number of events in the time interval, divided by the duration of the time interval in seconds.

C-Weighted Sound Level, C-Level (CL) - The C-scale sound level is a quantity, in decibels, read from a standard sound level meter with C-weighting circuitry. The C-scale incorporates slight de-emphasis of the low and high portion of the audible frequency spectrum.

Community. Community means those individuals, organizations, or special interest groups affected by or interested in decisions affecting towns, cities, or unincorporated areas near or adjoining a military installation; and officials of local, state and federal governments, and Native American tribal councils responsible for decision making and administration of programs affecting those communities.

Continuous Noise - On-going noise whose intensity remains at a measurable level without interruption over an indefinite or a specified period of time.

Day-Night Average Sound Level (DNL) - The 24-hour average frequency-weighted sound level, in decibels, from midnight to midnight, obtained after addition of 10 decibels to sound levels in the

night from midnight up to 7 a.m. and from 10 p.m. to midnight (0000 up to 0700 and 2200 up to 2400 hours). A-Weighting is understood unless otherwise specified.

Decibels (dB) - The decibel is a logarithmic unit of measure of sound pressure.

Encroachment - The term implies unguided use or development of the land surrounding a military installation.

Equivalent Sound Level (LEQ) - The level of a constant sound which, in a given situation and time period, has the same energy as does a time varying sound. For noise sources, which are not in continuous operation, the equivalent sound level may be obtained by summing individual sound exposure level (SEL) values and normalizing over the appropriate time period.

Fixed-Wing Aircraft - A powered aircraft that has wings attached to the fuselage so that they are either rigidly fixed in place or adjustable, as distinguished from aircraft with rotating wings, like a helicopter.

Frequency - Number of complete oscillation cycles per unit of time. The unit of frequency is the Hertz (Hz).

Helicopter - An aircraft deriving both lift and control from one or more power driven rotors rotating on substantially vertical axes.

Hertz - Unit of frequency equal to one cycle per second.

Impulse Noise (Impulsive Noise) - Noise of short duration (typically less than one second), especially of high intensity, abrupt onset and rapid decay, and often rapidly changing spectral composition. Impulse noise is characteristically associated with such sources as explosions, impacts, the discharge of firearms, the passage of supersonic aircraft (sonic boom) and many industrial processes.

Intermittent Noise - Fluctuating noise whose level falls one or more times to low or immeasurable values during an exposure.

Military Operations Area (MOA) - A MOA is a special use airspace assignment of defined vertical and lateral dimensions established outside positive control areas to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

Noise - Any sound without value.

Noise Exposure - The cumulative acoustic stimulation reaching the ear of a person over a specified period of time (e.g., a work shift, a day, or a lifetime).

Noise Hazard (Hazardous Noise) - Acoustic stimulation of the ear, which is likely to produce noise-induced permanent threshold shift in some portion of the population.

Noise Level Reduction (NLR) - NLR is the difference in decibels, between the A-weighted sound level outside a building and the A-weighted sound level inside a designated room in the building. The NLR is dependent upon the transmission loss characteristics of the building surfaces exposed to an exterior noise source, the particular noise characteristics of the exterior noise source and the acoustic properties of the designated room in the building.

Noise Zone III (NZ III) - NZ III consists of an area around the source of the noise in which the day-night sound level (DNL) is greater than 75 decibels, A-weighted (dBA) or 70 decibels, C-weighted (dBC). The noise level within NZ III is considered so severe that noise-sensitive activities should not be conducted therein.

Noise Zone II (NZ II) - NZ II consists of an area where the day-night sound level is between 65 and 75 dBA or 62 and 70 dBC. Exposure to noise within this area is considered significant and use of the land within NZ II should normally be limited to activities such as industrial, manufacturing, transportation and resource production.

Noise Zone I (NZ I) - NZ I includes all areas around a noise source in which the day-night sound level is less than 65 dBA or 62 dBC. This area is usually suitable for all types of land use activities.

Public. Public, for the purposes of this management plan, means the same thing as community.

Sound Exposure Level (SEL) - The level of the sound pressure squared, integrated over a given time.

Sound Level Meter - An instrument that provides a direct reading of the sound pressure level at a particular location. It consists of a microphone and electronic amplifier together with a meter having a scale graduated in decibels. Using appropriate built-in electrical filters, it is possible to directly measure the overall A- and C-weighted sound pressure levels. Standard sound level meters must satisfy the requirements of American National Standards Institute (ANSI) Specification for Sound Level Meters, S1.4-1983.

Standard Land Use Coding Manual (SLUCM) - Standard system for identifying and coding land use activities. Published by the U.S. Department of Commerce, 1965.

D.2 GLOSSARY OF ACRONYMS AND ABBREVIATIONS.

A

AAF	Army Airfield
ADNL	A-weighted Day-Night Average Sound Level
AGL	Above Ground Level
ANSI	American National Standards Institute
AR	Army Regulation
ARNG	Army National Guard

B

NONE

C

CDNL	C-weighted Day-Night Level

D

DA	Department of the Army
dB	Decibels
dBA	Decibels, A-weighted
dBC	Decibels, C-weighted
DNL	Day-Night Average Sound Level
DOD	Department of Defense
DODI	Department of Defense Instruction

E

EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency

F

FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FICUN	Federal Interagency Committee on Urban Noise
FY	Fiscal Year

G

GIS	Geographic Information System

H

HQ	Headquarters

HQDA	Headquarters, Department of the Army
Hz	Hertz

I

IG	Inspector General

J

JLUS	Joint Land Use Study

K

NONE

L

LEQ	Equivalent Sound Level

M

MSL	Mean Sea Level

N

NAS	Naval Air Station
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NLR	Noise Level Reduction
NOE	Nap of the Earth
NZ	Noise Zone
NZ I	Noise Zone I
NZ II	Noise Zone II
NZ III	Noise Zone III

O

NONE

P

PAO	Public Affairs Officer
PL	Public Law

Q

NONE

R

NONE

S

SEL	Sound Exposure Level
SJA	Staff Judge Advocate
SLUCM	Standard Land Use Coding Manual

T

TDR	Transfer of Development Rights
TM	Technical Manual
TRADOC	U.S. Army Training and Doctrine Command

U

USACERL	U.S. Army Construction Engineering Research Laboratories
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAF	U.S. Air Force
USC	U.S. Code

V

NONE

W NONE

X NONE

Y NONE

Z NONE

APPENDIX D

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