Public Comment to the Round Table

Date: June 7 2023

Subject: Director's report

From: Peter Grace, Brisbane resident

Dear Round Table Members:

1) Please thank Bert of the SFO Noise Office for using the ANEEM method to count Noise Monitor events at the non-Title 21 Noise Monitors. These are the Monitors outside the 65 dB contour shown on the map in the Director's Report. The shape is sometimes referred to as the Flying Jesus.
    a. The number of events counted has increased significantly particularly for those monitors distant from the airport when counting using the ANEEM method.
2) The California Standard for monitor Thresholds is 55dB as shown at the top of page 2 in the attached memo from HMMH[1]. If your city has a Noise Monitor outside the 65dB contour, please ask in this meeting what Thresholds is being used for your monitor(s) and if not 55dB, why not. (Brisbane's monitor appears to have been set to 60dB which is not the California standard.)
    a. We know the Monitors' Threshold can be set to 55dB as one of the original studies on ANEEM, set the threshold to 55dB for Amsterdam airport.
    b. As a citizen, I believe I am experiencing more noise events than shown in the Director's Report. One of the motivations for changing the counting method was that the Director's report did not reflect the experience of the Citizens on the ground.
3) The ANEEM method identifies each plane that causes a noise event. The prior method did not. This has profound implications for your role overseeing noise created by the airport and what you might want to consider focusing on. What do your citizens want?
    a. Is it to sleep better and focus on reducing the disruption caused by flights during the sleeping hours 10pm-7am?
    b. Is it those flights that your citizens are reporting through Stop.jet Noise or directly to the SFO Noise Office?
    c. Is it naming the loudest flights at each of your cities' monitors?
    d. Is it reducing the frequency of the rumble in such cities as Burlingame and Hillsborough and of course Millbrae? Ask the Noise Office to count and report on the number of Events in the Director's Report using C-weighted data which captures low frequency events much better than the currently used A-weighted data. You might ask for a comparison of the number of A-weighted and C-weighted events.
4) Please also ask the Noise Office to share the Noise Monitor data and other data about each flight such as airline, plane type, height, speed, distance from the monitor at nearest point of contact and other data. Please ask that all the monthly data is posted to the Noise Office website. The Noise Office has generously given this data in the past but as an exception.

Please ask as you can get replies to the above questions. As a member of the Public attending the meeting, I have no voice. It appears that no one at the Round Table needs to respond to the Public's questions or comments.

---

[1] Harris Miller Technical Memo dated 23 January 2009 was written to request Threshold waivers from the Regulator, Caltrans, for the Title-21 monitors i.e. those monitors used to define the 65dB contour. Please at the top of page 2: "Therefore, the **California standard noise monitor threshold and required tolerance are 55 dB** and 1.5 dB, respectively." I thus read that the California standard noise monitor threshold for the non-Title-21 monitors threshold is 55dB.

HARRIS MILLER MILLER & HANSON INC.
8880 Cal Center Drive, Suite 430
Sacramento, CA 95826
T 916.368.0707
F 916.368.1201
W www.hmmh.com

TECHNICAL MEMORANDUM

To: Mr. Bert Ganoung

From: Gene Reindel and Brad Nicholas

Date: January 23, 2009

Subject: SFO Title 21 Noise Monitor Threshold Waiver Request

Reference: HMMH Job #: 800530.000 002

The purpose of this technical memorandum is for the City and County of San Francisco, as the proprietor of San Francisco International Airport (SFO), to request waivers from Caltrans to increase the threshold noise levels at their remote monitoring terminals (RMTs) as part of their approved "monitoring plan". SFO has carefully calibrated the settings on their noise monitors to ensure the accurate computation of the aircraft Community Noise Equivalent Level (CNEL). In the environment surrounding SFO, this necessitates higher event noise thresholds than specified in Title 21. As the primary purpose of noise monitoring data under Title 21 is to establish the limits of the 65 dB CNEL contour this document will only request waivers for the RMTs which are used for this purpose.

The following table provides the requested thresholds for the SFO monitoring sites which are used to determine the extents of the 65 dB CNEL contour:

Table 1 Requested Thresholds at SFO RMT Locations

RMT No.	Requested Threshold (dB)	RMT No.	Requested Threshold (dB)
1	65	14	64
4	64	15	64
5	64	16	63
6	64	17	63
8	65	18	63
12	65	19	65

Following the methodology outlined in Harris Miller Miller & Hanson's July 25, 2008 memorandum, this document will present example data for each noise monitor to show that the thresholds have been set at optimum levels for obtaining aircraft CNEL from SFO operations.

1. BACKGROUND

Section 5001 of Title 21[1] specifies that ***"…the threshold noise level shall be a noise level which is 10 decibels below the numerical value of the appropriate Community Noise Equivalent Level (CNEL) standard specified in Section 5012."*** and that ***"Where the airport proprietor can demonstrate the accuracy of the CNEL measurement will remain within the required tolerance specified in Section 5070, the department may grant a waiver to increase the threshold level."***

[1] California Division of Aeronautics, Title 21 (Register 90, No. 10—3-10-90), Subchapter 6. Noise Standards.

Section 5012 of Title 21 specifies that the "standard" is 65 dB CNEL. Section 5070 specifies a tolerance of "plus or minus 1.5 dB on the CNEL scale". Therefore, the California standard noise monitor threshold and required tolerance are 55 dB and 1.5 dB, respectively.

Due to high background (non-aircraft generated) noise levels, SFO requires the threshold noise levels used to detect aircraft noise events at the RMT's be set at values greater than 55 dB. A threshold near the ambient noise level can cause aircraft noise events to extend for artificially long durations, which causes the Single Event Noise Exposure Level (SENEL) and resulting cumulative CNEL to be reported higher than actual. By setting the threshold above the ambient noise level, yet well below the maximum aircraft noise level, the noise monitoring system is able to log discreet aircraft noise events. As the loudest aircraft noise events dominate the aircraft CNEL, the exclusion of very quiet aircraft noise events will not change the reported aircraft CNEL beyond the acceptable tolerance of 1.5 dB.

