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# TECHNICAL MEMORANDUM

| | |
|---|---|
| To: | Ms. Monica Newhouse<br>Airport Noise Program Manager<br>Sacramento International Airport<br>6900 Airport Boulevard<br>Sacramento, CA 95837 |
| From: | Gene Reindel<br>Robert Behr |
| Date: | June 24, 2004 |
| Subject: | Noise Measurements and Analysis of Nighttime (10 pm – 7 am) UPS Flights Along the ILS Approach Corridor to Mather Airport |
| Reference: | HMMH Job Number 297880.006 |

**Introduction**

At the request of the Sacramento County Airports System (SCAS), Harris Miller Miller & Hanson Inc. (HMMH) assisted with nighttime (10 pm – 7 am) aircraft noise measurements from April 26, 2004 to May 24, 2004 along the Runway 22L ILS approach corridor to Mather Airport.

The objective of this measurement program was to: (1) establish baseline nighttime arrival noise levels for UPS Boeing 757 aircraft on standard approaches for the first 14 days and (2) measure noise from UPS Boeing 757 aircraft on Continuous Descent Approaches (CDA) at night for the following 14-day period. Unfortunately, UPS reported only two CDA attempts during the second 14-day measurement period with neither of the approaches conforming to UPS-desired CDA profile. As a result, UPS delayed further testing until refinements of the UPS-Mather CDA can be achieved.

This memorandum reviews the data collected for the nighttime UPS Boeing 757 aircraft arrivals and compares these data to the previously acquired UPS 757 arrival noise data to establish the baseline for future tests of the CDA at Mather Airport.

Appendix A is a brief summary of noise terminology used in this memorandum that may be beneficial for those not familiar with the metrics used.

**Noise Measurements**

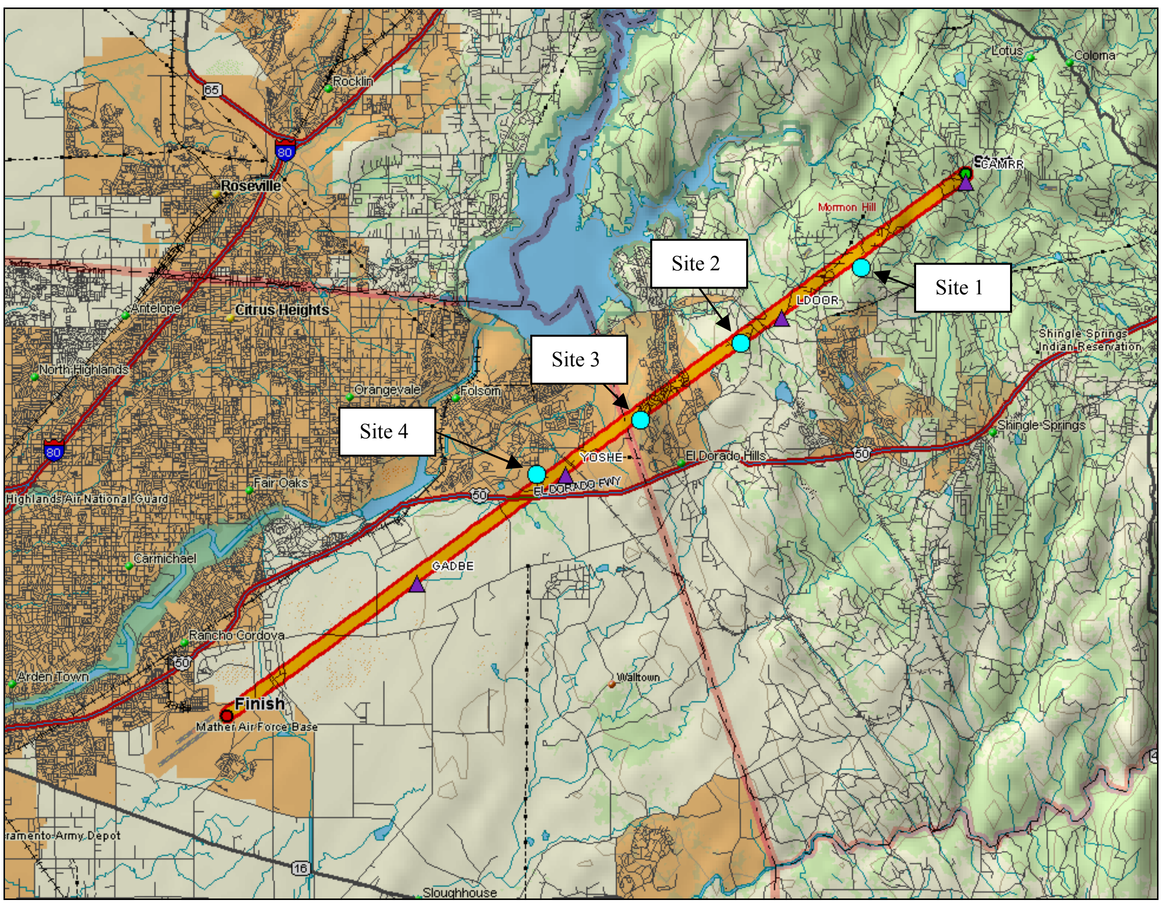
SCAS and HMMH used one SCAS Larson Davis 870 noise monitor and three HMMH Larson Davis 820 noise monitors. Three of the four monitors were placed at the same locations as the February 2003 noise measurements. Site 1 was at a different location, at the request of the resident, which was approximately 2,200 feet east of the previous site and approximately 130 feet lower in elevation. Table 1 lists the exact locations of these sites and Figure 1 shows the sites' relationships to the ILS approach course.

