APPENDIX G-4

NOISE MONITORING REPORT

TETRA TECH, INC.
820 Mililani Street, Suite 700
Honolulu, Hawai'i 96813
Telephone (808) 533-3366
FAX (808) 533-3360

February 22, 2005

Uyen Tran
Contract Monitor
US Army Engineer District, Honolulu
Programs & Project Management Division
Building 252, Attn: CEPOH-PP-E
Fort Shafter, HI 96858-5440

Subject: Noise Monitoring Report
Mākua Military Reservation, Hawai'i

Dear Ms. Tran:

Tetra Tech, Inc., is pleased to provide the U.S. Army Corps of Engineers, Honolulu Engineer District (POH) with this letter report summarizing our noise monitoring efforts in support of the Environmental Impact Statement (EIS) for the Mākua Military Reservation (MMR), Hawai'i. These activities were conducted at areas both on-site and adjacent to MMR between May 2002 and April 2003. Monitoring took place during four company-level combined-arms live-fire exercise (CALFEX) events and was performed to provide the Army with real-time noise data from actual CALFEX events. The monitoring data provide comprehensive noise level "time histories" recorded during the various training events, as well as background (i.e., nontraining-related) noise level conditions at MMR.

The noise monitoring data obtained will assist in characterizing existing noise conditions at MMR as well as highlighting the main contributors to off-post noise conditions produced during training events. Noise levels were monitored during four company-level CALFEX events: 22 May 2002, 29 January 2003, 31 January 2003, and 10 April 2003. Additional monitoring of background noise conditions was conducted at one on-site location on 08 April 2003. Appendix A of this report includes a table providing the technical summary for each monitoring event from each monitoring location. In addition, Appendix B includes a series of line graphs of the 20-minute interval histories from the three CALFEX events monitored between January 2003 and April 2003.

Existing Conditions

Noise levels at MMR vary greatly, depending on whether or not live-fire training exercises are in progress. When there are no training exercises in progress, noise conditions are dominated by wind, birds, and insects. Under such conditions, noise levels typically vary between about 25 decibels, A-weighted (dBA) and 45 dBA, depending on wind conditions and proximity to bird or insect noises. Noise levels at Mākua Beach are typically higher due to breaking waves, and noise levels near the shoreline will typically be 55 to 70 dBA, depending on wind and surf conditions. Beach areas further from the shoreline and closer to Farrington Highway will have typical background

noise levels of 40 to 50 dBA. Background noise levels must be recognized to determine whether training activities result in a significant change in noise conditions at off-post locations during CALFEX training events.

Approach

Larson Davis sound level meters were used to measure noise levels at up to three sites during each of the monitored training events (see Appendix A for respective model nos.). The three monitoring locations (one on-site and two off-range) used during these CALFEX events included:

- **On-site locations**—Lower Mākua Valley/MMR Control Building ("Admin Trailer Area");
- **Off-range location**—Mākua Beach, located just west of MMR; and,
- **Off-range location**—Silva Ranch, located one valley south of MMR.

Mākua Beach is the public recreation area closest to the live fire area at MMR. Silva Ranch is the only private residence close to MMR. There are no schools, day care centers, medical facilities, or nursing homes within two miles of MMR. During the 22 May 2002 CALFEX, one noise meter was also located at Objective Coyote within the live fire area; therefore, no noise monitoring occurred at Silva Ranch during this CALFEX. The 08 April 2003 background noise monitoring occurred along the high portion of the northern firebreak road in the Kahanahaiki Valley portion of MMR.

Methodology

Larson Davis Model 824 meters were used at three of the four above-noted CALFEX events, allowing for concurrent measurement of both fast and slow response sampling rates using A-weighted, C-weighted, and unweighted data. Larson Davis Model 720 meters were used during the 22 May 2002 CALFEX only. Standard noise monitoring conventions employ fast response settings for impulse type noise events and slow response settings for more continuous noise sources. The A-weighted decibel scale approximates the relative response of human hearing to different acoustical frequencies. The C-weighted and unweighted decibel scales are commonly used to measure blast noise, sonic booms, or other low-frequency sounds capable of inducing vibrations in buildings or other structures.

Primary data collection for all instruments was set for fast response A-weighted data, with concurrent logging of unweighted peak noise levels. The fast instrument response setting results in the meter taking 32 noise readings per second. Fast response readings are averaged into 1/8th-second intervals, which are then integrated into longer time period intervals. The slow response setting samples noise levels eight times per second, and averages those readings into one-second intervals for subsequent logging and analysis. Two different time history records were logged at the three CALFEX events where Larson Davis Model 824 meters were used: one-second time histories and 20-minute interval histories (see Appendix A). Overall monitoring period statistics were logged at all events. Monitoring durations varied at different locations and on different days, but typically lasted for periods of three to six hours.

Standards

The Army utilizes four noise zones: Busy Day Zone II (also called Land Use Planning Zone or "LUPZ"), Noise Zone I, Noise Zone II, and Noise Zone III. These zones are the Army's noise guidelines and are described in Environmental Protection and Enhancement documents AR 200-1 (Army 1997) and DA PAM 200-1 (Army 2002). Chapter 7 of DA PAM 200-1 includes the Army's Environmental Noise Management Plan, which outlines specific procedures designed to meet the objectives of minimizing the impact of environmental noise on the public without impairing the mission of the installation. The zones are defined as follows:

- **Busy Day Zone II (LUPZ)**—this zone is defined as compatible with noise-sensitive land uses encompassing areas where, during periods of increased operations, community annoyance levels can reach those levels normally associated with Zone II (see below);
- **Zone I**—this zone is defined as compatible with noise-sensitive land uses with noise exposure that would be expected to result in less than 15 percent of the population described as "highly annoyed;"
- **Zone II**—this zone is defined as normally incompatible with noise-sensitive land uses characterized by noise exposure that would be expected to result in more than 15 percent of the population described as "highly annoyed;" and.
- **Zone III**—this zone is defined as incompatible with noise-sensitive land uses with exposure resulting in more than 39 percent of the population describing themselves as "highly annoyed."

According to the Army's Environmental Noise Management Handbook (USACHPPM 2001), "many of the complaints received by installations are from people living in the LUPZ and Zone I." This document further states, "these are people who are living in quiet areas but who are disturbed by infrequent events, such as a helicopter flying low over a complainant's house or a single large detonation of explosives."

Army Land Use Planning Noise Guidelines

Noise Zone	Percent Population Highly Annoyed	Transportation/Small Arms Noise ADNL in A-weighted dB	Impulsive Noise CDNL in C-weighted dB	Peak Noise in dBP
Busy Day Zone II (LUPZ)	9–15	60-65	57–62	NE
Zone I	<15	<65	<62	<87
Zone II	>15	65–75	62–70	87-104
Zone III	>39	>75	>70	>104

Sources: AR 200-1 (Army 1997), DA PAM 200-1 (Army 2002), and Env. Noise Management Handbook (USACHPPM 2001).
Notes:
(1) Noise levels from all sources should be evaluated in terms of annual averages of the identified noise metric.
(2) Noise from transportation sources (aircraft and vehicles) and common industrial sources should be evaluated using A-weighted day-night average sound level (Ldn) values (ADNL).
(3) Noise from impulsive sources (such as armor, artillery, and demolition activities) should be evaluated using C-weighted Ldn values (CDNL).
(4) Peak noise levels cited are unweighted (dBP).
(5) Compatibility determinations for existing conditions and proposed actions should be supplemented by descriptions of projected noise increases and potential public reactions where:
  (a) the noise environment is determined by a few infrequent but very high level noise sources;
  (b) single event noise levels from the proposed action are 10 dB or more greater than existing levels;
  (c) the A-weighted Ldn is between 60 and 65 dBA and the proposed action would increase the Ldn by 3 dB or more; and
  (d) the A-weighted Ldn is above 65 dBA and the proposed action would increase the Ldn by 1.5 dB or more.

The above-cited Army guidelines are for annual average Ldn conditions (ADNLs and CDNLs). However, these Ldn levels represent 24-hour time-weighted average noise levels and thus cannot be readily compared directly with any of the shorter-term noise monitoring data collected during CALFEX events. Two summary tables included in the Army's Environmental Noise Management Handbook (USACHPPM 2001) do utilize maximum noise level readings associated with aircraft noise (e.g., helicopter flyover) and with small arms range noise based on short-term monitoring near populated or residential areas. For example, the relationship between the maximum noise level readings of aircraft and the percentage of highly annoyed people has been shown as follows:

Percentage of People Highly Annoyed by Aircraft Noise

Maximum Noise Level in A-weighted dB	Percent Population Highly Annoyed
70	5
75	13
80	20
85	28
90	35

Source: Env. Noise Management Handbook (USACHPPM 2001).
Notes:
(1) Noise are evaluated using A-weighted Lmax values.
(2) Data generated at airfields with 50 to 200 operations per day near populated or residential areas; for sites with fewer than 50 operations per day, the relationship provides an estimation of the percentage of people who might be annoyed.

Moreover, the relationship between the maximum noise level readings at small arms ranges and the percentage of highly annoyed people has been shown as follows:

Percentage of People Highly Annoyed by Small Arms Range Noise

Maximum Noise Level in A-weighted dB	Percent Population Highly Annoyed
<63	2
63	10
65	13
70	21
75	29
80	38

Source: Env. Noise Management Handbook (USACHPPM 2001).
Notes:
(1) Noise are evaluated using A-weighted Lmax values.
(2) Threshold of annoyance shown to be approximately 63 dB, A-weighted, for areas near populated or residential areas.