2. THRESHOLD SETTINGS RATIONALE

Airport noise monitoring systems are designed to quantify the aircraft noise exposure at discrete community locations. They accomplish this by continuously measuring the noise level and then discriminating between aircraft and community noise sources. The event detection threshold is a key noise monitor setting to allow this discrimination. In basic terms, the noise monitoring system goes through the following steps to compute the aircraft CNEL:

1. Continuously measure noise
2. Identify events that exceed a given event detection threshold
3. Process RADAR data and determine the times when aircraft pass the monitoring site
4. Correlate the aircraft pass-by times to the times of noise events to determine aircraft noise events
5. Compute the aircraft CNEL by summing the aircraft noise events in the 24-hour day

Thus, the ability to select discrete noise events is key to the determination of aircraft CNEL.

As shown in the following figure, ambient noise in excess of the noise monitor threshold limits the system's ability to distinguish discrete events. Figure 1 displays sample noise monitor data with event detection set at 55 dB (shown with a red line). Note that there appear to be four discrete noise events, but that they are lumped together into two events. The "lumped" events each contain two louder events plus periods of ambient background noise. If the lumped events contain a mix of community and aircraft sources they are impossible to separate for the aircraft CNEL computation. A loud community event could be lumped in with a relatively quiet aircraft event and unnaturally inflate the aircraft CNEL beyond the 1.5 dB tolerance allowed.

Figure 2 displays the same data with a noise event threshold of 60 dB. Each of the loud events is now discrete. The noise monitoring system can better attribute the noise to aircraft or community sources.

The discrimination of aircraft events from community events is necessary for an accurate estimate of aircraft CNEL within the allowed tolerance. To accomplish this, noise monitor thresholds must be set above the ambient community noise levels.