The noise monitors were set up midday on April 26, 2004 and collected data through the morning of May 24, 2004. Data collected included one-second equivalent sound levels (Leq), daily 24-hour Community Noise Equivalent Levels (CNEL), single event maximum sound levels (Lmax), and single event noise exposure levels (SENEL). SCAS and HMMH personnel set the single-event detection threshold approximately 10 decibels (dB) above the ambient level at each site, which is consistent with our previous arrival noise measurement efforts. SCAS and HMMH personnel performed daily servicing and acoustic calibration of each noise monitor.

**Table 1: Mather Airport Approach Corridor Measurement Site Data**

| Site | Address | Approx. Coordinates | Approx. Elevation (MSL) | Approx Distance to Threshold Rwy 22L (nm) | Approx. 3-Degree Glide Slope Altitude (ft) |
|---|---|---|---|---|---|
| 1 | Bertana Ct/Lazy Knoll Ct<br>Rescue, CA | N38-43.549<br>W120-58.744 | 1,510 feet | 17.30 | 5,600 |
| 2 | 2280 Ethel Dr<br>El Dorado County, CA | N38-41.868<br>W121-02.586 | 1,260 feet | 13.87 | 4,417 |
| 3 | 354 Glen Ridge Ct<br>El Dorado Hills, CA | N38-40.198<br>W121-05.381 | 1,010 feet | 11.17 | 3,557 |
| 4 | 2305 Farndon Ct<br>Folsom, CA | N38-39.016<br>W121-08.291 | 336 feet | 8.55 | 2,722 |

**Figure 1: Noise Measurement Locations along the ILS Approach Corridor**



### Flight Tracks

The SCAS Aircraft Noise and Operations Monitoring System (ANOMS) collected flight track data of all aircraft arriving and departing Mather Airport during the noise measurement period. These data provided the aircraft altitudes and flight paths flown, which were then correlated with the recorded noise data for each measurement site.

### Data Analysis

Table 2 shows by measurement site the number of noise events that were detected and correlated to each UPS aircraft for the February 2003 and April-May 2004 measurement periods.

**Table 2: Number of Correlated Nighttime UPS Boeing 757 Aircraft Arrivals**

| Site | B757 Arrival February 2003 | B757 Arrival April-May 2004 |
|---|---|---|
| 1 | 12 | 29 |
| 2 | 12 | 30 |
| 3 | 14 | 31 |
| 4 | 14 | 32 |

#### *Single Event Data*

Using the ANOMS operations data and the noise monitor event and one-second Leq data, SCAS and HMMH correlated the noise and operations data to derive the Lmax and SENEL for each aircraft operation. The tables in Appendix B list all of the nighttime arrivals of UPS jet air cargo aircraft in the vicinity of the noise monitoring sites during the measurement period along with the noise data correlated to each arrival.

