Fort Hood Noise Study

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At the request of the U.S. Army Corps of Engineers, Fort Worth District Office, an installation compatible-use zone (ICUZ) noise study was prepared for Fort Hood, Texas. The purpose of this study was to address the noise impact from military training activity conducted at Fort Hood. The major component of this Fort Hood ICUZ noise study was a comprehensive long-term noise monitoring program and the use of computer modeling to develop noise contours to identify noise-impacted areas. Noise measurements were obtained at a total of 17 noise measurement locations: 9 airfield noise monitoring sites, and 8 weapon-firing blast noise monitoring sites. Because of the day-to-day variations in military training activity, it was determined that 60 days of noise data at each of the 17 noise-monitoring sites would be useful in understanding long-term airfield and weapon-firing blast noise levels. Airfield noise contours were developed using the NOISEMAP computer model, whereas the weapon-firing blast noise contours were developed using the BNOISE computer model. An overview of the Fort Hood ICUZ noise study is presented, and the measured and predicted airfield and weapon-firing blast noise levels are compared.

At the request of the U.S. Army Corps of Engineers, Fort Worth District Office, an installation compatible-use zone (ICUZ) noise study was prepared for Fort Hood. This ICUZ study is required by Army Regulation (AR) 210–20 (*1*) as part of the Department of Army Installation Master Planning Program. The purpose of this study is to address the noise impact issue from military training exercises conducted at military facilities at Fort Hood. The ICUZ program offers a method for analyzing exposure to noise and provides land use guidelines for achieving compatibility between the needs of the army and civilian communities.

One of the major components of this ICUZ study was a comprehensive long-term noise monitoring program and the use of computer modeling to develop noise contours to identify Zone I, Zone II, and Zone III noise-impacted areas. This study deals almost exclusively with the issue of noise at Fort Hood. Noise measurements were obtained at a total of 17 noise measurement locations: 9 airfield noise monitoring sites around Hood Army Airfield (HAAF) and Robert Gray Army Airfields (RGAAF), and 8 blast noise monitoring sites at various Fort Hood weapon-firing range locations. Because of the day-to-day variations in military training activity, it was determined that 60 days of noise data at each of the 17 noise monitoring sites would be useful in understanding long-term airfield and weapon-firing blast noise levels.

PROGRAM DESIGN

Because of the limitations in the available number of noise monitoring units, and the different noise descriptors used in measuring airfield noise and impulsive weapon-firing blast noise, it was decided that the noise monitoring would be performed in two phases. The Phase I noise measurements focused on airfield noise. A total of nine noise measurement locations were selected: two in the vicinity of RGAAF, four around HAAF, and three along the various flight corridors leading to and from the Fort Hood Army Installation. The Phase II noise measurements focused on the blast noise from artillery and weapon-firing activity on the various ranges at Fort Hood. The purpose of the noise monitoring program was not only to define the actual noise levels from airfield and weapon-firing activity at Fort Hood, but also for comparison with the computer modeling results.

The primary noise descriptor for the measurement and evaluation of airfield noise is an A-weighted day-night noise level (ALDN) measured over a 24-hr period with a 10-dB penalty assessed to nighttime (10:00 p.m. to 7:00 a.m.) hourly Leq noise levels. The hourly Leq level is the steady A-weighted sound level over a 1-hr period that contains the same acoustic energy as the fluctuating noise measured during that same 1-hr period of time. Because weapon-firing blast noise is an impulsive noise source, the primary noise descriptor is the C-weighted day-night noise level (CLDN) measured over a 24-hr period with a 10-dB penalty assessed to the nighttime hourly Leq noise levels.

The ALDN and CLDN noise descriptors are consistent with the annual average day noise contours generated by the NOISEMAP (airfield noise contours) and BNOISE (blast noise contours) computer models used in this analysis. According to Army Regulation AR200–1 (*2*), noise impact areas should be divided into three zones where residential housing, schools, and other noise sensitive land uses will be considered as follows:

Zone	*ALDN*	*CLDN*	*Quality*
I	<65	<62	Acceptable
II	65–75	62–70	Normally Unacceptable
III	>75	>70	Unacceptable

INSTRUMENTATION AND COMMUNICATION NETWORK SYSTEM

To perform the noise monitoring portion of the Fort Hood ICUZ noise study, instrumentation was required that could measure both A-weighted (for airfield noise) and C-weighted (for weapon-firing blast noise) noise levels. In addition, the instrumentation also had to have a fast rise time and sampling rate to measure the full amplitude and short duration time of the impulsive weapon-firing blast noise. In order to satisfy these constraints, the U.S. Army Environmental Hygiene Agency (AEHA) at Aberdeen Proving Grounds in Maryland provided their Metrosonics dB–604 noise monitoring units

Acentech Inc., 125 Cambridge Park Drive, Cambridge, Mass. 02140.

with real time detectors (RTDs) for use during the noise monitoring portion of this study.

The Metrosonics dB–604 units have the ability to measure A-weighted or C-weighted noise levels and store the data internally for downloading at a later time. The primary format selected for data storage on these Metrosonics units were hourly multiple intervals that included hourly Leq levels, five hourly statistical noise descriptors (L_{99}, L_{90}, L_{50}, L_{10}, and L_1), L_{max}, single-event noise levels (for analyzing aircraft and helicopter operations and weapon-firing blast noise), and daily LDN levels.

Although these various noise descriptors were useful in evaluating the data on a day-to-day basis, the primary noise descriptor used in evaluating the noise impact from activity at Fort Hood was the LDN day-night sound level. LDN is the specified noise descriptor recommended by the Department of Defense and other federal agencies to be used in assessing community noise impacts in ICUZ noise and land use compatibility studies.

Because of the vast amount of noise data obtained during the noise monitoring portion of the Fort Hood ICUZ noise study, it was necessary to devise a process where the data could be checked and evaluated on a daily basis to minimize instrumentation downtime or questionable noise measurements that could result in loss of data. As a result, each of the Metrosonics dB–604 units were equipped with a telephone modem and a dedicated telephone line. In addition, the units were also connected to AC power to keep the internal gel-cell batteries fully charged. Without AC power, the Metrosonics dB–604 RTD units would require frequent recharging. Because this would result in unacceptable downtime, it was necessary to select noise measurement locations with access to AC power and telephone service. All Metrosonics dB–604 units were also equipped with wind anemometers to inhibit data logging during high wind (>15 mph) conditions.