Readings

Overall noise level summary data were collected at the 22 May 2002 CALFEX (Larson Davis Model 720 meters), while detailed time history data and 20-minute interval history data were collected at the other three CALFEX events (Larson Davis Model 824 meters). Although several types of noise level statistics were collected (see Appendix A), the most useful data are the A-weighted fast response data for the following parameters:

- **Minimum noise level (Lmin)**—the lowest 1/8th-second average noise level during a monitoring interval;

- **Average noise level (Leq)**—the equivalent average noise level for a monitoring interval;
- **10 percentile noise level (L10)**—the noise level exceeded ten percent of the time during a monitoring interval;
- **Maximum noise level (Lmax)**—the highest 1/8th-second average noise level during a monitoring interval; and
- **Peak noise level (Lpk)**—the highest instantaneous noise level detected at a sampling rate of 32 readings per second during a monitoring interval.

It should be note that, in general, human hearing does not respond to fluctuating noise levels as rapidly as noise monitoring equipment. Consequently, Lpk data are not always representative of how people perceive rapidly fluctuating noise levels. Therefore, the Lmax level typically is considered more representative of how people hear impulse noise levels than the Lpk level.

Results

Monitoring results of each CALFEX event are summarized in Appendix A. Appendix B includes line graphs of the 20-minute interval histories from the three CALFEX events monitored during January and April 2003. Separate graphs are presented for each monitoring station that was active during each of the three CALFEX events. As noted above, no comparable graphs are available for the 22 May 2002 CALFEX since Larson Davis Model 720 meters were used. In addition, line graphs are not available for the Silva Ranch station monitored on 29 January 2003 due to instrument failure during a rain event and no graphs are presented for the Mākua Beach site on 10 April 2003 due to suspected loss of instrument calibration.

The charts in Appendix B show that noise levels at particular locations remain generally similar during different CALFEX events, although background noise level conditions vary somewhat depending on wind and wave conditions. All CALFEX events began at about sunrise, and lasted about three hours. Noise monitoring typically continued after conclusion of the live fire exercise to collect background noise level data. The January 2003 CALFEX exercises did not include the use of bangalore torpedoes or Claymore mines; these devices were detonated for noise monitoring purposes after the live fire exercise had been completed and troops had returned to the lower valley assembly area.

The highest noise level events occur only intermittently during any CALFEX exercise. Noise levels associated with training activity are higher within MMR than at Mākua Beach (a non-residential area), and are lowest at Silva Ranch (a single-residence area). Topographic shielding and site distance significantly reduces training noise impacts at Silva Ranch. It should be noted that the 08 April 2003 data for the Upper Valley site (see Appendix A) are not considered representative of typical background noise conditions. Strong winds and consequent rustling of tall vegetation near this monitoring location resulted in high background noise levels after the first few 20-minute intervals. The initial 20-minute interval data from this location are more typical of common background noise conditions when wind speeds are low.

Conclusions

It can be concluded that small arms firing, heavy weapons firing (e.g., howitzers, mortars, grenade simulators, and Claymore mines), and demolition charge detonations can be heard off-site at Mākua Beach during a CALFEX event. Low altitude helicopter flights (below 1,000 feet) flying from over the ocean and across Mākua Beach are an

additional source of noise associated with these training exercises. Small arms noise at Mākua Beach is seldom loud enough to be considered a disturbance, and much of the actual small arms firing is not very audible at the beach due to terrain shielding. The Lmax from small arms firing is typically less than 80 dBA at Mākua Beach, and often closer to 70 dBA.

Howitzer and mortar firings are audible at Mākua Beach, but generally are not loud enough to cause any kind of startle reaction. Noise monitoring data indicate Lmax levels at Mākua Beach of less than 90 dBA for most howitzer and mortar rounds. Lmax noise levels from howitzer and mortar firing reach 90 dBA at Mākua Beach mostly when winds are blowing down valley toward the beach and there is a low cloud deck or inversion layer. Under other weather conditions, the Lmax from howitzer and mortar firing is often less than 85 dBA and sometimes less than 80 dBA.

Bangalore torpedo detonations and Claymore mine detonations normally produce the loudest impulse noise events at Mākua Beach. Lmax noise levels from bangalore torpedo detonations can reach 95-97 dBA and Claymore mine detonations can produce Lmax levels of 85 to 90 dBA at Mākua Beach. Lmax noise levels from these sources may be 5 dBA lower when winds are blowing onshore and there is no low level inversion layer or cloud deck to reflect detonation noise. Based on our observations, and discussions with MMR range control personnel, there generally is only one bangalore torpedo detonation and only a few Claymore mine detonations during a typical CALFEX event. However, the bangalore torpedo Lmax levels at Mākua Beach may be close to the startle threshold for some people.

Helicopter overflight noise is likely to be the primary source of disturbance to human receptors using Mākua Beach during a CALFEX event. Helicopter flyover event noise levels at Mākua Beach appear rather variable, depending on how close the flight track comes to a person's location. Low altitudes (less than 1,000 feet) and close flight tracks have the potential to generate Lmax noise levels of between 85 to 95 dBA. More distant flight tracks generate noise Lmax noise levels of less than 80 dBA. Because direct overhead flight patterns seems to be unusual, typical Lmax levels from helicopter flyovers are generally in the 80 to 85 dBA range.

Please feel free to contact us at (808) 533-3366 if you have any questions or comments. Tetra Tech looks forward to continuing to be of service to the U.S. Army Corps of Engineers, POH.

Sincerely,

Robert Sculley
Senior Scientist

Gary A. Floyd
Deputy Project Manager, Site Investigations

Enclosures (10 copies of 2002-2003 Noise Monitoring Report)

cc: Mr. Gary Shirakata, POH PM
Mr. Ed Yamada, POH
Ms. Judith Charles, Tetra Tech
Mr. John Bock, Tetra Tech
Mr. Roy Roenbeck, Tetra Tech
MMR Administrative Record

APPENDIX A

SUMMARY OF NOISE MONITORING DATA

SUMMARY OF NOISE MONITORING DATA, MAKUA MILITARY RESERVATION CALFEX EXERCISES

PARMAMETER	MAKUA BEACH SITE			ADMIN TRAILER AREA	
	MAY 22, 2002	JAN 29, 2003	JAN 31, 2003	MAY 22, 2002	APRIL 10, 2003
Meter Model	Larson Davis 720	Larson Davis 824	Larson Davis 824	Larson Davis 820	Larson Davis 824
Serial Number	0263	0918	1367	1276	1368
Instrument Type	Type 2	Type 1	Type 1	Type 1	Type 1
Microphone Type	3/8 inch electret	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field
Run Date	May 22, 2002	January 29, 2003	January 31, 2003	May 22, 2002	April 10, 2003
Start Time	5:11 am	7:55:57 AM	7:38:16 AM	5:31 am	6:21:41 AM
Stop Time	not logged	11:13:02 AM	2:01:31 PM	not logged	11:55:13 AM
Duration	not logged	3:17:05	6:23:15	not logged	5:33:32
Primary Detector Mode	Fast	Fast	Fast	Fast	Fast
Secondary Detector Modes	not applicable	Slow; Impulse	Slow; Impulse	not applicable	Slow; Impulse
Sampling Rate	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second
Leq, Lmax, Lmin Weighting	A-weighted	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted	A, C, unweighted (flat)
Instantaneous Peak Weighting	A-weighted and unweighted	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted and unweighted	A, C, unweighted (flat)
Statiscal Analysis (Lxx) Weighting	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted
Lmax, Lmin Integration Period	1/8 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second	1/8 second, 1 second
Time History Averaging	1 second	1 second	1 second	1 second	1 second
Interval History Averaging	1 second	20 minutes	20 minutes	1 second	20 minutes
Exceedance Event Logging	not applicable	1/32 second	1/32 second	1/32 second	1/32 second
Overall Average Noise Level (Leq)	65.3 dBA	65.1 dBA	62.7 dBA	78.8 dBA	68.4 dBA
		77.4 dBC	76.7 dBC		79.9 dBC
		81.4 dBF	79.6 dBF		81.7 dBF
Minimum 1/8-second Value (Lmin fast)	36.3 dBA	35.3 dBA	41.1 dBA	35.1 dBA	50.8 dBA
Time of Lmin	9:24 am	10:28:14 AM	1:53:58 PM	9:01 am	11:18:11 AM
		54.3 dBC	51.6 dBC		63.0 dBC
		10:49:03 AM	12:24:38 PM		11:16:56 AM
		58.0 dBF	53.3 dBF		64.0 dBF
		10:48:58 AM	12:24:38 PM		11:16:56 AM
Minimum 1/8-second Value (Lmin impulse)	not applicable	36.6 dBA	41.6 dBA	not applicable	51.3 dBA
Time of Lmin		10:49:00 AM	12:24:38 PM		11:18:26 AM
		56.8 dBC	53.4 dBC		64.8 dBC
		10:49:02 AM	12:24:39 PM		9:28:24 AM
		62.3 dBF	56.8 dBF		66.2 dBF
		10:49:02 AM	11:51:55 AM		11:45:58 AM
Minimum 1-second Value (Lmin slow)	not applicable	36.8 dBA	42.1 dBA	not applicable	51.6 dBA
Time of Lmin		10:49:00 AM	12:24:39 PM		11:18:50 AM
		55.9 dBC	53.0 dBC		64.5 dBC
		10:49:02 AM	12:24:39 PM		7:32:13 AM
		60.1 dBF	55.8 dBF		65.9 dBF
		10:49:03 AM	12:24:39 PM		11:45:59 AM