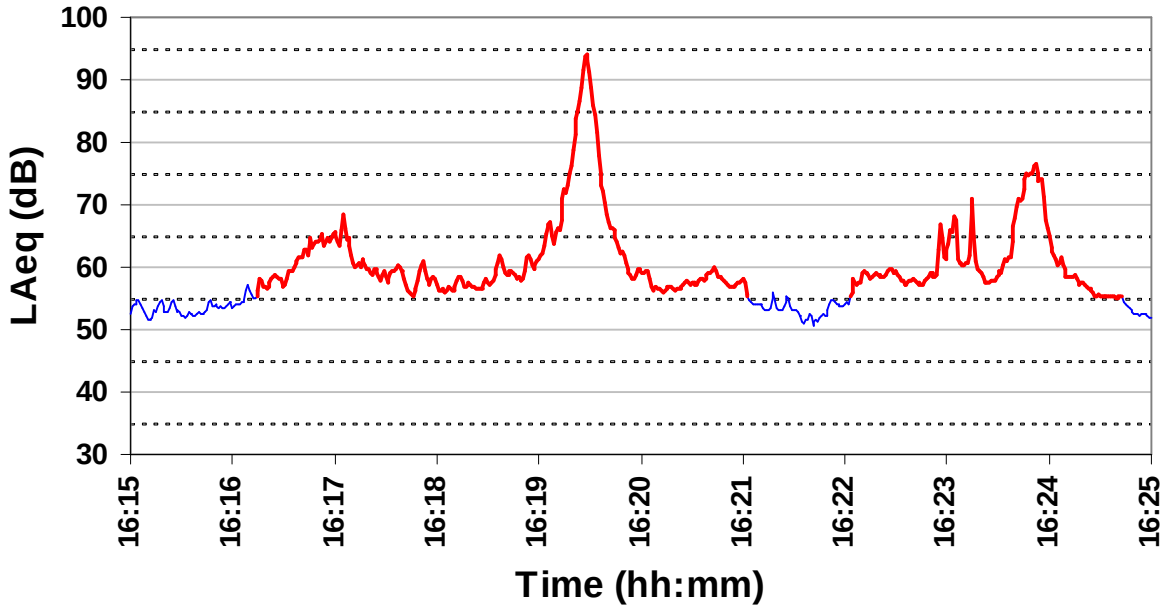

Figure 1 Sample Noise Monitoring Data with a 55 dB Threshold

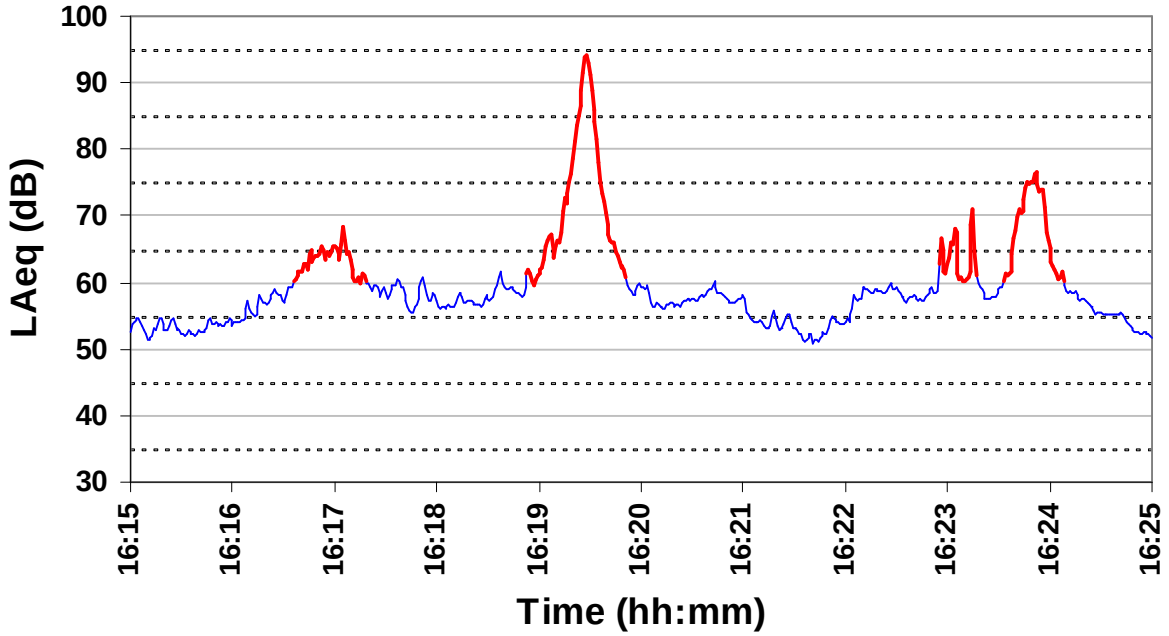

Figure 2 Sample Noise Monitoring Data with a 60 dB Threshold

3. METHODOLOGY

To demonstrate that the noise monitors have optimal event thresholds we can examine a sample of noise monitoring data and answer the following question:

Does the threshold appear to be above the ambient level, but well below the level of significant aircraft noise events?

To collect discrete noise event data with useful durations, the thresholds must be set above the ambient noise level. However, the threshold must be set low enough such that aircraft with a significant contribution to the CNEL are not excluded. A noise event detection threshold at least 10 dB below the maximum noise level for events of interest (aircraft generated noise events) will help ensure that the computed aircraft CNEL will be accurate. We demonstrate the threshold's relationship to loud aircraft noise events and the ambient background using time-history graphs of noise levels throughout a typical day.

4. NEED FOR THRESHOLD WAIVER

The analysis utilized complete 1/2–second time history data for full day for each noise monitor. Time history data simply reports the actual noise level as recorded during each ½ second. For each monitor, a date with CNEL values typical of the sites' average conditions was selected for time history analysis. Table 2 presents the average annual aircraft and community CNEL as well as the aircraft and community CNEL for the analysis date for each noise monitor.

The figures on pages 8 through 13 show the noise levels throughout the analysis day at each of the noise monitors. These figures demonstrate two facts. First, as discussed above, the ambient noise levels reach or exceed 55 dB (dashed red line) for extended periods of time each day at these noise monitors. To collect discrete noise event data with useful durations, the thresholds (solid red line) must be set above the ambient noise level. Second, the noisier aircraft events, which dominate the CNEL, are often 20 to 30 dB above the loudest ambient levels. An event threshold well below the maximum noise level for events of interest will help ensure that the computed aircraft CNEL will be accurate. These graphs demonstrate that through careful analysis of the ambient and aircraft noise levels at the sites, the staff at SFO has set the event detection thresholds. Note that time periods of monitor calibration are plotted at a value of zero on these figures.

Table 2 CNEL at Noise Monitors for Average Conditions and the Time History Analysis Date

RMT	Noise Event Threshold (dB)	Average Annual CNEL (dB)		Time History Date	Time History CNEL (dB)	
		Aircraft	Community		Aircraft	Community
1	65	73.1	69.1	7/31/08	73.2	68.7
4	64	70.5	60.6	8/1/08	70.7	60.7
5	64	64.7	61.6	7/31/08	65.5	60.6
6	64	65.9	60.1	7/31/08	65.8	60.9
8	65	58.2	65.1	8/2/08	58.0	65.4
12	65	60.1	59.8	8/2/08	60.5	59.2
14	64	61.7	61.4	8/2/08	62.2	61.9
15	64	57.2	60.8	7/30/08	57.0	61.0
16	63	60.3	57.3	7/29/08	60.4	58.4
17	63	60.8	59.7	7/26/08	60.9	59.8
18	63	66.5	59.3	7/30/08	65.9	59.6
19	65	62.4	57.9	7/23/08	62.5	57.2

4.1 Analysis Results

The following discussion examines the analysis results for the sites which may be used to establish the bounds of the 65 dB CNEL contour. To demonstrate that the higher threshold meets the Title 21 1.5 dB criterion, Table 3 shows the total and aircraft-only CNEL at each of the noise monitors for the analysis date. It also shows the adjusted aircraft CNEL in which all noise between 55 dB (Title 21 standard threshold) and the existing threshold is added to the aircraft CNEL. This yields the maximum possible aircraft CNEL with a 55 dB threshold. Finally, the change in CNEL due to this adjustment is displayed. With the exceptions of RMT 8, RMT 12, and RMT 15 the difference in the CNEL is below the Title 21 1.5 dB tolerance.

Table 3 CNEL at Noise Monitors

	Noise Event	Time History	CNEL (dB)				
RMT	Threshold (dB)	Date	Aircraft	Community	TOTAL	Adjusted Aircraft[1]	Difference (adjusted - aircraft)
1	65	7/31/08	73.2	68.7	74.5	74.0	0.9
4	64	8/1/08	70.7	60.7	71.1	70.9	0.2
5	64	7/31/08	65.5	60.6	66.7	65.9	0.4
6	64	7/31/08	65.8	60.9	67.0	66.0	0.3
8	65	8/2/08	58.0	65.4	66.1	65.3	7.3
12	65	8/2/08	60.5	59.2	62.9	62.1	1.6[2]
14	64	8/2/08	62.2	61.9	65.1	63.6	1.4
15	64	7/30/08	57.0	61.0	62.5	60.4	3.4[2]
16	63	7/29/08	60.4	58.4	62.5	61.5	1.1
17	63	7/26/08	60.9	59.8	63.4	62.2	1.3
18	63	7/30/08	65.9	59.6	66.8	66.3	0.4
19	65	7/23/08	62.5	57.2	63.6	62.8	0.3