With the Metrosonics dB–604 units connected to a modem and telephone line, it was possible to communicate directly with each of the noise monitoring sites from the Acentech office in Cambridge. This set-up allowed downloading of the data from the Metrosonics units in Texas directly onto a personal computer in Cambridge for final storage and further analysis and evaluation. Figure 1 shows a schematic of the instrumentation and communication network system. This process allowed verifying that the units were operating properly, downloading and storing the data onto a personal computer, and checking the data on a daily basis. A local technician was also hired to check and calibrate the units on a regular basis, and to provide field maintenance when necessary. Each noise monitoring site was contacted, checked, and downloaded each morning by telephone, and if a problem was detected, the site technician was called and instructed as to which sites required immediate attention. This process allowed minimizing system downtime, as well as reducing the amount of lost or questionable data.

NOISE MONITORING SITES

A total of 17 noise measurement locations were selected to monitor both airfield noise (9 sites) and weapon-firing blast noise (8 sites).

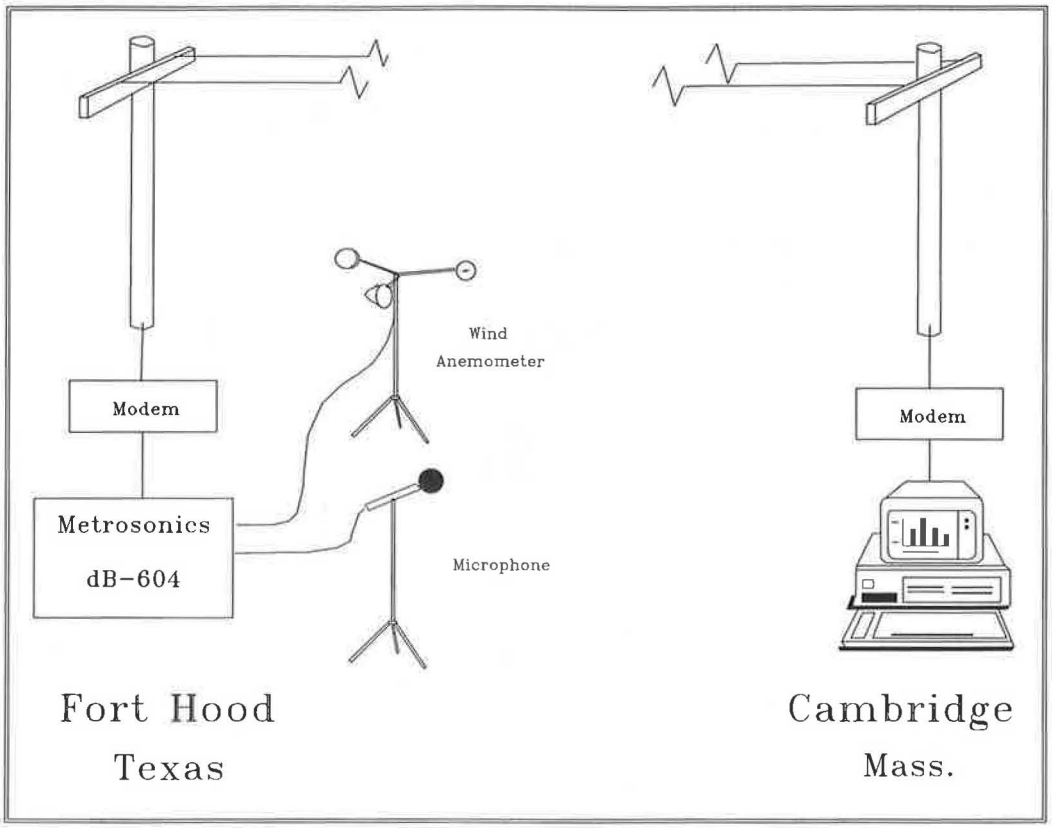

FIGURE 1 Instrumentation-communication network.

Airfield noise measurements were obtained at both HAAF and RGAAF. The location of the airfield noise monitoring sites were as follows: RGAAF (two sites), HAAF (four sites), and Fort Hood flight corridors (three sites). Figures 2–4 show the various airfield measurement locations in the vicinity of HAAF and RGAAF. All nine airfield noise monitoring sites were located at residential homes where access to ac power and telephone service was available.

RGAFF is located at the extreme southwest corner of the Fort Hood Military Reservation. The primary noise sources at RGAAF are helicopter operations and C-5 touch-and-go training exercises conducted by aircraft flying in from other airbases. Because of the reduced level of aircraft and helicopter activity at RGAAF in comparison with HAAF, only two noise monitoring sites were selected in this area.

HAAF is located along the south edge of the military reservation property line adjacent to the Fort Hood cantonment area. Helicopter operations are the primary noise source at HAAF. Although most of the helicopter flight operations are required to remain over Fort Hood property, the proximity of residential housing to the airfield makes this a noise sensitive area.

For noise monitoring along the flight corridors leading to and from the Fort Hood Military Reservation, three sites were selected as representative of this type of activity.

A total of eight noise monitoring sites were selected to measure the weapon-firing blast noise levels at Fort Hood. These measurement locations are shown in Figure 5. Because of the requirements regarding access to AC power and telephone communication with each of the noise monitoring units, and security, all eight of the noise monitoring sites were located at the observation towers at the various weapon-firing ranges. These eight locations were selected because they essentially encircle the entire Fort Hood weapon-firing area and were easily accessible.

AIRFIELD NOISE MEASUREMENTS

The airfield noise measurements were obtained at the nine airfield noise monitoring sites over a 3-month period from January through the end of March. Because of the large amount of noise data obtained during the noise monitoring portion of the Fort Hood ICUZ noise study, only the daily LDN noise levels are summarized and presented in this report.

Figures 6 and 7 show typical daily LDN noise levels measured in the vicinity of RGAAF and HAAF. These figures also show the 65 LDN level that defines Zone I (<65 LDN) where residential housing, schools, and other noise sensitive land uses are considered acceptable.

Although the data in these figures indicate that there are some days when the daily LDN level is above 65 dBA, these days generally correlate with high levels of activity at the airfields. For example, Site 5, which is located close to HAAF, clearly indicates this trend. During the week, when activity at the airfield is generally high, the daily LDN levels tend to be at or above 65 LDN. However, on weekends, when there is substantially reduced levels of activity at the airfield, the daily LDN levels tend to be much lower. This same trend, although to a lesser degree, is also consistent with the daily LDN levels measured at Sites 4 and 6, which are also close to HAAF.