SUMMARY OF NOISE MONITORING DATA, MAKUA MILITARY RESERVATION CALFEX EXERCISES

PARMAMETER	MAKUA BEACH SITE			ADMIN TRAILER AREA	
	MAY 22, 2002	JAN 29, 2003	JAN 31, 2003	MAY 22, 2002	APRIL 10, 2003
Maximum 1/8-second Value (Lmax fast)	91.7 dBA	97.0 dBA	96.8 dBA	97.8 dBA	100.6 dBA
Time of Lmax	6:50 am	8:04:32 AM	8:26:41 AM	5:51 am	8:08:25 AM
		113.6 dBC	115.2 dBC		116.0 dBC
		10:32:36 AM	10:20:02 AM		8:08:25 AM
		118.9 dBF	120.5 dBF		120.3 dBF
		10:32:36 AM	10:20:02 AM		8:08:25 AM
Maximum 1/8-second Value (Lmax fast)	91.7 dBA	97.0 dBA	96.8 dBA	97.8 dBA	100.6 dBA
Time of Lmax	6:50 am	8:04:32 AM	8:26:41 AM	5:51 am	8:08:25 AM
		113.6 dBC	115.2 dBC		116.0 dBC
		10:32:36 AM	10:20:02 AM		8:08:25 AM
		118.9 dBF	120.5 dBF		120.3 dBF
		10:32:36 AM	10:20:02 AM		8:08:25 AM
Maximum 1-second Value (Lmax slow)	not applicable	90.1 dBA	89.4 dBA	not applicable	92.7 dBA
Time of Lmax		8:04:38 AM	8:26:41 AM		8:08:25 AM
		105.7 dBC	107.4 dBC		108.4 dBC
		10:32:36 AM	10:20:02 AM		8:08:25 AM
		110.9 dBF	112.5 dBF		112.6 dBF
		10:32:36 AM	10:20:02 AM		8:08:25 AM
Instantaneous Peak dBA	121.3 dBA	123.8 dBA	122.3 dBA	122.3 dBA	128.7 dBA
Time of Peak dBA	7:11 am	10:32:36 AM	7:57:33 AM	7:59 am	8:08:25 AM
Instantaneous Peak dBC	not applicable	124.3 dBC	124.6 dBC	not applicable	129.6 dBC
Time of Peak dBC		10:32:36 AM	7:57:33 AM		8:08:25 AM
Instantaneous Peak unweighted dB	125.5 dBF	127.1 dBF	129.6 dBF	128.5 dBF	129.4 dBF
Time of unweighted Peak	7:59 am	10:32:36 AM	10:20:02 AM	7:59 am	8:08:25 AM
dBA Value Exceeded:					
5% of the time (L5)	76.4 dBA	68.4 dBA	66.5 dBA	86.6 dBA	70.0 dBA
10 % of the time (L10)	72.6 dBA	66.3 dBA	63.9 dBA	84.8 dBA	66.3 dBA
33% of the time (L33)	not applicable	61.9 dBA	57.3 dBA	71.9 dBA	60.2 dBA
50% of the time (L50)	not applicable	59.3 dBA	52.7 dBA	62.9 dBA	58.3 dBA
90% of the time (L90)	41.0 dBA	44.9 dBA	47.5 dBA	46.5 dBA	53.5 dBA
95% of the time (L95)	39.3 dBA	43.1 dBA	46.5 dBA	44.3 dBA	53.1 dBA
Dominant Noise Sources: (A-wtd Lmax noise source in **bold**; if differen unwtd instant peak source in **bold italics**)	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations***	helicopters; howitzer firing; **detonations**; generator
Location notes, other notes	near tree on upper beach	meter on frontage road; scattered showers; light rain	near tree on upper beach	N side of admin trailer; UH-60 at dip pond	E side of admin trailer; portable generator 100 ft away; generator may have set Lmin levels
Distance (feet) to howitzer firing point		2,200	2,200		1,800
Distance (feet) to Objective Deer	5,800	5,700	5,800	5,300	5,300

SUMMARY OF NOISE MONITORING DATA, MAKUA MILITARY RESERVATION CALFEX EXERCISES

PARMAMETER	LOWER VALLEY SITE		NORTH VALLEY SITE	SILVA RANCH SITE		OBJECTIVE COYOTE
	JAN 29, 2003	JAN 31, 2003	APRIL 8, 2003	JAN 31, 2003	APRIL 10, 2003	MAY 22, 2002
Meter Model	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 820
Serial Number	0917	0918	0917	0917	1369	1282
Instrument Type	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1
Microphone Type	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field
Run Date	January 29, 2003	January 31, 2003	April 8, 2003	January 31, 2003	April 10, 2003	May 22, 2002
Start Time	7:11:53 AM	7:26:33 AM	10:54:39 AM	7:48:46 AM	7:08:34 AM	5:47 am
Stop Time	10:58:29 AM	12:28:45 PM	3:29:33 PM	12:48:38 PM	12:13:52 PM	not logged
Duration	3:46:36	5:02:12	4:34:55	4:59:52	5:05:19	not logged
Primary Detector Mode	Fast	Fast	Fast	Fast	Fast	Fast
Secondary Detector Modes	Slow; Impulse	Slow; Impulse	Slow; Impulse	Slow; Impulse	Slow; Impulse	not applicable
Sampling Rate	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second
Leq, Lmax, Lmin Weighting	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted
Instantaneous Peak Weighting	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted and unweighted
Statiscal Analysis (Lxx) Weighting	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted
Lmax, Lmin Integration Period	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second
Time History Averaging	1 second	1 second	1 second	1 second	1 second	1 second
Interval History Averaging	20 minutes	20 minutes	20 minutes	20 minutes	20 minutes	1 second
Exceedance Event Logging	1/32 second	1/32 second	1/32 second	1/32 second	1/32 second	1/32 second
Overall Average Noise Level (Leq)	73.2 dBA 82.6 dBC 85.5 dBF	69.2 dBA 81.3 dBC 83.1 dBF	74.4 dBA 99.6 dBC 104.2 dBF	56.3 dBA 67.1 dBC 69.2 dBF	54.7 dBA 64.6 dBC 65.7 dBF	66.0 dBA
Minimum 1/8-second Value (Lmin fast) Time of Lmin	15.8 dBA 10:12:06 AM 28.7 dBC 8:01:54 AM 30.0 dBF 8:01:56 AM	51.9 dBA 9:23:12 AM 55.6 dBC 11:27:43 AM 56.3 dBF 11:27:43 AM	28.3 dBA 11:05:23 AM 37.7 dBC 11:05:43 AM 41.0 dBF 11:05:43 AM	48.7 dBA 10:06:59 AM 53.9 dBC 12:36:30 PM 54.6 dBF 12:36:30 PM	39.6 dBA 10:37:17 AM 46.8 dBC 9:56:51 AM 47.8 dBF 9:56:51 AM	24.4 dBA not logged
Minimum 1/8-second Value (Lmin impulse) Time of Lmin	23.0 dBA 8:03:06 AM 30.5 dBC 8:02:21 AM 32.0 dBF 8:02:21 AM	52.2 dBA 9:23:05 AM 56.4 dBC 11:27:42 AM 57.3 dBF 11:27:42 AM	28.7 dBA 11:05:23 AM 41.7 dBC 11:07:39 AM 44.8 dBF 11:05:40 AM	49.2 dBA 9:38:49 AM 55.1 dBC 11:36:46 AM 56.1 dBF 9:50:40 AM	40.1 dBA 10:37:17 AM 49.1 dBC 10:06:02 AM 50.3 dBF 11:14:45 AM	not applicable
Minimum 1-second Value (Lmin slow) Time of Lmin	19.6 dBA 10:12:06 AM 29.9 dBC 8:02:08 AM 31.3 dBF 8:02:12 AM	52.4 dBA 9:23:06 AM 56.4 dBC 11:27:43 AM 57.4 dBF 11:27:43 AM	28.9 dBA 11:05:23 AM 40.8 dBC 11:07:38 AM 43.7 dBF 11:05:40 AM	49.4 dBA 10:15:08 AM 55.0 dBC 9:50:40 AM 55.9 dBF 9:36:47 AM	40.9 dBA 10:37:18 AM 49.0 dBC 9:56:52 AM 50.4 dBF 9:56:52 AM	not applicable