[1] Attributes all noise between 55 dB and the requested noise event threshold to aircraft
[2] Additional analysis described below confirms this site complies with 1.5 dB criterion

An additional analysis of RADAR Point of Closest Approach (POCA) data for aircraft in the vicinity of RMT 8, RMT 12, and RMT 15 was conducted to verify compliance with the 1.5 dB criterion. The noise between 55 dB and the existing monitor threshold may be due to either aircraft or community noise sources. The times of aircraft POCA were used to exclude periods of noise during which no aircraft were in the vicinity of the noise monitor from the adjustment above. This newly computed Adjusted Aircraft CNEL is presented in Table 4. The differences relative to the original Aircraft CNEL are all less than the 1.5 dB criterion with the exception of RMT 8.

Table 4 CNEL at Noise Monitors: POCA Analysis Results

	Noise Event	Time History	CNEL (dB)				
RMT	Threshold (dB)	Date	Aircraft	Community	TOTAL	Adjusted Aircraft[3]	Difference (adjusted - aircraft)
8	65	8/2/08	58.0	65.4	66.1	60.9	2.9
12	65	8/2/08	60.5	59.2	62.9	61.2	0.7
15	64	7/30/08	57.0	61.0	62.5	58.4	1.4

[3] Attributes all noise between 55 dB and the requested noise event threshold to aircraft only if an aircraft is within the vicinity of the noise monitor

Due to the high ambient noise levels and relatively low maximum aircraft levels at RMT 8 this analysis can not show compliance with the 1.5 dB criterion. Examination of the time history in Figure 7 shows

that the threshold is set at the best possible level to capture discreet noise events for matching. Lowering the threshold would cause events which are now discreet to combine into longer events which will contain long periods of high ambient noise. Additionally these lumped events will be more difficult to match correctly to aircraft and thus *decrease* the accuracy of the system's differentiation of aircraft and community noise. As such, we request the threshold waiver for RMT 8 on the basis that the requested threshold provides the most accurate estimate of aircraft noise.