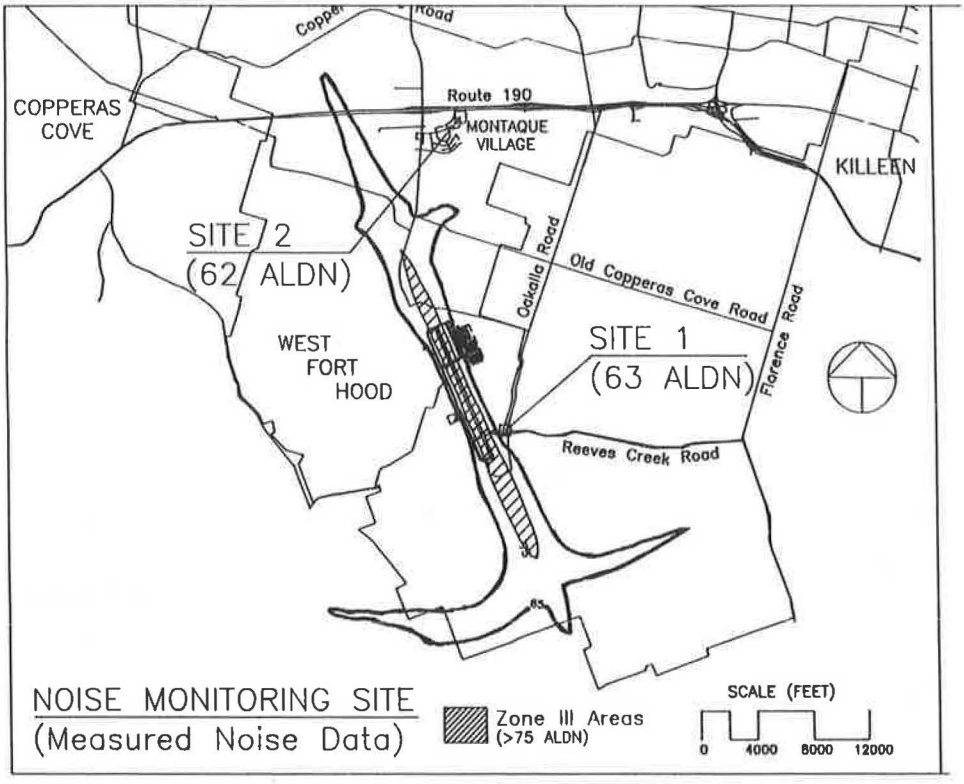

FIGURE 2 RGAAF noise contours: 65 and 75 ALDN contours.

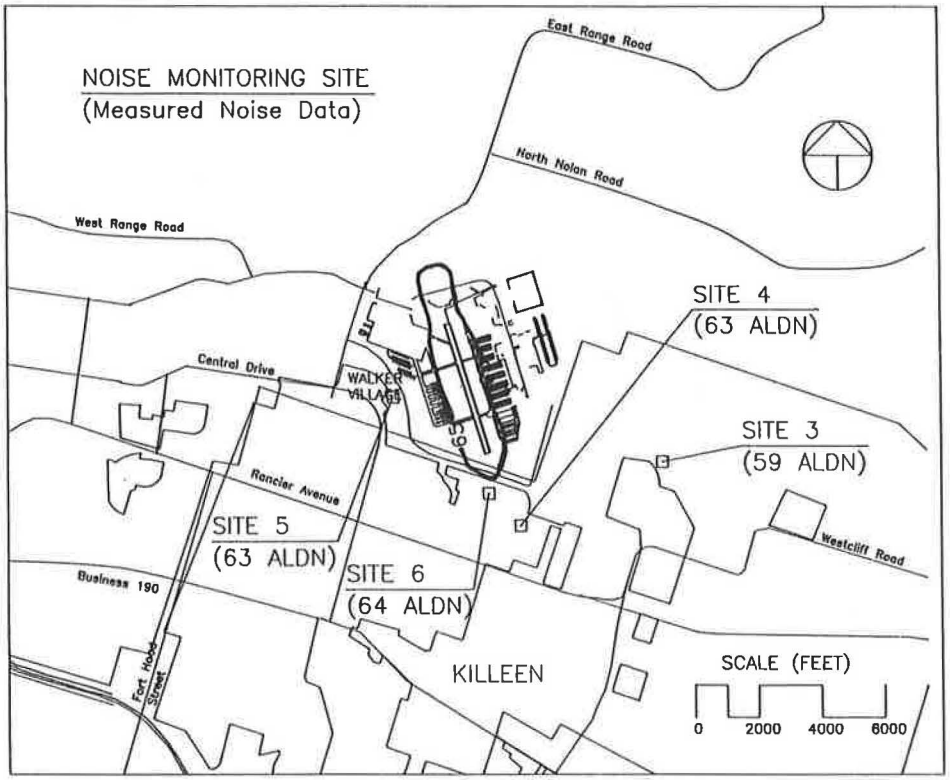

FIGURE 3 HAAF noise contours: 65 ALDN contour.

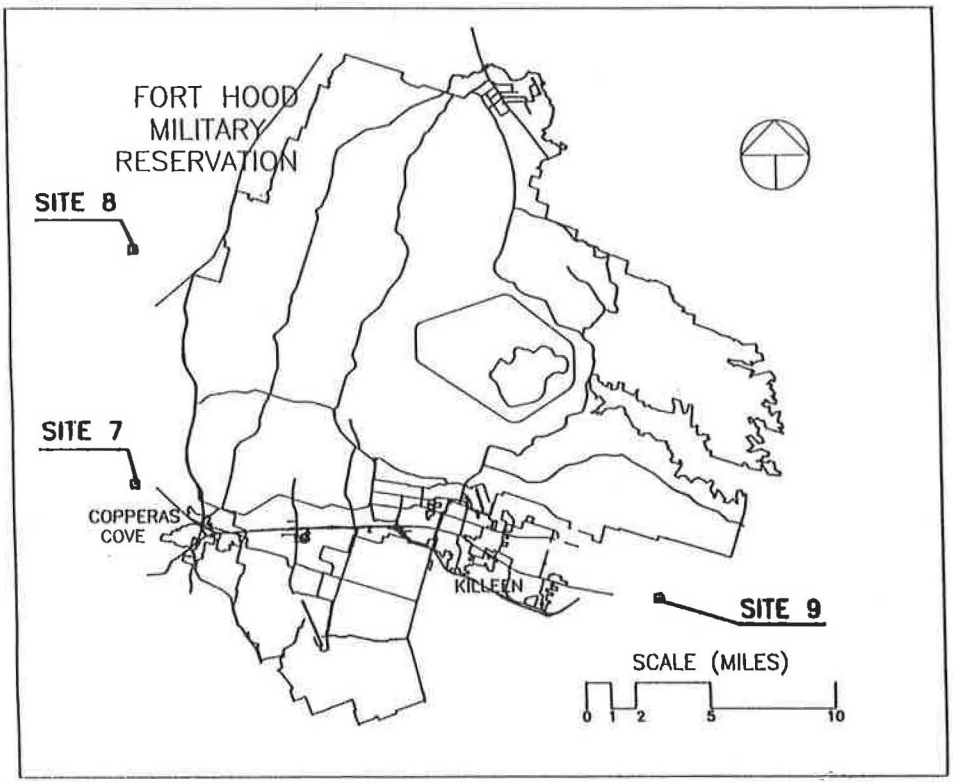

FIGURE 4 Airfield noise monitoring sites: flight corridors.