SUMMARY OF NOISE MONITORING DATA, MAKUA MILITARY RESERVATION CALFEX EXERCISES

PARMAMETER	LOWER VALLEY SITE		NORTH VALLEY SITE	SILVA RANCH SITE		OBJECTIVE COYOTE
	JAN 29, 2003	JAN 31, 2003	APRIL 8, 2003	JAN 31, 2003	APRIL 10, 2003	MAY 22, 2002
Maximum 1/8-second Value (Lmax fast)	104.4 dBA	97.6 dBA	100.0 dBA	92.7 dBA	82.0 dBA	107.8 dBA
Time of Lmax	10:53:41 AM	8:59:08 AM	1:15:30 PM	7:48:50 AM	11:26:46 AM	not logged
	118.6 dBC	116.7 dBC	124.3 dBC	107.2 dBC	89.5 dBC	
	8:04:13 AM	10:20:02 AM	1:15:30 PM	7:48:49 AM	8:08:28 AM	
	122.7 dBF	121.9 dBF	126.8 dBF	110.7 dBF	94.2 dBF	
	8:04:13 AM	10:20:02 AM	1:16:02 PM	7:48:49 AM	8:08:28 AM	
Maximum 1/8-second Value (Lmax impulse)	107.0 dBA	102.1 dBA	102.9 dBA	97.9 dBA	82.7 dBA	not applicable
Time of Lmax	10:53:41 AM	8:59:08 AM	2:29:20 PM	7:48:50 AM	11:26:46 AM	
	120.5 dBC	120.0 dBC	126.2 dBC	111.8 dBC	92.9 dBC	
	8:04:13 AM	10:20:02 AM	1:16:06 PM	7:48:49 AM	8:08:28 AM	
	124.4 dBF	125.2 dBF	128.6 dBF	115.6 dBF	97.3 dBF	
	8:04:13 AM	10:20:02 AM	1:09:31 PM	7:48:49 AM	8:08:28 AM	
Maximum 1-second Value (Lmax slow)	98.4 dBA	93.8 dBA	96.2 dBA	83.9 dBA	80.2 dBA	not applicable
Time of Lmax	10:53:41 AM	8:17:43 AM	1:24:02 PM	7:48:50 AM	11:26:46 AM	
	113.4 dBC	109.0 dBC	120.7 dBC	100.2 dBC	87.2 dBC	
	8:04:13 AM	10:20:02 AM	1:16:02 PM	7:48:50 AM	11:15:58 AM	
	117.6 dBF	113.8 dBF	124.0 dBF	104.8 dBF	87.6 dBF	
	8:04:13 AM	10:20:02 AM	1:16:02 PM	7:48:50 AM	8:08:28 AM	
Instantaneous Peak dBA	127.5 dBA	125.5 dBA	121.5 dBA	115.7 dBA	94.4 dBA	134.0 dBA
Time of Peak dBA	8:03:38 AM	8:59:08 AM	2:29:20 PM	7:48:50 AM	11:26:46 AM	not logged
Instantaneous Peak dBC	127.7 dBC	126.1 dBC	133.2 dBC	125.2 dBC	99.2 dBC	not applicable
Time of Peak dBC	7:44:52 AM	8:59:08 AM	1:24:01 PM	7:48:50 AM	8:08:28 AM	
Instantaneous Peak unweighted dB	127.9 dBF	130.4 dBF	131.8 dBF	125.5 dBF	103.1 dBF	134.3 dB
Time of unweighted Peak	7:16:17 AM	10:20:02 AM	1:24:01 PM	7:48:50 AM	8:08:28 AM	not logged
dBA Value Exceeded:						
5% of the time (L5)	77.4 dBA	74.0 dBA	77.6 dBA	61.0 dBA	60.4 dBA	69.9 dBA
10 % of the time (L10)	73.6 dBA	68.2 dBA	75.7 dBA	57.7 dBA	55.7 dBA	64.5 dBA
33% of the time (L33)	62.5 dBA	61.3 dBA	72.2 dBA	52.5 dBA	48.2 dBA	55.5 dBA
50% of the time (L50)	57.1 dBA	55.9 dBA	69.7 dBA	51.6 dBA	46.5 dBA	53.1 dBA
90% of the time (L90)	49.2 dBA	52.9 dBA	42.4 dBA	50.2 dBA	43.8 dBA	44.5 dBA
95% of the time (L95)	45.4 dBA	52.8 dBA	32.2 dBA	50.0 dBA	43.2 dBA	42.1 dBA
Dominant Noise Sources: (A-wtd Lmax noise source in **bold**; if differer unwtd instant peak source in **bold italics**)	***helicopters*** ; howitzer firing; **detonations**	**helicopters**; howitzer firing; ***detonations***	peak noise sources unknown; wind may have produced high background noise levels	helicopters; highway traffic; detonations; wind; surf; peak levels extraneous, staff adjusting meter tripod	helicopters; highway traffic; ***detonations*** ; wind; surf	**detonations**; howitzer and mortar firings
Location notes, other notes	E side of helipad area; OH-58D helicopters; scattered showers; light rain	E side of helipad area; OH-58D helicopters air sampling pumps probably set Lmin levels	near air monitoring station A8 along north firebreak road, Kahanahaiki Valley	northwest corner, Silva Ranch; air sampling pumps probably set Lmin levels	northwest corner, Silva Ranch; air sampling pumps may have set Lmin levels	Objective Coyote in Impact Area; peak detector overloaded
Distance (feet) to howitzer firing point	1,700	1,700	NA (no CALFEX)	7,600	7,600	
Distance (feet) to Objective Deer	4,700	4,700	NA (no CALFEX)	7,400	7,400	

Notes:

Howitzer firing point was different for May 22, 2002 CALFEX than for subsequent CALFEXs.

Noise monitoring data collected at Makua Beach on April 10, 2003 are not included because instrument battery problems prevented proper instrument calibration. Resulting data are out-of-character with previous data and with concurrent data collected at the Admin Trailer site.

No noise monitoring data were collected at Silva Ranch on January 29, 2003 because the meter was accidentally turned off while securing rain protection for the instrument.

Data Source: noise monitoring data collected by Tetra Tech staff.

SUMMARY OF NOISE MONITORING DATA
MAKUA MILITARY RESERVATION AND ADJACENT OFF-SITE AREAS

PARAMETER	MAKUA BEACH SITE			ADMIN TRAILER AREA	
	MAY 22, 2002	JAN 29, 2003	JAN 31, 2003	MAY 22, 2002	APRIL 10, 2003
Meter Model	Larson Davis 720	Larson Davis 824	Larson Davis 824	Larson Davis 820	Larson Davis 824
Serial Number	0263	0918	1367	1276	1368
Instrument Type	Type 2	Type 1	Type 1	Type 1	Type 1
Microphone Type	3/8 inch electret	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field
Run Date	May 22, 2002	January 29, 2003	January 31, 2003	May 22, 2002	April 10, 2003
Start Time	5:11 am	7:55:57 AM	7:38:16 AM	5:31 am	6:21:41 AM
Stop Time	not logged	11:13:02 AM	2:01:31 PM	not logged	11:55:13 AM
Duration	not logged	3:17:05	6:23:15	not logged	5:33:32
Primary Detector Mode	Fast	Fast	Fast	Fast	Fast
Secondary Detector Modes	not applicable	Slow; Impulse	Slow; Impulse	not applicable	Slow; Impulse
Sampling Rate	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second
Leq, Lmax, Lmin Weighting	A-weighted	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted	A, C, unweighted (flat)
Instantaneous Peak Weighting	A-weighted and unweighted	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted and unweighted	A, C, unweighted (flat)
Statiscal Analysis (Lxx) Weighting	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted
Lmax, Lmin Integration Period	1/8 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second	1/8 second, 1 second
Time History Averaging	1 second	1 second	1 second	1 second	1 second
Interval History Averaging	1 second	20 minutes	20 minutes	1 second	20 minutes
Exceedance Event Logging	not applicable	1/32 second	1/32 second	1/32 second	1/32 second
Overall Average Noise Level (Leq)	65.3 dBA	65.1 dBA 77.4 dBC 81.4 dBF	62.7 dBA 76.7 dBC 79.6 dBF	78.8 dBA	68.4 dBA 79.9 dBC 81.7 dBF
Minimum 1/8-second Value (Lmin fast)	36.3 dBA	35.3 dBA	41.1 dBA	35.1 dBA	50.8 dBA
Time of Lmin	9:24 am	10:28:14 AM 54.3 dBC 10:49:03 AM 58.0 dBF 10:48:58 AM	1:53:58 PM 51.6 dBC 12:24:38 PM 53.3 dBF 12:24:38 PM	9:01 am	11:18:11 AM 63.0 dBC 11:16:56 AM 64.0 dBF 11:16:56 AM
Minimum 1/8-second Value (Lmin impulse)	not applicable	36.6 dBA	41.6 dBA	not applicable	51.3 dBA
Time of Lmin		10:49:00 AM 56.8 dBC 10:49:02 AM 62.3 dBF 10:49:02 AM	12:24:38 PM 53.4 dBC 12:24:39 PM 56.8 dBF 11:51:55 AM		11:18:26 AM 64.8 dBC 9:28:24 AM 66.2 dBF 11:45:58 AM
Minimum 1-second Value (Lmin slow)	not applicable	36.8 dBA	42.1 dBA	not applicable	51.6 dBA
Time of Lmin		10:49:00 AM 55.9 dBC 10:49:02 AM 60.1 dBF 10:49:03 AM	12:24:39 PM 53.0 dBC 12:24:39 PM 55.8 dBF 12:24:39 PM		11:18:50 AM 64.5 dBC 7:32:13 AM 65.9 dBF 11:45:59 AM
Maximum 1/8-second Value (Lmax fast)	91.7 dBA	97.0 dBA	96.8 dBA	97.8 dBA	100.6 dBA
Time of Lmax	6:50 am	8:04:32 AM 113.6 dBC 10:32:36 AM 118.9 dBF 10:32:36 AM	8:26:41 AM 115.2 dBC 10:20:02 AM 120.5 dBF 10:20:02 AM	5:51 am	8:08:25 AM 116.0 dBC 8:08:25 AM 120.3 dBF 8:08:25 AM
Maximum 1/8-second Value (Lmax impulse)	not applicable	100.7 dBA	100.0 dBA	not applicable	104.3 dBA
Time of Lmax		8:04:32 AM 116.9 dBC 10:32:36 AM 122.2 dBF 10:32:36 AM	8:26:41 AM 118.5 dBC 10:20:02 AM 124.3 dBF 10:20:02 AM		8:08:25 AM 119.6 dBC 8:08:25 AM 123.6 dBF 8:08:25 AM
Maximum 1-second Value (Lmax slow)	not applicable	90.1 dBA	89.4 dBA	not applicable	92.7 dBA
Time of Lmax		8:04:38 AM 105.7 dBC 10:32:36 AM 110.9 dBF 10:32:36 AM	8:26:41 AM 107.4 dBC 10:20:02 AM 112.5 dBF 10:20:02 AM		8:08:25 AM 108.4 dBC 8:08:25 AM 112.6 dBF 8:08:25 AM
Instantaneous Peak dBA	121.3 dBA	123.8 dBA	122.3 dBA	122.3 dBA	128.7 dBA
Time of Peak dBA	7:11 am	10:32:36 AM	7:57:33 AM	7:59 am	8:08:25 AM
Instantaneous Peak dBC	not applicable	124.3 dBC	124.6 dBC	not applicable	129.6 dBC
Time of Peak dBC		10:32:36 AM	7:57:33 AM		8:08:25 AM
Instantaneous Peak unweighted dB	125.5 dBF	127.1 dBF	129.6 dBF	128.5 dBF	129.4 dBF
Time of unweighted Peak	7:59 am	10:32:36 AM	10:20:02 AM	7:59 am	8:08:25 AM
dBA Value Exceeded:					
5% of the time (L5)	76.4 dBA	68.4 dBA	66.5 dBA	86.6 dBA	70.0 dBA
10 % of the time (L10)	72.6 dBA	66.3 dBA	63.9 dBA	84.8 dBA	66.3 dBA
33% of the time (L33)	not applicable	61.9 dBA	57.3 dBA	71.9 dBA	60.2 dBA
50% of the time (L50)	not applicable	59.3 dBA	52.7 dBA	62.9 dBA	58.3 dBA
90% of the time (L90)	41.0 dBA	44.9 dBA	47.5 dBA	46.5 dBA	53.5 dBA
95% of the time (L95)	39.3 dBA	43.1 dBA	46.5 dBA	44.3 dBA	53.1 dBA
Dominant Noise Sources: (A-weighted Lmax noise source in **bold;** if different, unweighted instant peak source in ***bold italics***)	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations*** ; surf at shoreline	**helicopters**; howitzer firings; ***detonations***	helicopters; howitzer firing; **detonations**; generator
Location notes, other notes	near tree on upper beach	meter on frontage road; scattered showers; light rain	near tree on upper beach	N side of admin trailer; UH-60 at dip pond	E side of admin trailer; portable generator 100 ft away; generator may have set Lmin levels
Distance (feet) to howitzer firing point	2,000	2,200	2,200	1,400	1,800
Distance (feet) to Objective Deer	5,800	5,700	5,800	5,300	5,300