Figure 3 Noise Levels 7/31/08 - RMT 1

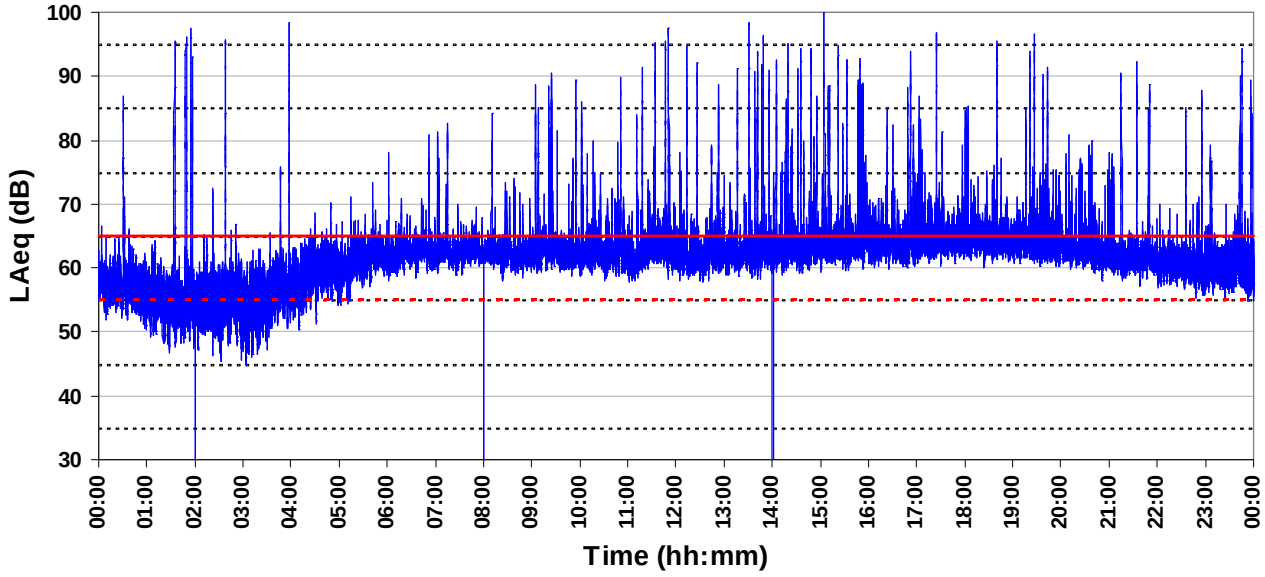

Figure 4 Noise Levels 8/1/08 - RMT 4

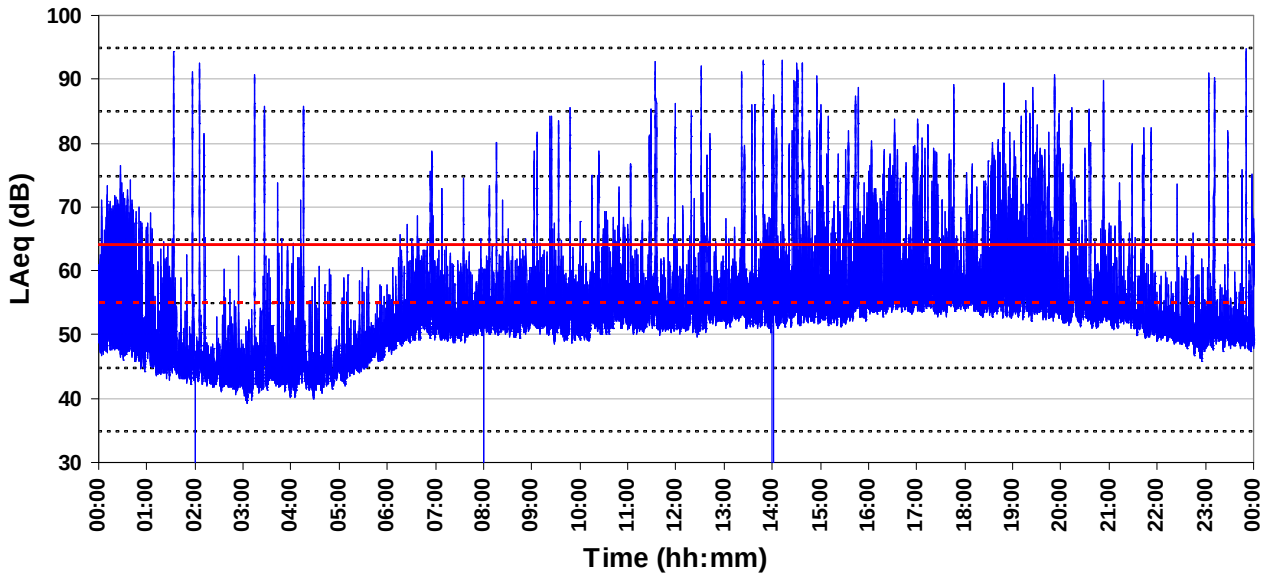

Figure 5 Noise Levels 7/31/08 - RMT 5

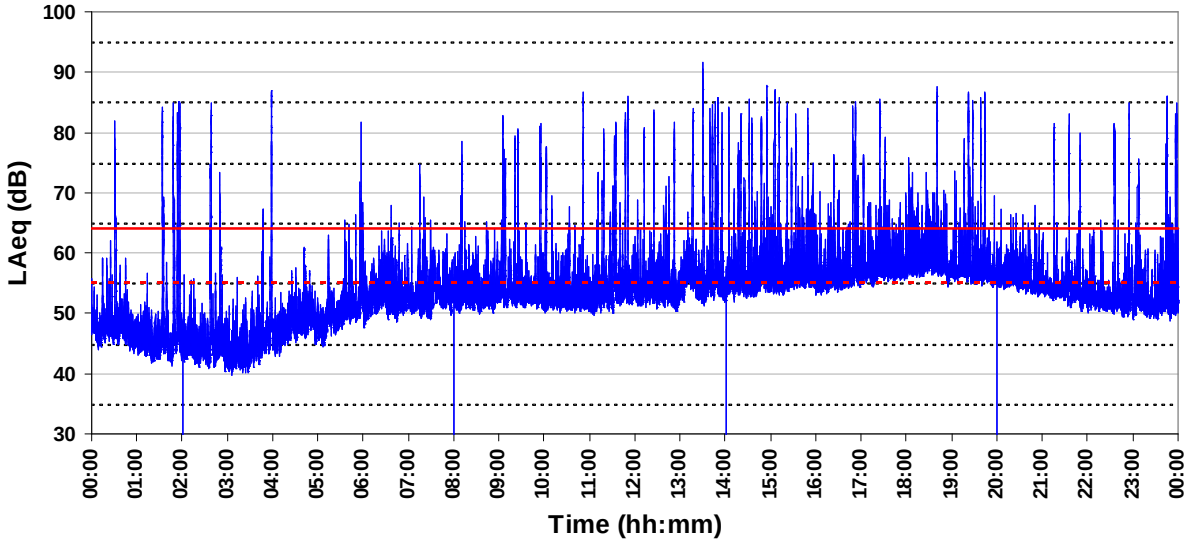