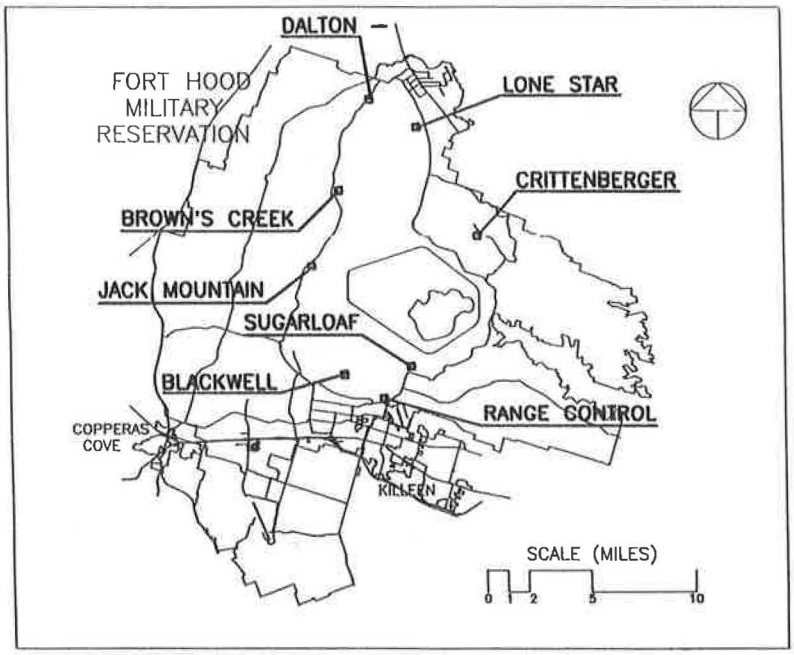

FIGURE 5 Blast noise monitoring sites.

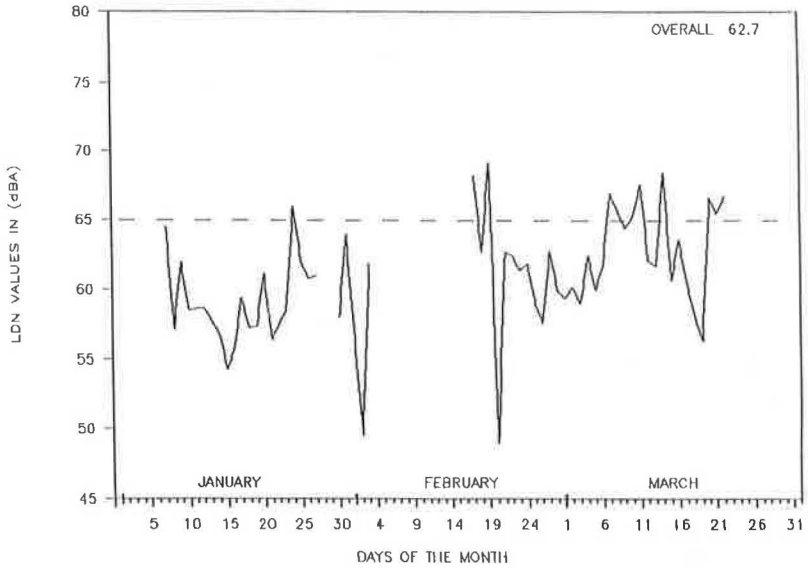

FIGURE 6 Site 1 RGAAF daily LDN noise levels.

Table 1 presents the LDN levels on a monthly basis and also presents the overall LDN level over the entire noise monitoring period. Although there are days when the daily LDN level at some of the sites exceeds 65 dBA, this table clearly indicates that on a monthly and overall basis, the levels at all nine airfield noise monitoring sites are below 65 LDN.

The overall LDN noise levels at Sites 1 and 2 that are near RGAAF are 63 and 62 dBA, respectively. Data obtained at Site 1, which is adjacent to the south end of the runway at RGAAF, indicate that the daily LDN levels usually range between 56 and 62 dBA. However, on days when C–5 aircraft are practicing touch-and-go operations, the daily LDN levels increase to 65 to 68 dBA. Site 2, which is located approximately 3 mi north of RGAAF, is along one of the helicopter flight tracks between Fort Hood and the airfield. In addition, Site 2 is also near Route 190 where traffic noise also contributes to the overall noise levels measured at this location. In any event, the overall levels at Site 2 are still well below 65 LDN.

Sites 4, 5, and 6, which are adjacent to HAAF, all have roughly the same overall LDN level, 63, 63, and 64 dBA, respectively. Because of the flight tracks flown by the helicopters approaching or departing HAAF from the south end of the runway, it could be expected that the daily and overall LDN levels measured at these three noise monitoring sites would be almost identical. Figure 8 shows the daily LDN

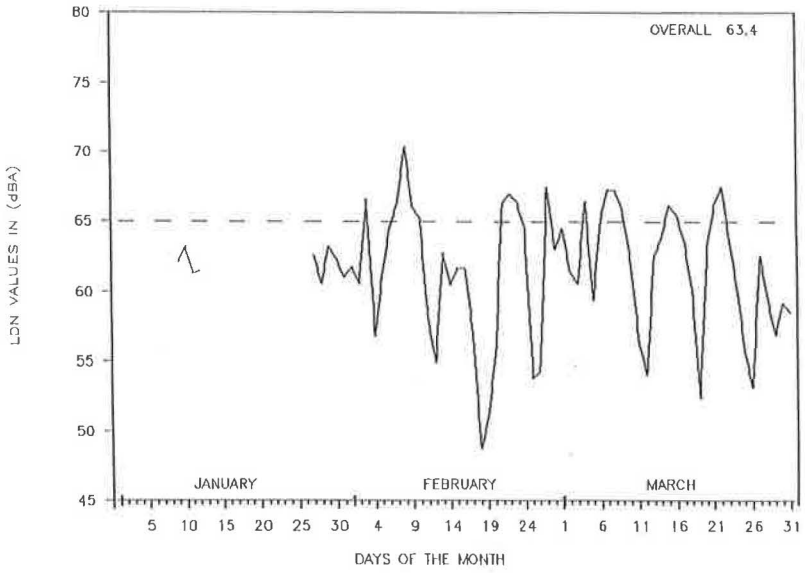

FIGURE 7 Site 5 HAAF daily LDN noise levels.