Notes:
(1) Howitzer firing point was different for May 22, 2002 CALFEX than for subsequent CALFEXs.
(2) Noise monitoring data collected at Makua Beach during CALFEX on April 10, 2003 are not included because instrument battery problems prevented proper instrument calibration. Resulting data are out-of-character with previous data and with concurrent data collected at the Admin Trailer site.
(3) No noise monitoring data were collected at Silva Ranch during CALFEX on January 29, 2003 due to instrument malfunction experienced during a rain shower event.

Data Source: All noise monitoring data collected by Tetra Tech, Inc. using Larson Davis instruments.

SUMMARY OF NOISE MONITORING DATA
MAKUA MILITARY RESERVATION AND ADJACENT OFF-SITE AREAS

PARAMETER	LOWER VALLEY SITE		NORTH VALLEY SITE	SILVA RANCH SITE		OBJECTIVE COYOTE
	JAN 29, 2003	JAN 31, 2003	APRIL 8, 2003	JAN 31, 2003	APRIL 10, 2003	MAY 22, 2002
Meter Model	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 824	Larson Davis 820
Serial Number	0917	0918	0917	0917	1369	1282
Instrument Type	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1
Microphone Type	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field	1/2 inch condenser, free field
Run Date	January 29, 2003	January 31, 2003	April 8, 2003	January 31, 2003	April 10, 2003	May 22, 2002
Start Time	7:11:53 AM	7:26:33 AM	10:54:39 AM	7:48:46 AM	7:08:34 AM	5:47 am
Stop Time	10:58:29 AM	12:28:45 PM	3:29:33 PM	12:48:38 PM	12:13:52 PM	not logged
Duration	3:46:36	5:02:12	4:34:55	4:59:52	5:05:19	not logged
Primary Detector Mode	Fast	Fast	Fast	Fast	Fast	Fast
Secondary Detector Modes	Slow; Impulse	Slow; Impulse	Slow; Impulse	Slow; Impulse	Slow; Impulse	not applicable
Sampling Rate	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second	32 samples per second
Leq, Lmax, Lmin Weighting	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted
Instantaneous Peak Weighting	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A, C, unweighted (flat)	A-weighted and unweighted
Statiscal Analysis (Lxx) Weighting	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted	A-weighted
Lmax, Lmin Integration Period	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second, 1 second	1/8 second
Time History Averaging	1 second	1 second	1 second	1 second	1 second	1 second
Interval History Averaging	20 minutes	20 minutes	20 minutes	20 minutes	20 minutes	1 second
Exceedance Event Logging	1/32 second	1/32 second	1/32 second	1/32 second	1/32 second	1/32 second
Overall Average Noise Level (Leq)	73.2 dBA 82.6 dBC 85.5 dBF	69.2 dBA 81.3 dBC 83.1 dBF	74.4 dBA 99.6 dBC 104.2 dBF	56.3 dBA 67.1 dBC 69.2 dBF	54.7 dBA 64.6 dBC 65.7 dBF	66.0 dBA
Minimum 1/8-second Value (Lmin fast)	15.8 dBA	51.9 dBA	28.3 dBA	48.7 dBA	39.6 dBA	24.4 dBA
Time of Lmin	10:12:06 AM 28.7 dBC 8:01:54 AM 30.0 dBF 8:01:56 AM	9:23:12 AM 55.6 dBC 11:27:43 AM 56.3 dBF 11:27:43 AM	11:05:23 AM 37.7 dBC 11:05:43 AM 41.0 dBF 11:05:43 AM	10:06:59 AM 53.9 dBC 12:36:30 PM 54.6 dBF 12:36:30 PM	10:37:17 AM 46.8 dBC 9:56:51 AM 47.8 dBF 9:56:51 AM	not logged
Minimum 1/8-second Value (Lmin impulse)	23.0 dBA	52.2 dBA	28.7 dBA	49.2 dBA	40.1 dBA	not applicable
Time of Lmin	8:03:06 AM 30.5 dBC 8:02:21 AM 32.0 dBF 8:02:21 AM	9:23:05 AM 56.4 dBC 11:27:42 AM 57.3 dBF 11:27:42 AM	11:05:23 AM 41.7 dBC 11:07:39 AM 44.8 dBF 11:05:40 AM	9:38:49 AM 55.1 dBC 11:36:46 AM 56.1 dBF 9:50:40 AM	10:37:17 AM 49.1 dBC 10:06:02 AM 50.3 dBF 11:14:45 AM	
Minimum 1-second Value (Lmin slow)	19.6 dBA	52.4 dBA	28.9 dBA	49.4 dBA	40.9 dBA	not applicable
Time of Lmin	10:12:06 AM 29.9 dBC 8:02:08 AM 31.3 dBF 8:02:12 AM	9:23:06 AM 56.4 dBC 11:27:43 AM 57.4 dBF 11:27:43 AM	11:05:23 AM 40.8 dBC 11:07:38 AM 43.7 dBF 11:05:40 AM	10:15:08 AM 55.0 dBC 9:50:40 AM 55.9 dBF 9:36:47 AM	10:37:18 AM 49.0 dBC 9:56:52 AM 50.4 dBF 9:56:52 AM	
Maximum 1/8-second Value (Lmax fast)	104.4 dBA	97.6 dBA	100.0 dBA	92.7 dBA	82.0 dBA	107.8 dBA
Time of Lmax	10:53:41 AM 118.6 dBC 8:04:13 AM 122.7 dBF 8:04:13 AM	8:59:08 AM 116.7 dBC 10:20:02 AM 121.9 dBF 10:20:02 AM	1:15:30 PM 124.3 dBC 1:15:30 PM 126.8 dBF 1:16:02 PM	7:48:50 AM 107.2 dBC 7:48:49 AM 110.7 dBF 7:48:49 AM	11:26:46 AM 89.5 dBC 8:08:28 AM 94.2 dBF 8:08:28 AM	not logged
Maximum 1/8-second Value (Lmax impulse)	107.0 dBA	102.1 dBA	102.9 dBA	97.9 dBA	82.7 dBA	not applicable
Time of Lmax	10:53:41 AM 120.5 dBC 8:04:13 AM 124.4 dBF 8:04:13 AM	8:59:08 AM 120.0 dBC 10:20:02 AM 125.2 dBF 10:20:02 AM	2:29:20 PM 126.2 dBC 1:16:06 PM 128.6 dBF 1:09:31 PM	7:48:50 AM 111.8 dBC 7:48:49 AM 115.6 dBF 7:48:49 AM	11:26:46 AM 92.9 dBC 8:08:28 AM 97.3 dBF 8:08:28 AM	
Maximum 1-second Value (Lmax slow)	98.4 dBA	93.8 dBA	96.2 dBA	83.9 dBA	80.2 dBA	not applicable
Time of Lmax	10:53:41 AM 113.4 dBC 8:04:13 AM 117.6 dBF 8:04:13 AM	8:17:43 AM 109.0 dBC 10:20:02 AM 113.8 dBF 10:20:02 AM	1:24:02 PM 120.7 dBC 1:16:02 PM 124.0 dBF 1:16:02 PM	7:48:50 AM 100.2 dBC 7:48:50 AM 104.8 dBF 7:48:50 AM	11:26:46 AM 87.2 dBC 11:15:58 AM 87.6 dBF 8:08:28 AM	
Instantaneous Peak dBA	127.5 dBA	125.5 dBA	121.5 dBA	115.7 dBA	94.4 dBA	134.0 dBA
Time of Peak dBA	8:03:38 AM	8:59:08 AM	2:29:20 PM	7:48:50 AM	11:26:46 AM	not logged
Instantaneous Peak dBC	127.7 dBC	126.1 dBC	133.2 dBC	125.2 dBC	99.2 dBC	not applicable
Time of Peak dBC	7:44:52 AM	8:59:08 AM	1:24:01 PM	7:48:50 AM	8:08:28 AM	
Instantaneous Peak unweighted dB	127.9 dBF	130.4 dBF	131.8 dBF	125.5 dBF	103.1 dBF	134.3 dB
Time of unweighted Peak	7:16:17 AM	10:20:02 AM	1:24:01 PM	7:48:50 AM	8:08:28 AM	not logged
dBA Value Exceeded:						
5% of the time (L5)	77.4 dBA	74.0 dBA	77.6 dBA	61.0 dBA	60.4 dBA	69.9 dBA
10 % of the time (L10)	73.6 dBA	68.2 dBA	75.7 dBA	57.7 dBA	55.7 dBA	64.5 dBA
33% of the time (L33)	62.5 dBA	61.3 dBA	72.2 dBA	52.5 dBA	48.2 dBA	55.5 dBA
50% of the time (L50)	57.1 dBA	55.9 dBA	69.7 dBA	51.6 dBA	46.5 dBA	53.1 dBA
90% of the time (L90)	49.2 dBA	52.9 dBA	42.4 dBA	50.2 dBA	43.8 dBA	44.5 dBA
95% of the time (L95)	45.4 dBA	52.8 dBA	32.2 dBA	50.0 dBA	43.2 dBA	42.1 dBA
Dominant Noise Sources: (A-weighted Lmax noise source in **bold;** if different, unweighted instant peak source in ***bold italics***)	***helicopters*** ; howitzer firing; **detonations**	**helicopters**; howitzer firing; ***detonations***	peak noise sources unknown; wind may have produced high background noise levels	helicopters; highway traffic; detonations; wind; surf; peak levels extraneous, staff adjusting meter tripod	helicopters; highway traffic; ***detonations*** ; wind; surf	**detonations**; howitzer and mortar firings
Location notes, other notes	E side of helipad area; OH-58D helicopters; scattered showers; light rain	E side of helipad area; OH-58D helicopters; air sampling pumps probably set Lmin levels	near air monitoring station A8 along north firebreak road, Kahanahaiki Valley	northwest corner, Silva Ranch; air sampling pumps probably set Lmin levels	northwest corner, Silva Ranch; air sampling pumps may have set Lmin levels	Objective Coyote in Impact Area; peak detector overloaded
Distance (feet) to howitzer firing point	1,700	1,700	5,000 (no CALFEX)	7,600	7,600	1,200
Distance (feet) to Objective Deer	4,700	4,700	4,600 (no CALFEX)	7,400	7,400	2,400