As discussed in Appendix A, Lmax is the maximum sound level of a particular noise event and corresponds to the loudest sound detected by the human ear for that event. SENEL, on the other hand, is a computed value that incorporates the duration of the noise event above a set threshold level. SENEL is not heard, but calculated to determine the total sound energy of an event. Two events with identical Lmax values may produce very different SENEL values. For example, the noise of a gunshot and a passing aircraft may have the same Lmax, but the aircraft event lasts over a longer period of time and has a higher SENEL. The SENEL allows us to compare noise events based on our impressions of sound with higher SENEL values likely to be more annoying. Figures 2 and 3 show the measured ranges and averages of Lmax and SENEL at each noise measurement site for those correlated UPS nighttime flights during the February 2003 and April-May 2004 periods.

To further refine the distance to each aircraft, SCAS conducted a point-of-closest-approach analysis to derive the slant range distance from the measurement site to the aircraft. For each measurement site, Figures 4-11 show the Lmax and SENEL for the UPS nighttime flights as a function of the slant range distance for the two measurement periods. Figures 12-19 display samples of the sound levels at each site during a four-hour period of the night with annotations indicating UPS aircraft overflights as well as any known unusual non-aircraft noise sources.

***Comparison of Measurements in February 2003 and April-May 2004***

As shown in Figures 4-11, the slant ranges and Lmax and SENEL values are fairly consistent between the two measurement periods. In Figures 4 and 5, the differences in slant ranges at Site 1 are due primarily to the change in location and elevation of the measurement site as a result of a homeowner request to relocate the site.

There were two arrivals that attempted the CDA: (1) UPS 958 on May 11, 2004 and (2) UPS 956 on May 12, 2004. UPS judged these attempts to be unsatisfactory CDAs. However, for purposes of this report, we compared the noise measurements acquired at the monitoring locations for these two arrivals with the other arrivals measured during April-May 2004. Due to the limited data and the fact that these CDA attempts were unsuccessful, we drew no conclusions from the comparison. Table 3 summarizes all of the nighttime UPS Boeing 757 measurements with the two CDA attempts listed separately.

**Table 3: Ranges and Averages of Lmax and SENEL Measured and Correlated to Nighttime UPS Boeing 757 Aircraft for April-May 2004**

| Site | Aircraft Arrivals | Lmax (dB) | | SENEL (dB) | | Aircraft Slant Range (ft) | |
|---|---|---|---|---|---|---|---|
| | | Range | Average | Range | Energy Average | Range | Average |
| 1 | All Arrivals | 50.6 – 66.2 | 58.8 | 57.7 – 75.4 | 71.1 | 4,657 – 7,579 | 5,517 |
| | UPS958 | | 51.4 | | 60.2 | | 5,286 |
| | UPS956 | | 57.1 | | 65.7 | | 5,500 |
| 2 | All Arrivals | 51.3 – 68.7 | 61.9 | 63.1 – 79.7 | 74.4 | 3,287 – 5,118 | 3,635 |
| | UPS958 | | 60.2 | | 70.3 | | 3,302 |
| | UPS956 | | 51.3 | | 63.1 | | 4,146 |
| 3 | All Arrivals | 57.3 – 73.4 | 64.8 | 67.4 – 83.6 | 75.0 | 2,722 – 4,023 | 3,018 |
| | UPS958 | | 61.0 | | 70.8 | | 2,889 |
| | UPS956 | | 57.3 | | 68.1 | | 4,023 |
| 4 | All Arrivals | 58.5 – 75.3 | 65.9 | 69.5 – 85.5 | 77.0 | 2,182 – 3,844 | 3,012 |
| | UPS958 | | 66.0 | | 76.1 | | 3,018 |
| | UPS956 | | 59.6 | | 70.2 | | 3,844 |