TABLE 1 HAAF NOISE MEASUREMENTS: SUMMARY A-WEIGHTED LDN LEVELS

	January	February	March	Overall
Gray Army Airfield				
Site 1	60	63	64	63
Site 2	61	63	62	62
Hood Army Airfield				
Site 3	55	56	62	59
Site 4	61	63	64	63
Site 5	62	64	63	63
Site 6	62	64	65	64
Flight Corridors				
Site 7	54	52	56	54
Site 8	-	58	58	59*
Site 9	56	59	58	58

*Overall LDN Level also includes April -61 LDN and May-50 LDN

levels at these three sites for the month of February 1989. Site 3, which is located somewhat farther from HAAF, has an overall LDN level of 59 dBA, which is 4 dBA lower than the overall levels measured adjacent to the airfield.

Noise level measurements at Sites 7, 8, and 9, which were located along flight corridors used by helicopters approaching or departing the Fort Hood Military Reservation, resulted in overall LDN noise levels of 54, 59, and 58 dBA, respectively.

BLAST NOISE MEASUREMENTS

Noise monitoring began at the blast noise monitoring sites on April 1 and continued through the middle of July. Because of the impulsive nature and the relative low frequency of weapon-firing blast noise, noise measurements were made on a C-weighted scale. Figures 9, 10, and 11 show typical daily C-weighted LDN noise levels measured at three of the weapon-firing blast monitoring sites. Sections of missing data in these figures are caused by instrumentation problems and loss of electrical power at several of the range location observation towers. Because there were only eight Metrosonics dB–604 units with real time detectors (RTDs) capable of accurately measuring the peak noise level associated with the short-duration impulsive nature of the weapon-firing blast noise, significant monitoring time was lost when units had to be returned for repairs.

Because of the wide range of training activity that occurs at Fort Hood, evaluation of the measured noise data was difficult. In addition to the weapon-firing activity at the ranges, there were also helicopter and aircraft operations that affected the noise measurements. All of the weapon-firing ranges are located along East, West, and South Range Roads. However, these roads also serve as visual flight track corridors for hel-

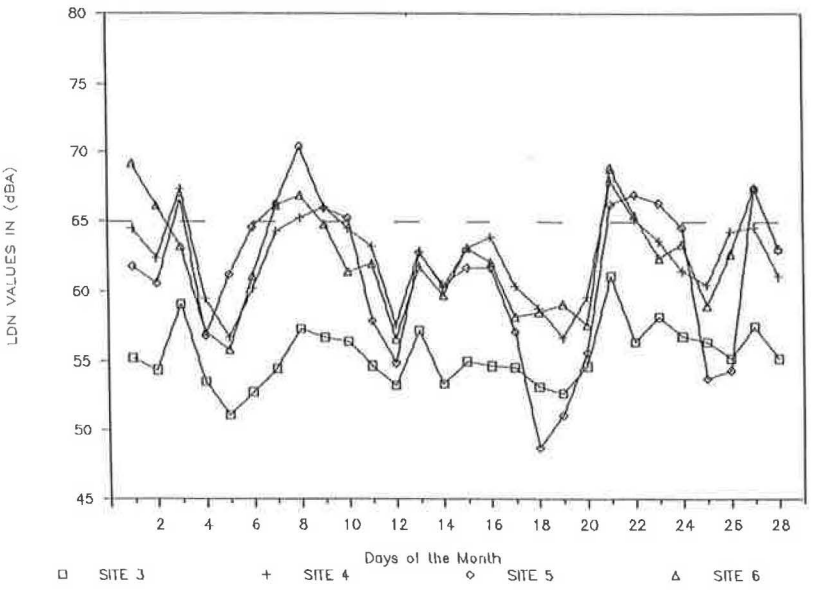

FIGURE 8 Comparison of daily LDN levels for Sites 3, 4, 5, and 6 (Feb. 1989).

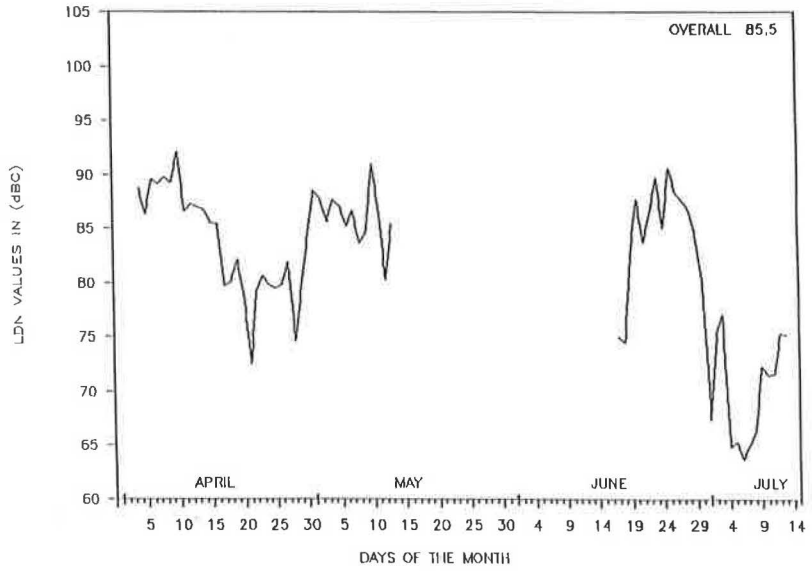

FIGURE 9 Site A: Sugarloaf—daily LDN noise levels.

icopters traveling to and from the various helicopter weapon-firing ranges. Also, aircraft from other military installations use Fort Hood to drop practice bombs at the Shoal Creek bombing range in the north, as well as live ordnances at the Smith Mountain artillery impact area. Therefore, both helicopter and aircraft activity also contributed to the overall noise level measurements obtained at the eight blast noise monitoring sites.