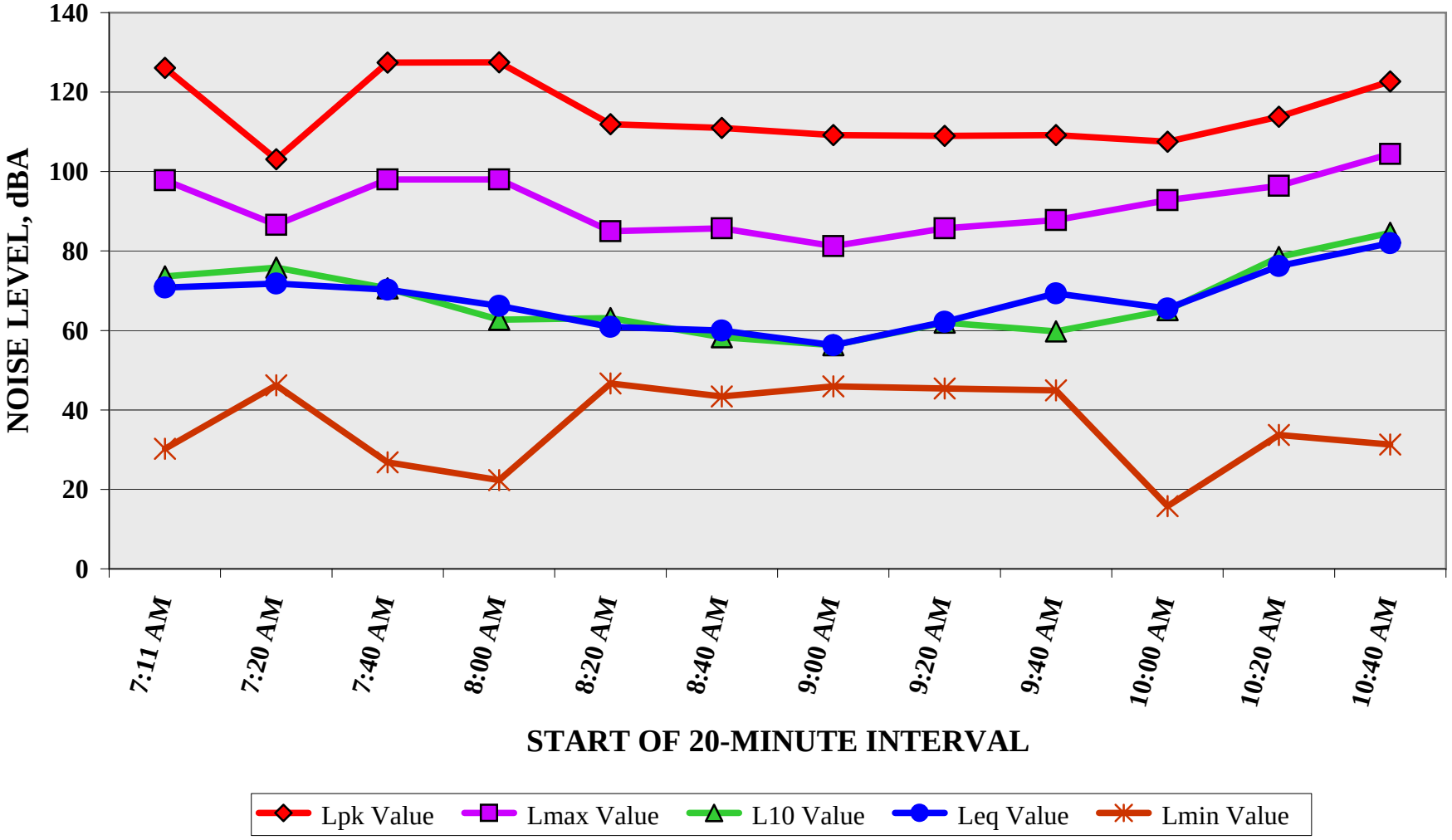
Notes:
(1) Howitzer firing point was different for M
(2) Noise monitoring data collected at Maku
Resulting data are out-of-character with p
(3) No noise monitoring data were collected