Figure 6 Noise Levels 7/31/08 - RMT 6

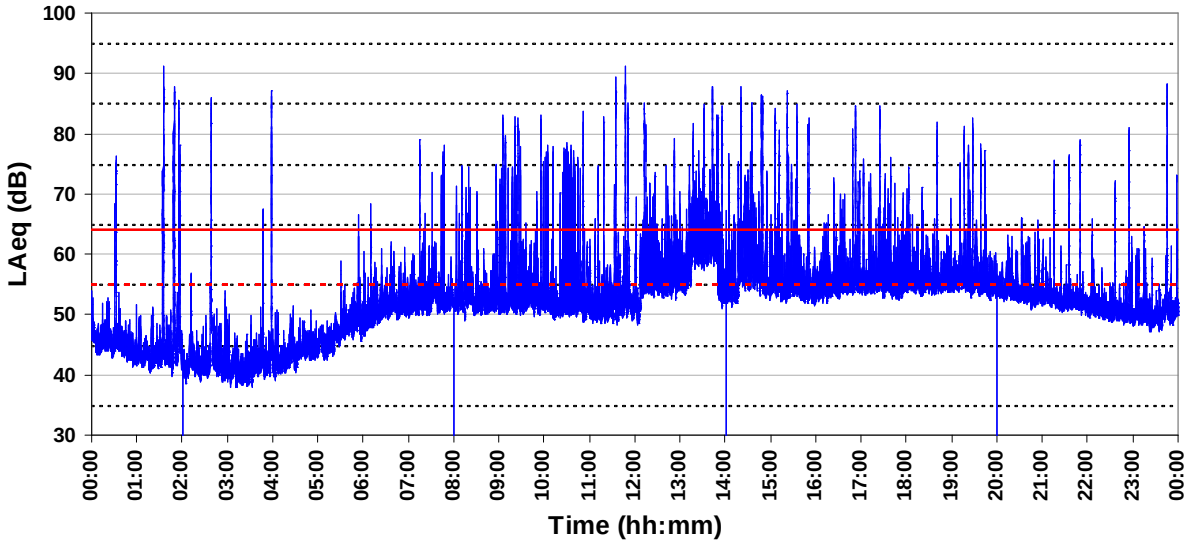

Figure 7 Noise Levels 8/2/08 - RMT 8

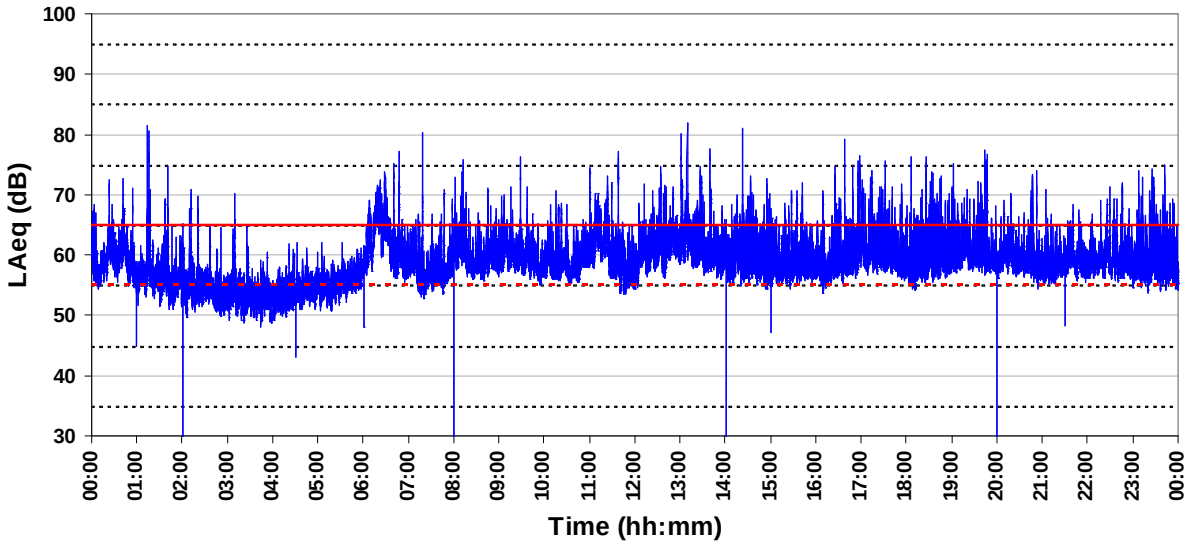

Figure 8 Noise Levels 8/2/08 - RMT 12

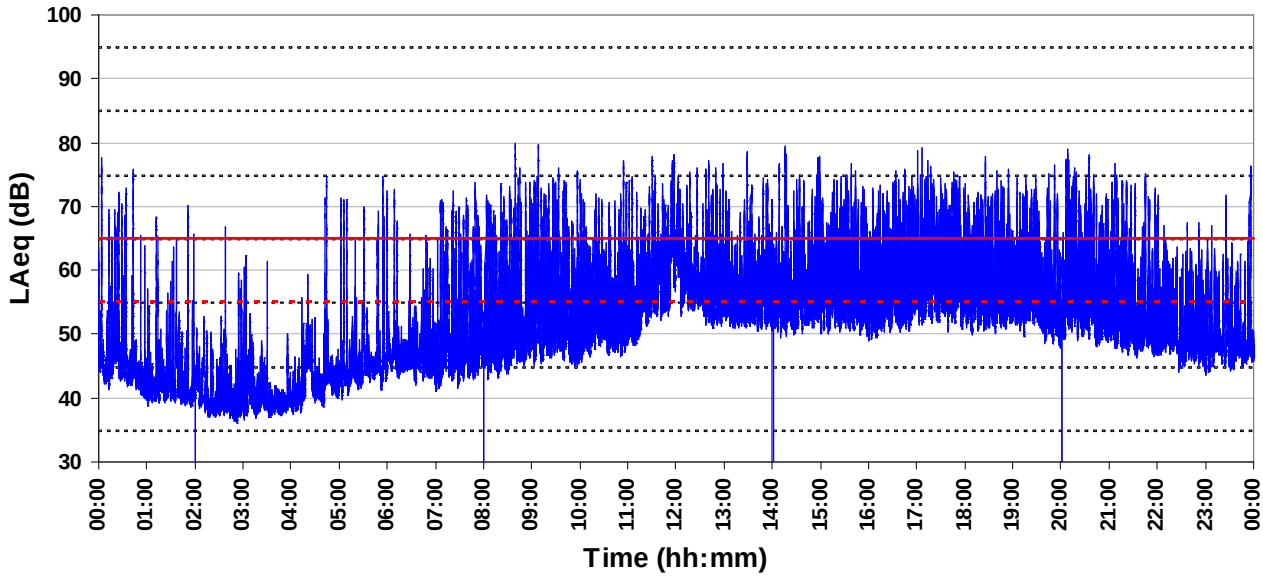