The C-weighted daily LDN noise levels displayed in Figures 9 and 11 clearly indicate the wide range of measured noise levels obtained at the various weapon-firing range locations.

Site A (Sugarloaf) is primarily used by M1 and M60 tanks firing 105-mm cannon rounds. With moderate levels of tank firing activity occurring at this range, daily LDN levels ranged between 85 and 90 dBC. Site C (Crittenberger) is used for multiple tank training exercises. This range is used by tank squads of up to four M1 or M60 tanks firing 105-mm cannon rounds, as well as M2/3 Bradley armored personnel carriers firing 25-mm chain-guns. With Bradley vehicles using the range, daily LDN levels range between 74 and 77 dBC. When the M1 and M60 tanks are on the range, the daily LDN levels increase to 85 to 90 dBC. During the noise measurement program, there were several days when 8-in. and 155-mm artillery firing from locations close to Site C (within 2 to 3 mi) along with actual range activity generated substantially higher daily LDN noise levels (95 to 100 dBC). However, when artillery firing occurred at more distant firing locations (>5 mi), the additional noise impact was not discernible above the actual range activity.

Site D (Lone Star) and Site E (Dalton) are located at the extreme northern section of the Fort Hood Military Reservation. Although Site D is primarily used by Army reserve

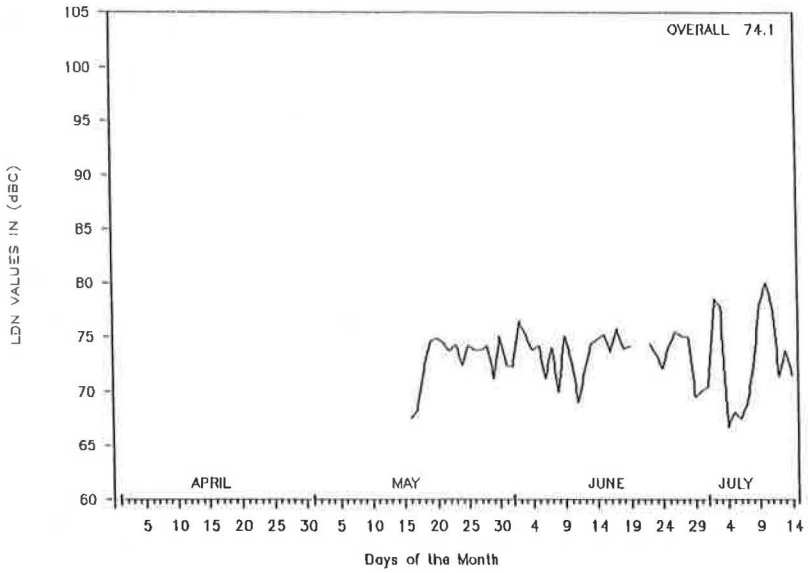

FIGURE 10 Site B: Range Control—daily LDN noise levels.

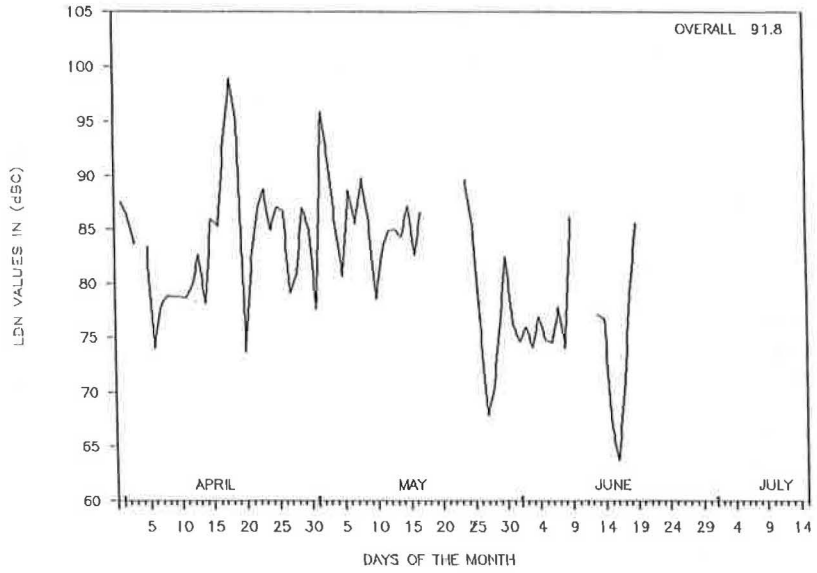

FIGURE 11 Site C: Crittenberger—daily LDN noise levels.

units on weekend training exercises, it is also used during the week as a forward area refuel and rearm point (FAARP) for helicopters awaiting their turn to fire their weapons at the Dalton–Henson Mountain firing ranges. In addition, Sites D and E are impacted by military jet aircraft using the Shoal Creek bombing range to practice simulated bombing runs. These aircraft flyovers contribute to the overall noise levels measured at these two locations. As a result, the overall C-weighted LDN noise levels measured at Sites D and E were higher than might have been expected given the actual activity contained in the range control firing logs.

Site E (Dalton) is primarily a helicopter firing range. The Dalton–Henson Mountain multiuse range complex is the primary firing range for helicopters firing their 2.75-in. rockets. In addition to the rocket-firing noise levels measured at this site, the helicopters themselves also contribute to the overall measured noise levels.

Site F (Brown's Creek) and Site G (Jack Mountain) are primarily firing ranges for the M2/3 Bradley armored personnel carrier firing its 25-mm chain-gun.

Site H (Blackwell) and Site B (Range Control) are not located on active firing ranges. These two sites were selected to define the measured noise levels along the southern boundary of the ranges without being impacted by actual on-site range activity. The higher daily LDN noise levels measured at Site B are caused by the impact of helicopter activity from HAAF. Helicopters departing or approaching HAAF from the west use South Range Road as their visual flight track corridor.

Table 2 presents the data measured at the eight blast noise monitoring sites on both a monthly and overall C-weighted LDN basis. Although these data accurately reflect the noise levels measured on the firing ranges, it was necessary to rely on the noise contours generated by the BNOISE computer

TABLE 2 FORT HOOD WEAPON-FIRING BLAST NOISE MEASUREMENTS: SUMMARY C-WEIGHTED LDN LEVELS

	April	May	June	July	Overall
Site A: Sugarloaf	86	87	86	72	86
Site B: Range Control	-	73	74	75	74
Site C: Crittenberger	88	93	93	-	92
Site D: Lone Star	82	89	88	-	87
Site E: Dalton	85	79	80	73	82
Site F: Brown's Creek	79	81	77	75	78
Site G: Jack Mountain	81	84	95	78	89
Site H: Blackwell	-	-	68	67	68*

*Overall LDN Level also includes August - 68 LDN.

model to determine the location of the acceptable Zone I (<62 LDN) noise area.