Data Source: All noise monitoring data collect

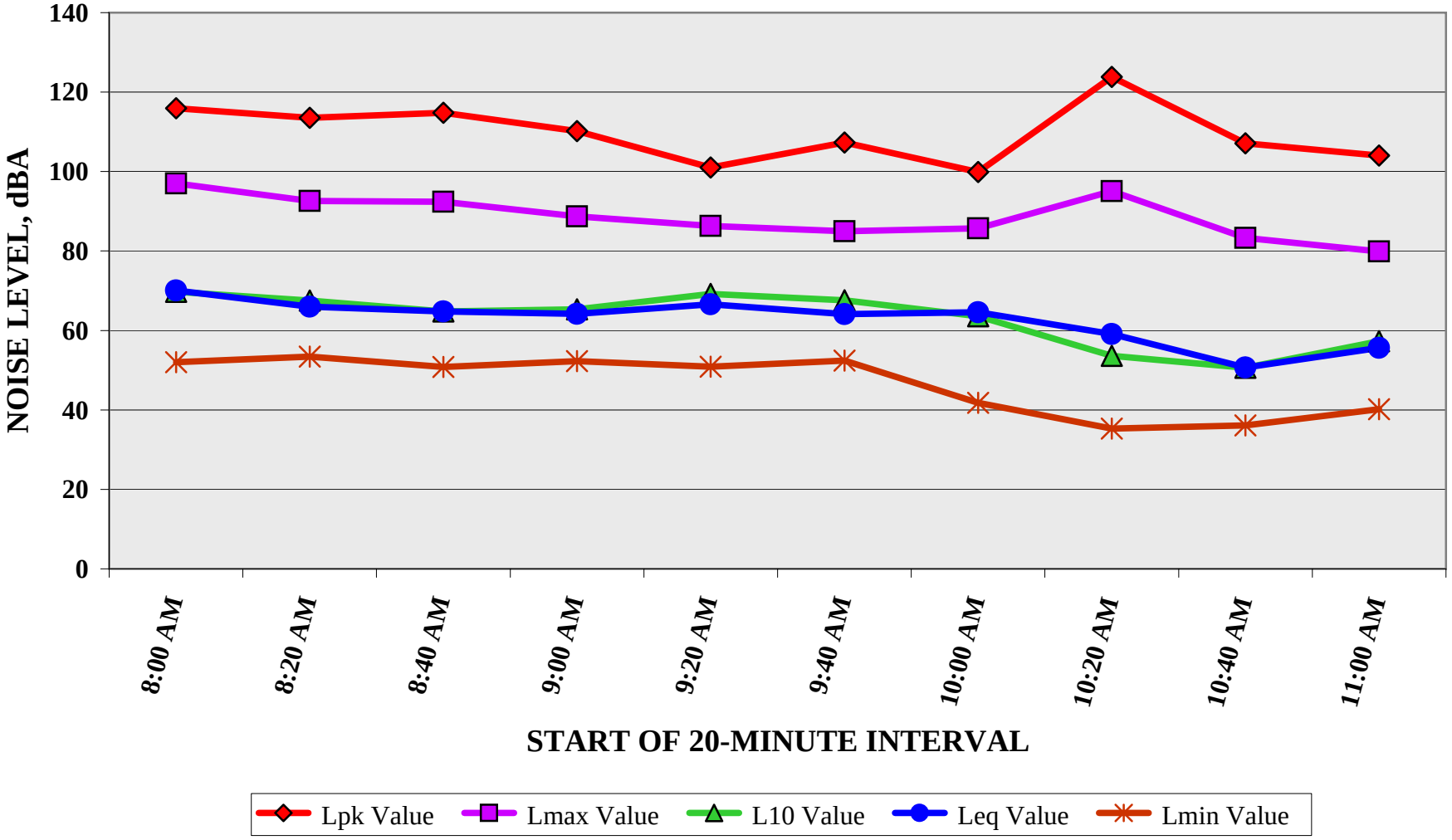
APPENDIX B

NOISE DATA INTERVAL GRAPHS

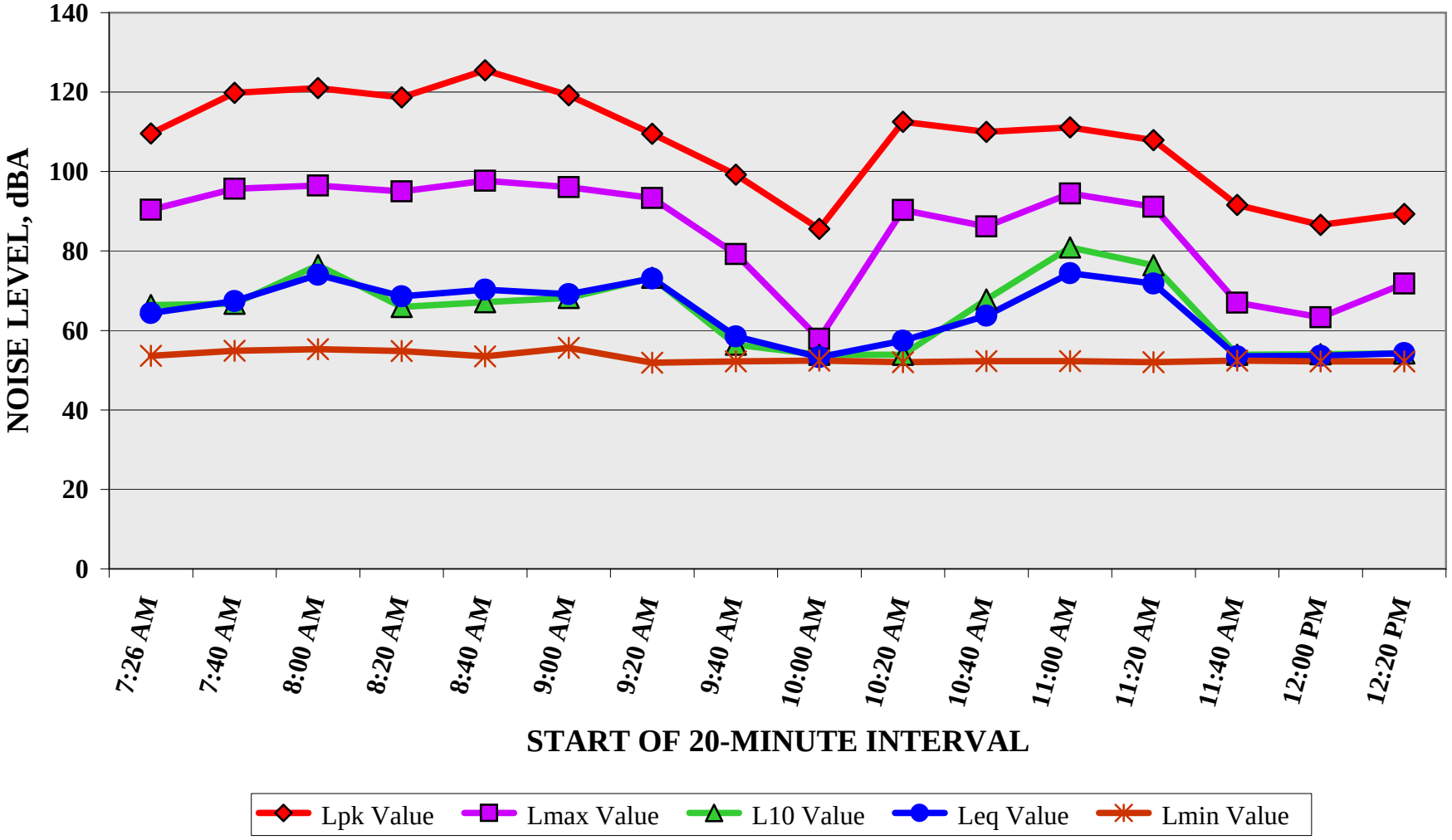
GRAPH #1
NOISE DATA FOR TIME INTERVALS
MMR - LOWER VALLEY SITE (29 JANUARY 2003)



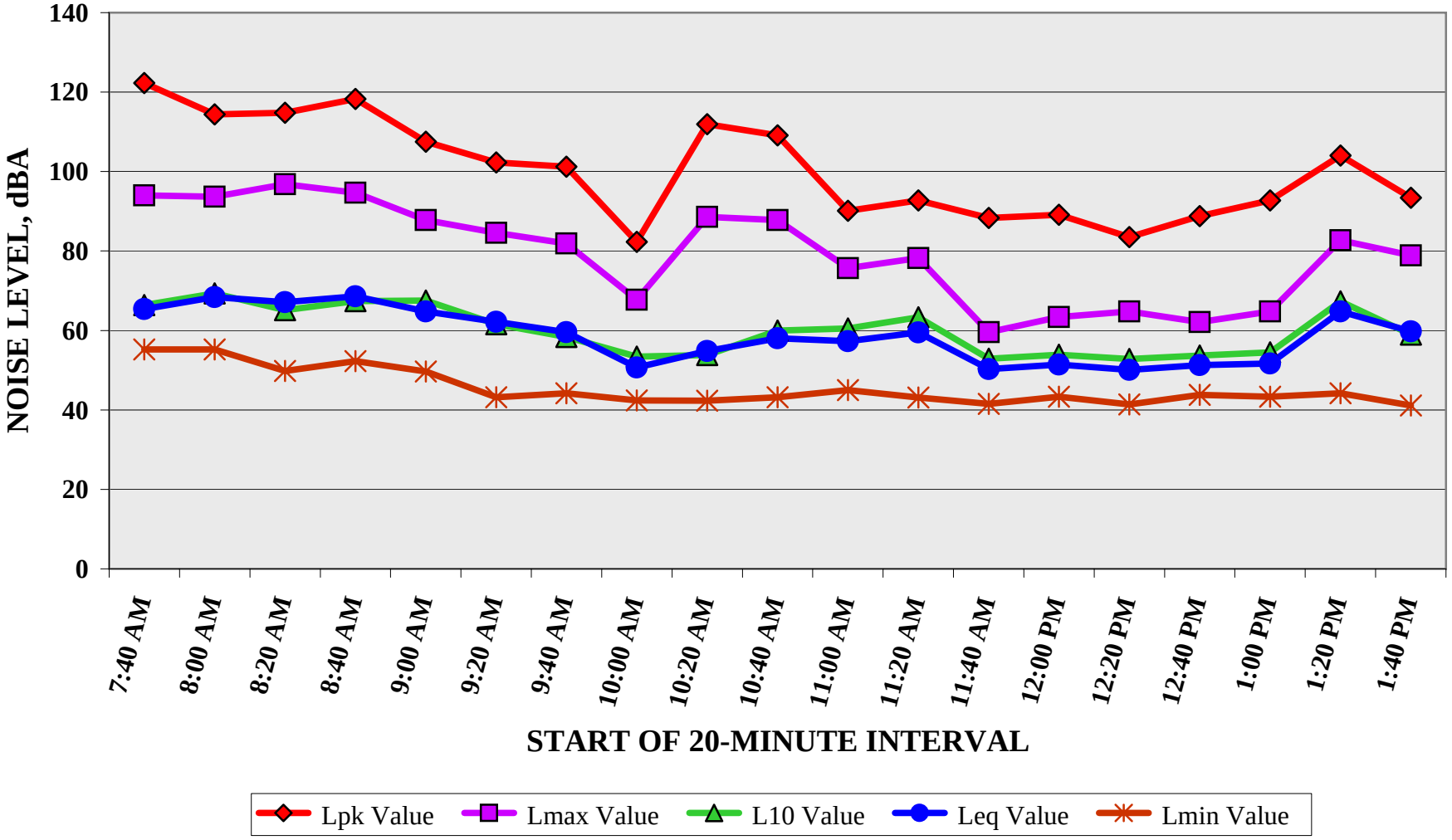
GRAPH #2
NOISE DATA FOR TIME INTERVALS
OFF-RANGE - MAKUA BEACH SITE (29 JANUARY 2003)