Figure 9 Noise Levels 8/2/08 - RMT 14

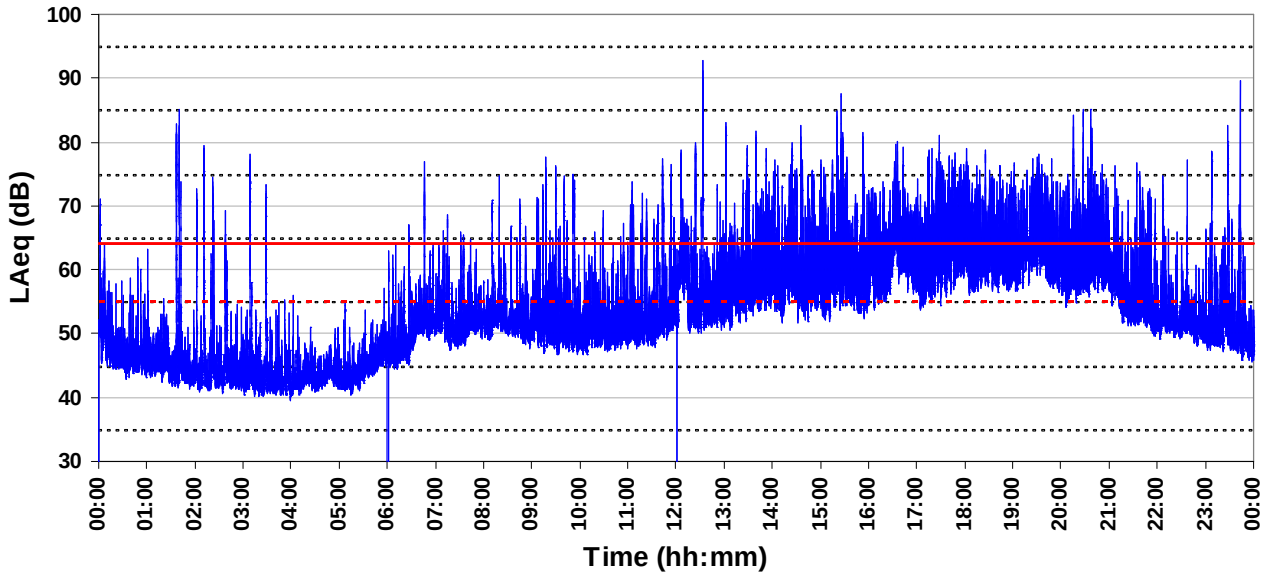

Figure 10 Noise Levels 7/30/08 - RMT 15

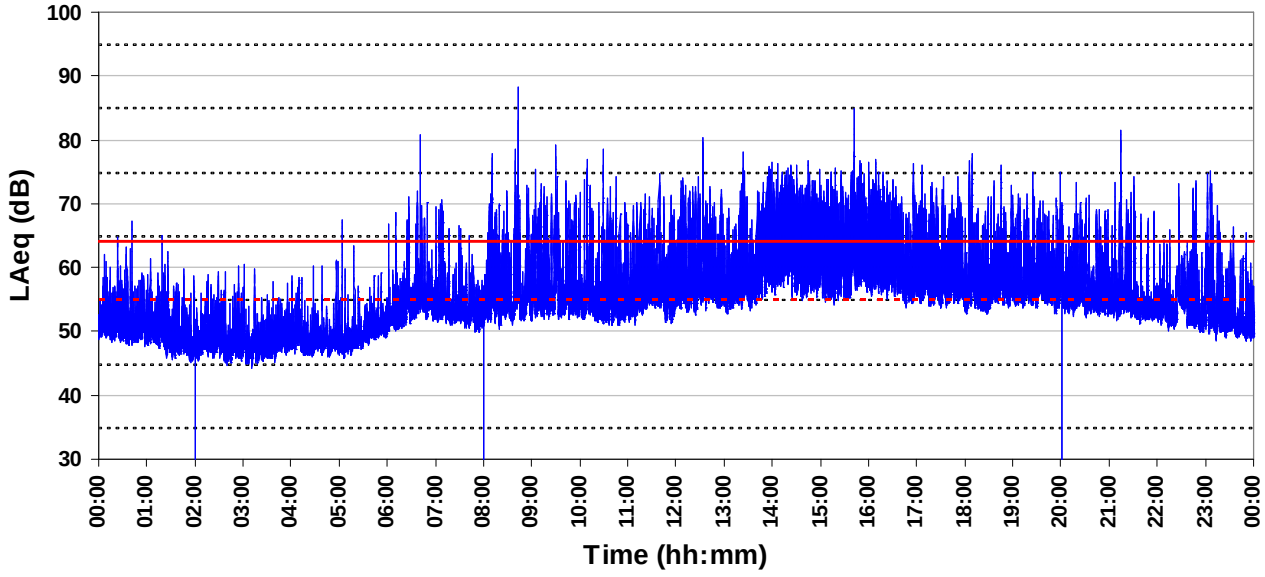

Figure 11 Noise Levels 7/29/08 - RMT 16