COMPUTER MODELING—NOISE CONTOURS

The second part of the Fort Hood ICUZ noise study consisted of using computer modeling to generate noise contours for both the airfield and the weapon-firing blast noise impact. In fact, one of the primary reasons for the extensive noise monitoring program at Fort Hood was to compare actual measured noise data with the noise contours generated by computer modeling.

The NOISEMAP computer model was used to generate the noise contours for the two primary Fort Hood Airfields: RGAAF and HAAF. This computer model was developed for the U.S. Air Force and is the model recommended by the Department of Defense for use on all Military AICUZ/ICUZ noise studies with airfield installations. Using airfield data consisting of aircraft or helicopter type, approach and departure flight tracks, runway utilization, and number of daytime and nighttime (10:00 p.m. to 7:00 a.m.) operations, A-weighted LDN noise contours were generated to define the Zone I (<65 LDN), Zone II (65 to 75 LDN), and Zone III (>75 LDN) impact areas. For this study, the most current PC Version 6.0 of the NOISEMAP computer model was used (*3*).

For assessing the noise impact from weapon-firing impulsive blast noise from U.S. military installations, the U.S. Army Construction Engineering Research Laboratory's (CERL) BNOISE computer model was used (*4*). This computer model supports the U.S. Army's ICUZ noise program and is used to generate C-weighted LDN noise contours to evaluate weapon-firing noise impacts at military installations. Using weapon range firing data that consist of weapon type (tank, artillery, mortar, rocket, etc.), size of round fired (105-mm, 155-mm, 8-in., etc.), type of round fired (TPT, HEAT, HE, etc.), firing point location, impact location, number of daytime rounds fired, and number of nighttime (10:00 p.m. to 7:00 a.m.) rounds fired, C-weighted LDN noise contours were generated to define the Zone I (<62 LDN), Zone II (62 to 70), and Zone III (>70 LDN) noise impact areas.

AIRFIELD COMPUTER MODELING—NOISEMAP

HAAF is located on South Fort Hood and borders the Killeen city limits. It is a fully operational airfield designed primarily to handle rotary-wing Army aircraft. The majority of operations at HAAF are conducted by six types of helicopters, the AH-64, AH-1, OH-58, UH-60, UH-1, and CH-47. Annual flight operations were derived from air traffic activity reports and information gathered from air traffic control personnel. The activity modeled was 100 percent rotary wing. The yearly averaged daily operations were 341.6 day flights (between 7:00 a.m. and 10:00 p.m.) and 34.4 night flights (between 10:00 p.m. and 7:00 a.m.).

The LDN noise contour for HAAF is shown in Figure 3. The 65 LDN noise contour, which defines Zones I (<65 LDN), encompasses an area surrounding the immediate vicinity of the runway.

RGAAF, located on West Fort Hood, is a fully operational airfield designed to handle all types of fixed-wing and rotary-wing aircraft. Air Force C-5 aircraft also conduct touch-and-go pattern operations at RGAAF.

Annual flight operations were derived from air traffic activity reports and information gathered from personnel. The activity modeled includes fixed- and rotary-wing flight operations. Fixed-wing aircraft operations at RGAAF average 61.7 daytime and 4.9 nighttime operations. In addition, five types of helicopters make up the majority of rotary wing operations at RGAAF. The AH-64, OH-58, UH-60, UH-1, and CH-47 conduct 80 percent of the total local military operations. Helicopter operations at RGAAF average 170.9 daytime and 16.7 nighttime operations.

The LDN noise contours for RGAAF are shown in Figure 2. This figure shows a 75 LDN noise contour surrounding the immediate vicinity of the runway and extending several thousand feet under the take-off and departure flight tracks.

A small portion of the 65 LDN noise contour is located outside the military reservation boundaries. This portion of the contour lies below the radar pattern and the west VFR pattern, with the primary contribution to the contour being the C-5 touch-and-go operations. The computer modeling analysis of RGAAF exhibits no noise intrusions on residential land uses.

BLAST NOISE COMPUTER MODELING—BNOISE

Fort Hood has over 60 different firing range complexes. These firing ranges essentially encircle the artillery impact area and include tanks, infantry fighting vehicles, helicopters, mortars, rockets, machine guns, and small arms weapon firing activity. In addition to the weapon firing that occurs on the ranges, there is also artillery firing (105-mm, 155-mm, and 8-in. howitzers) that occurs at the various artillery firing points that surround the ranges and impact within the designated artillery impact area at Fort Hood.

The BNOISE computer model consists of a weapon data base for only the large-caliber weapons that are the primary noise source at most military installations. The primary weapons of concern that are fired at Fort Hood include the M1 and M60 main battle tanks, the M2/3 bradley armored personnel carrier, TOW missiles, 2.75-in. rockets, hellfire missiles, dragon missiles, LAW (light anti-tank weapon) rockets, MLRS (multiple launch rocket system) rockets, mortars (60-mm, 81-mm, and 4.2-in.), and artillery (105-mm, 155-mm, and 8-in. howitzers). Most of this heavy-weapon firing activity occurs on approximately 20 of the total Fort Hood ranges and are mostly located along East and West Range Roads.

In order to generate the input data for the BNOISE computer model, it was necessary to summarize total weapon firing activity at the ranges over a 1-year period. Using the range control weapon firing logs, it was possible to generate an annual summary of the total rounds fired by the various weapon types used at each of the primary weapon firing ranges at Fort Hood. The same summary analysis was performed for the artillery firing data using information contained in the same range control weapon firing logs. These summary firing data, including firing point locations and impact locations, were used as input into the BNOISE computer model to generate C-weighted LDN noise contours. Using the computer-aided drafting (CAD) system, these noise contours were then superimposed onto a digital base map of the Fort Hood area.

Figure 12 contains the C-weighted LDN weapon-firing blast noise contours for both the artillery and the weapon-firing activity at the ranges. The larger 70 LDN noise contour defines the noise levels around the artillery impact area, whereas the smaller 70 LDN noise contours are associated with the weapon firing activity on the ranges as well as from the various artillery firing locations. The 62 LDN noise contour is almost totally contained within the boundary of the Fort Hood Military Reservation. Only a small area along the northeast boundary of Fort Hood (near Site C: Crittenberger) is contained within a Zone II area. Except for this location, there are no other off-base Zone II (62-70 LDN) or Zone III (>70 LDN) noise impact areas resulting from weapon-firing activity at Fort Hood.