**Figure 2**

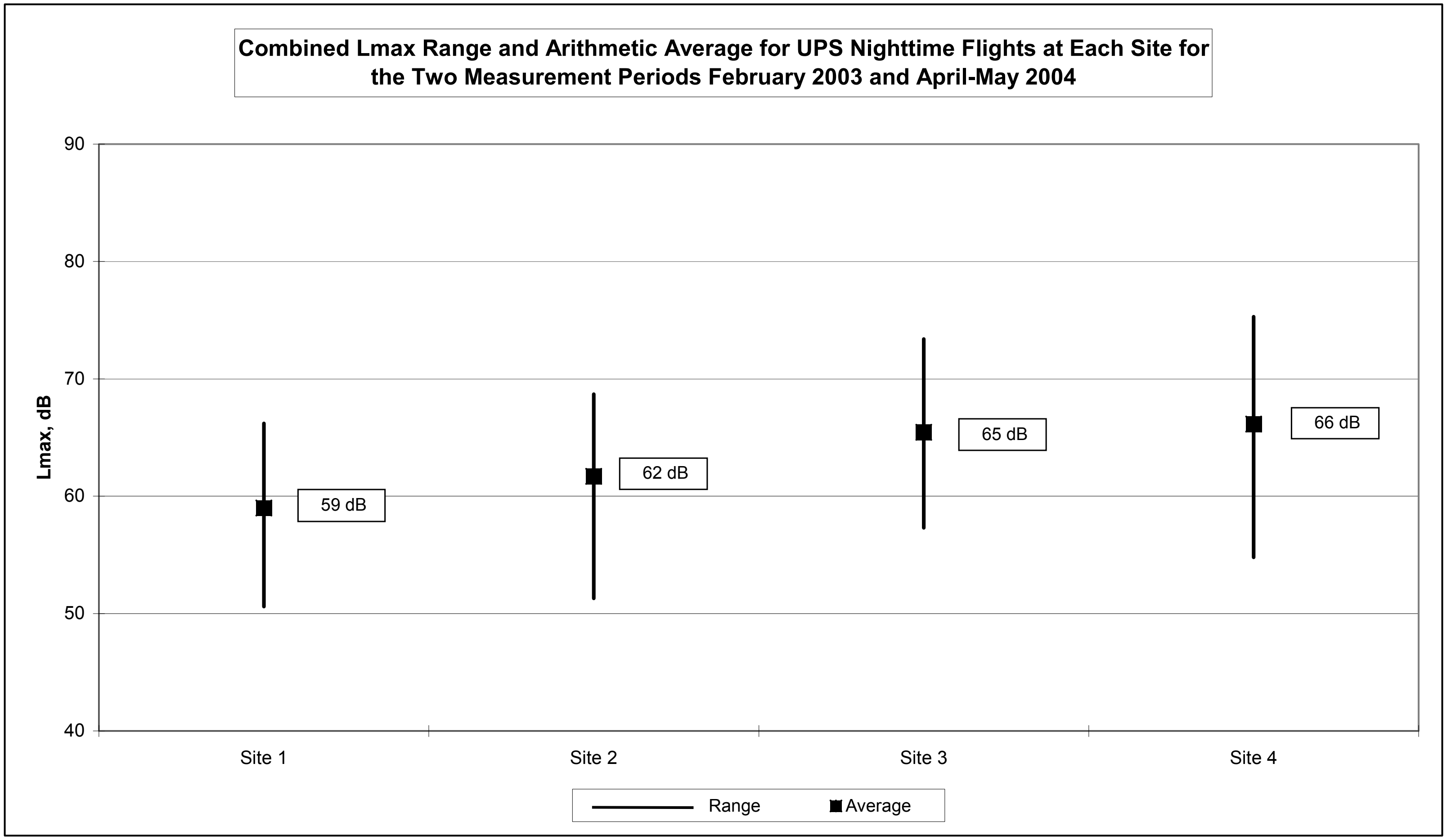

Combined Lmax Range and Arithmetic Average for UPS Nighttime Flights at Each Site for the Two Measurement Periods February 2003 and April-May 2004
Lmax, dB
90
80
70
60
50
40
59 dB
62 dB
65 dB
66 dB
Site 1
Site 2
Site 3
Site 4
Range
Average