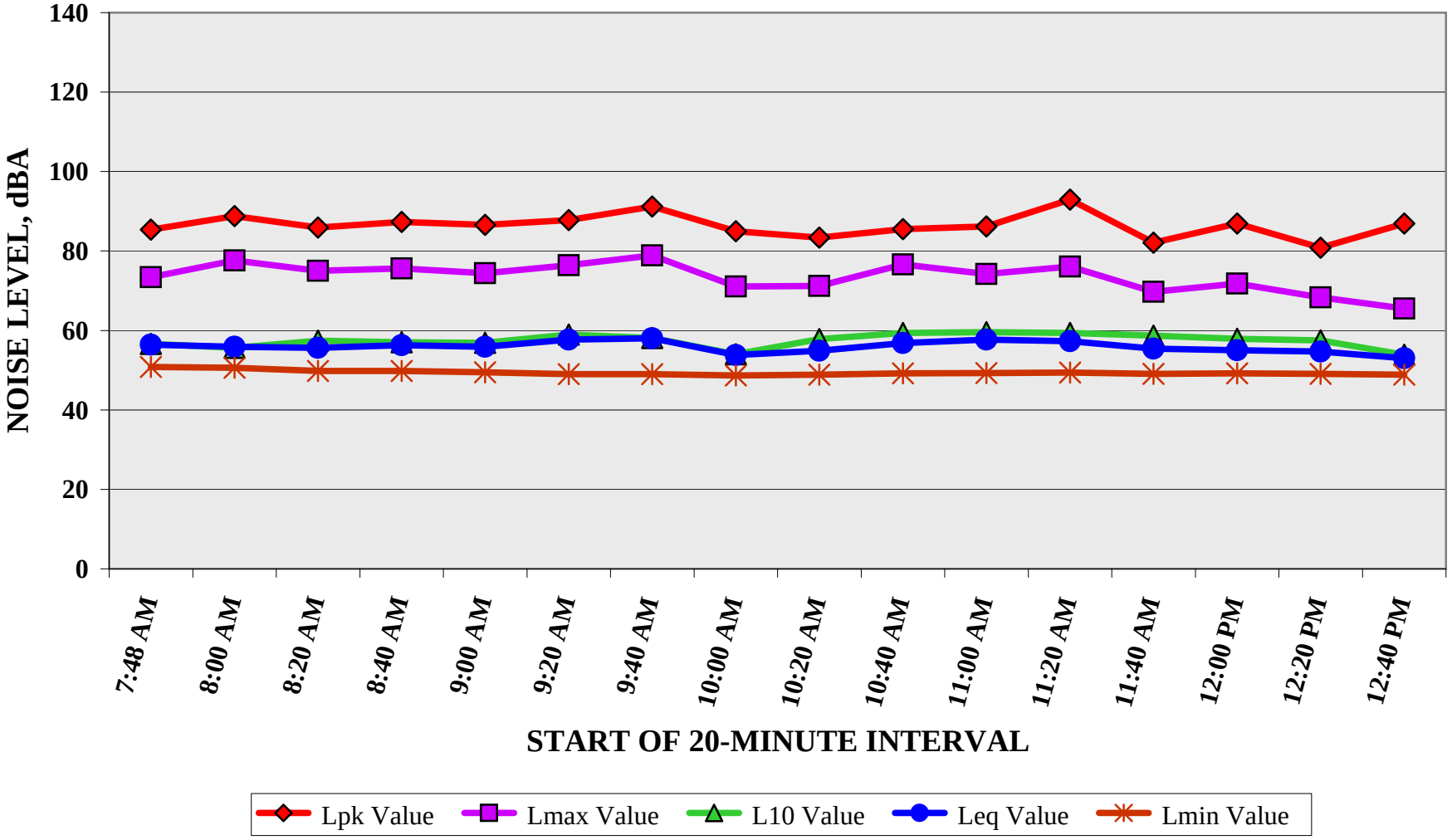
GRAPH #3
NOISE DATA FOR TIME INTERVALS
MMR - LOWER VALLEY SITE (31 JANUARY 2003)



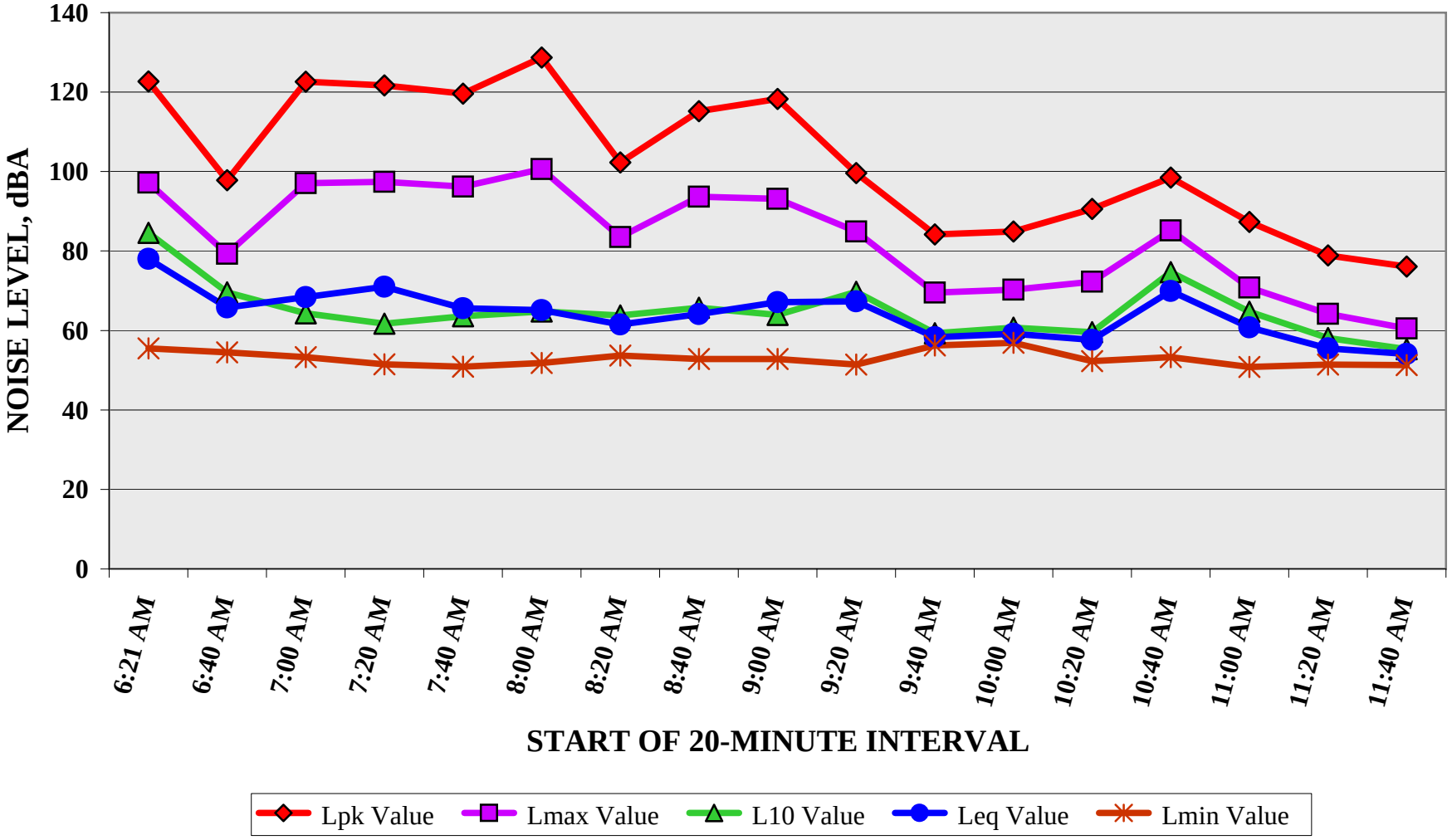
GRAPH #4
NOISE DATA FOR TIME INTERVALS
OFF-RANGE - MAKUA BEACH SITE (31 JANUARY 2003)



GRAPH #5
NOISE DATA FOR TIME INTERVALS
OFF-RANGE - SILVA RANCH SITE (31 JANUARY 2003)



GRAPH #6
NOISE DATA FOR TIME INTERVALS
MMR - ADMIN TRAILER AREA (10 APRIL 2003)



GRAPH #7
NOISE DATA FOR TIME INTERVALS
OFF-RANGE - SILVA RANCH SITE (10 APRIL 2003)