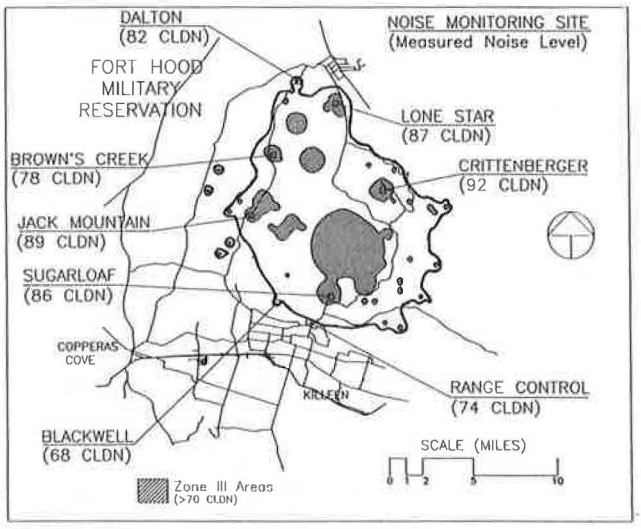

FIGURE 12 Blast noise: combined range firing and artillery firing (62 and 70 CLDN contours).

It should be noted that although the artillery firing noise contours do not extend beyond the Fort Hood Military Reservation, it does not mean that the artillery firing is inaudible in the residential areas surrounding Fort Hood. Because of the impulsive nature of artillery noise, the larger, noisier 8-in. artillery firing can be audible at distances of 10 mi (depending on wind direction and other atmospheric conditions) from the artillery firing point locations and impact area.

COMPARISON OF MEASURED AND PREDICTED NOISE LEVELS

One of the primary reasons for the extensive noise monitoring program at Fort Hood was to compare the actual measured noise data with the noise contours generated by computer modeling.

At Site 1, which is located adjacent to the south end of RGAAF, daily A-weighted LDN levels generally ranged between 58 and 62 dBA. Although there were days when the daily LDN levels exceeded 65 LDN, the overall (3-month logarithmic average) level at Site 1 was 62.7 dBA. Results of the computer modeling noise contours indicated that the LDN level at this location was 62.3 LDN.

At HAAF, Sites 4, 5, and 6 are located at residential noise monitoring sites near the airfield. The overall (3-month logarithmic average) LDN levels at all three sites are approximately identical at 63 dBA. Results of the computer modeling noise contours indicate that the LDN noise levels in this area around the perimeter of HAAF were approximately 62 dBA. Table 3 presents a comparison of the measured and predicted ALDN noise levels around the airfields. This comparison indicates that there is relatively good agreement between the measured data and the predicted LDN noise levels.

Comparison of the overall C-weighted LDN weapon-firing blast noise data from the Fort Hood firing ranges with the BNOISE computer modeling results is presented in Table 4.

TABLE 3 HAAF NOISE MEASUREMENTS: COMPARISON OF MEASURED AND PREDICTED ALDN NOISE LEVELS

	Measured Overall ALDN	Computer Modeling Results	Comparison
Robert Gray Army Airfield			
Site 1	62.7	62.3	+0.4
Site 2	61.8	58.5	+3.3
Hood Army Airfield			
Site 3	59.4	57.5	+1.9
Site 4	63.1	62.7	+0.4
Site 5	63.4	62.9	+0.5
Site 6	63.6	63.3	+0.3
Air Corridors			
Site 7	54.1	-	-
Site 8	59.1	-	-
Site 9	58.0	-	-

TABLE 4 FORT HOOD BLAST NOISE MEASUREMENTS: COMPARISON OF MEASURED AND PREDICTED CLDN NOISE LEVELS

	Measured Overall CLDN	Computer Modeling Results	Comparison
Site A: Sugarloaf	85.5	88.1	- 2.6
Site B: Range Control	74.1	61.6	+12.5
Site C: Crittenberger	91.8	82.2	+ 9.6
Site D: Lone Star	87.4	81.0	+ 6.4
Site E: Dalton	81.7	73.1	+ 8.6
Site F: Brown's Creek	78.3	84.2	- 5.9
Site G: Jack Mountain	89.4	81.7	+ 7.7
Site H: Blackwell	67.5	61.7	+ 5.8

Differences between these measured and predicted LDN levels are caused by a number of factors. For example, although the BNOISE computer model includes weapon-firing noise from helicopter rocket-firing activity on the ranges, it does not include the noise generated by the helicopter itself. In addition, military aircraft using the Shoal Creek bombing range generate flyover noise impacts along the northern ranges at Fort Hood that do not appear in the blast noise contours. As a result, measured noise levels at Site E (Dalton), which is a primary helicopter rocket-firing range, were 8 to 9 LDN higher than the results obtained from the computer model. In addition, Site D (Lone Star), which is primarily used by U.S. Army reserve units during weekend training exercises, had a higher-than-expected measured noise level because it is used as a FAARP for helicopters waiting to use the primary rocket-firing ranges.

Although Site B (Range Control) and Site H (Blackwell) were not located on active firing ranges, they were selected as blast noise monitoring sites so that artillery-firing noise levels could be evaluated without direct impact from range activity. However, noise impact from helicopter operations at HAAF, which uses South Range Road as a visual flight track corridor, resulted in higher measured noise levels than those predicted by the BNOISE computer model for weapon-firing activity only.

SUMMARY

Noise measurements at all of the airfield noise monitoring sites indicate that the overall average (logarithmic) LDN levels are below 65 dBA. Although there are days when LDN levels are above 65 dBA, these days generally correlate with high levels of helicopter activity at HAAF, or C–5 touch-and-go flight training activity at RGAAF. Noise contours developed for HAAF and RGAAF exhibit excellent agreement with the measured noise levels. This agreement is primarily because the airfield activity follows more well-defined flight tracks, and the level of activity is relatively constant over the entire year.

The results of the weapon-firing noise measurements and computer modeling analysis exhibit less agreement because of the complexity of military training activity at Fort Hood.

The results of this extensive airfield and blast noise monitoring program conducted at Fort Hood, together with the computer modeling used to develop noise contours for the airfields and the weapon-firing ranges, indicate that specific noise mitigation measures are not required.

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