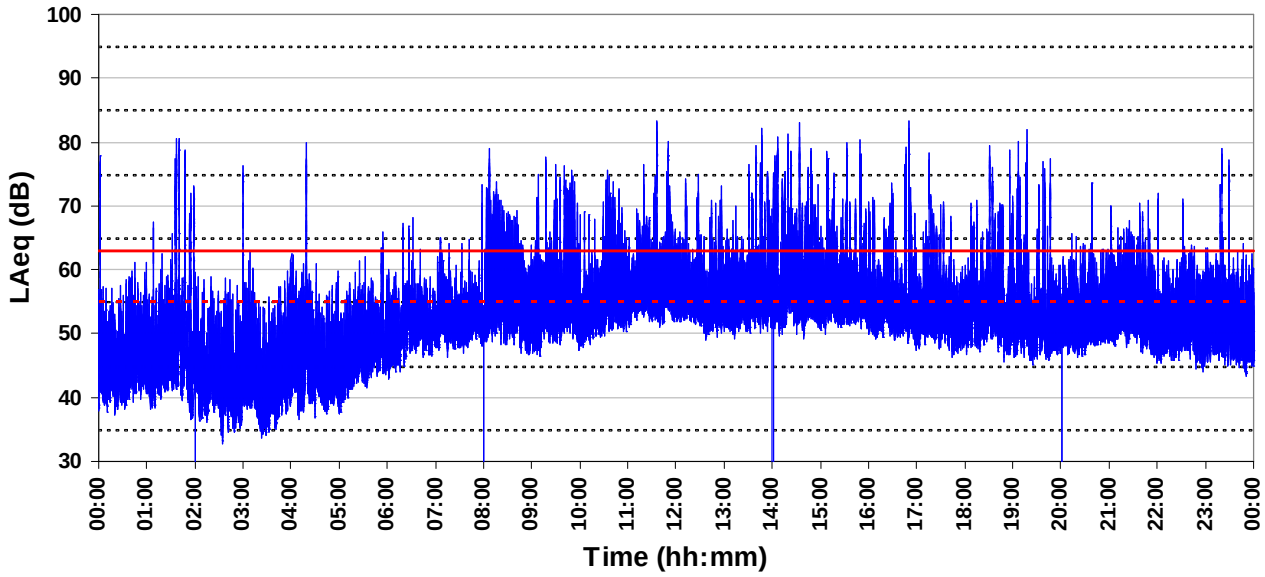

Figure 12 Noise Levels 7/26/08 - RMT 17

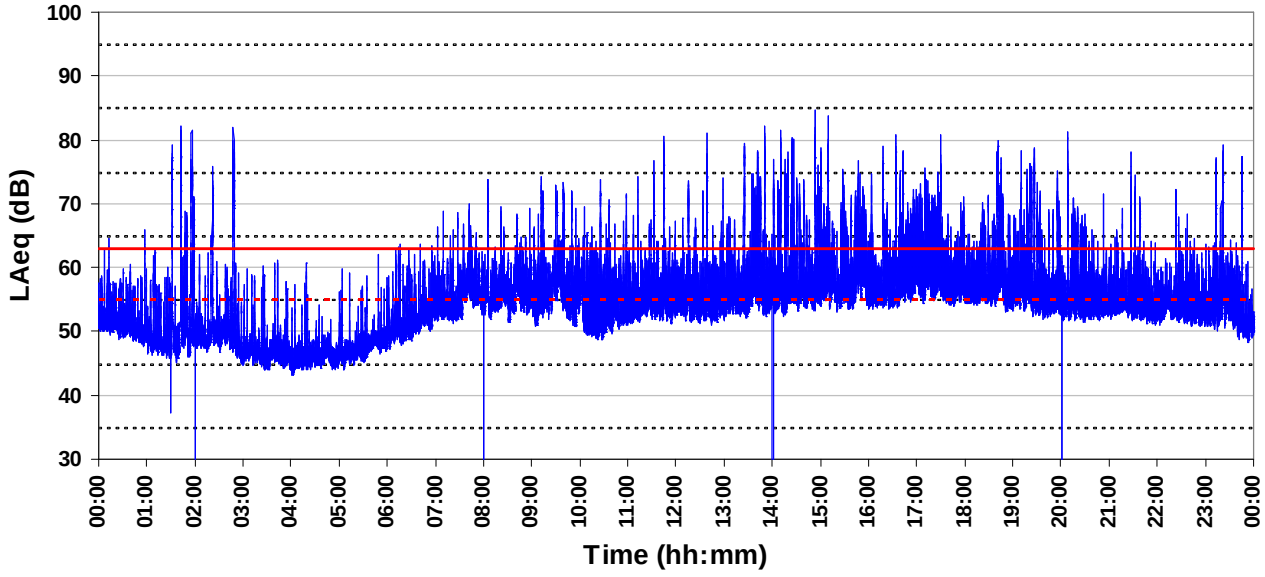

Figure 13 Noise Levels 7/30/08 - RMT 18

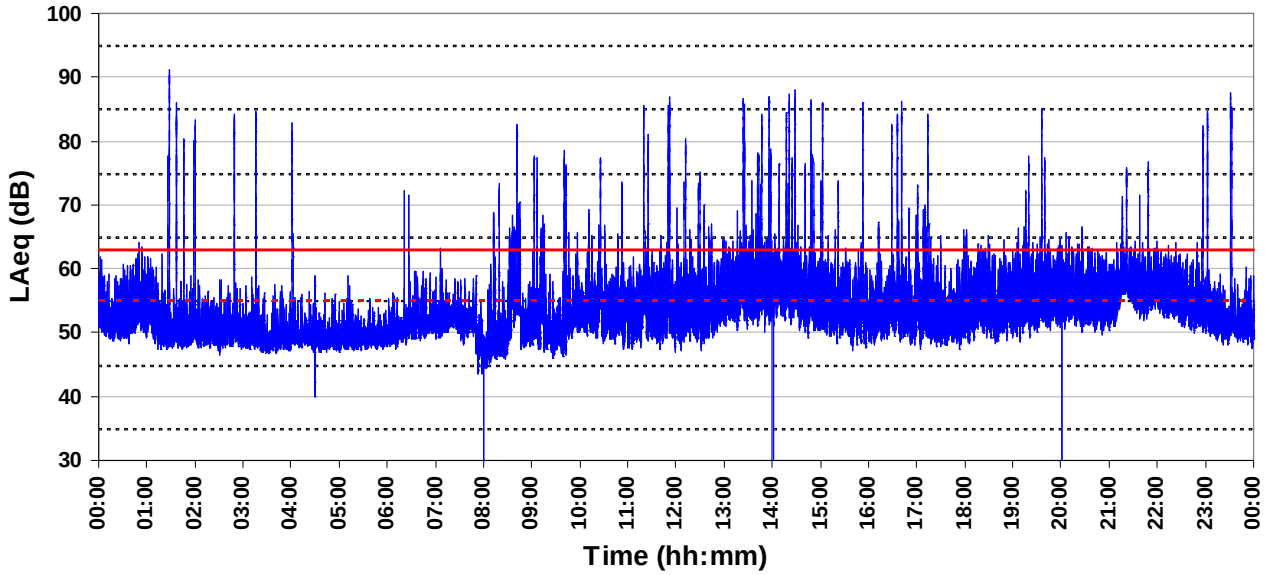

Figure 14 Noise Levels 7/23/08 - RMT 19