**Figure 3**

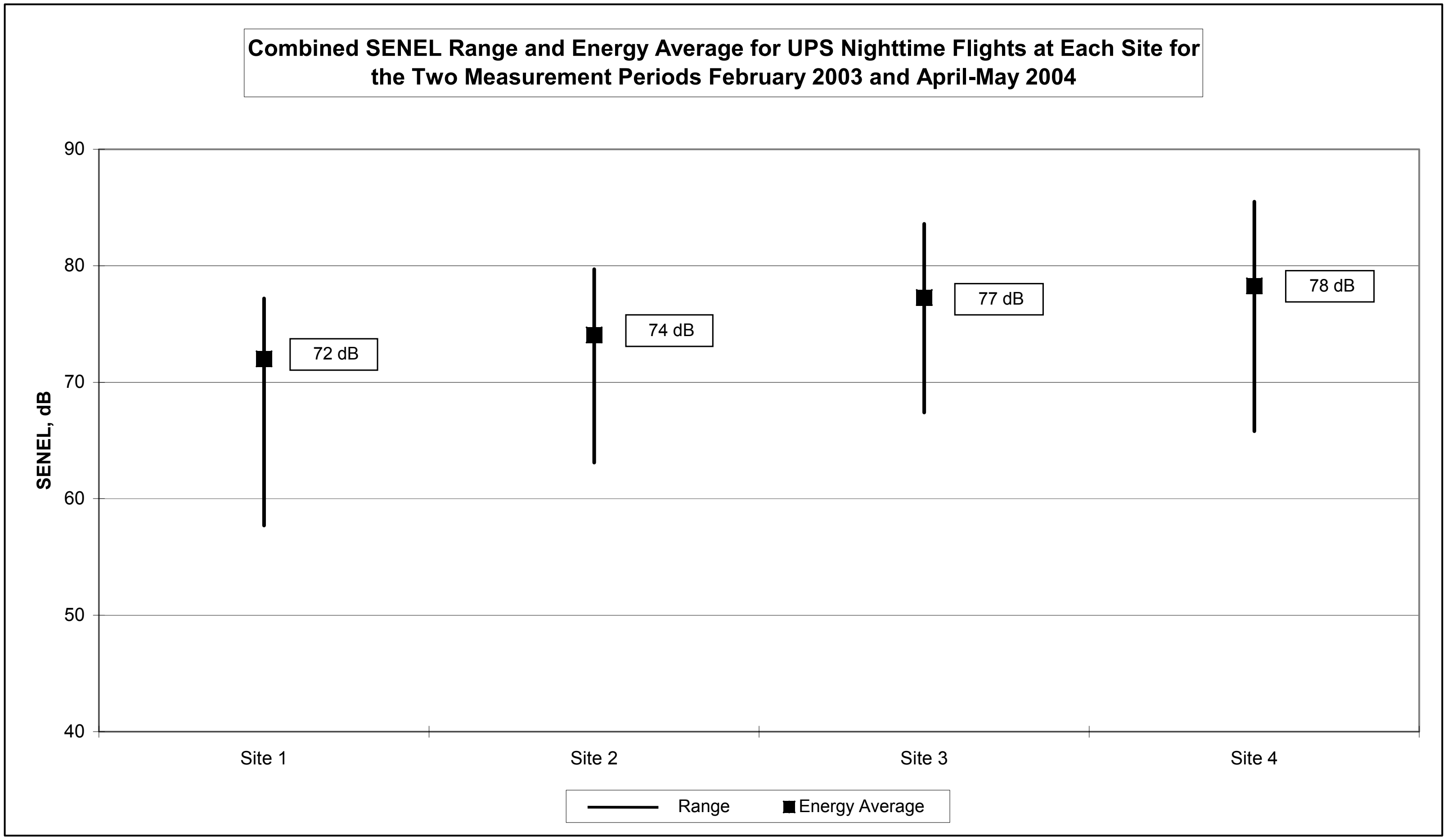

Combined SENEL Range and Energy Average for UPS Nighttime Flights at Each Site for the Two Measurement Periods February 2003 and April-May 2004
SENEL, dB
90
80
70
60
50
40
72 dB
74 dB
77 dB
78 dB
Site 1
Site 2
Site 3
Site 4
Range
Energy Average

**Figure 4**

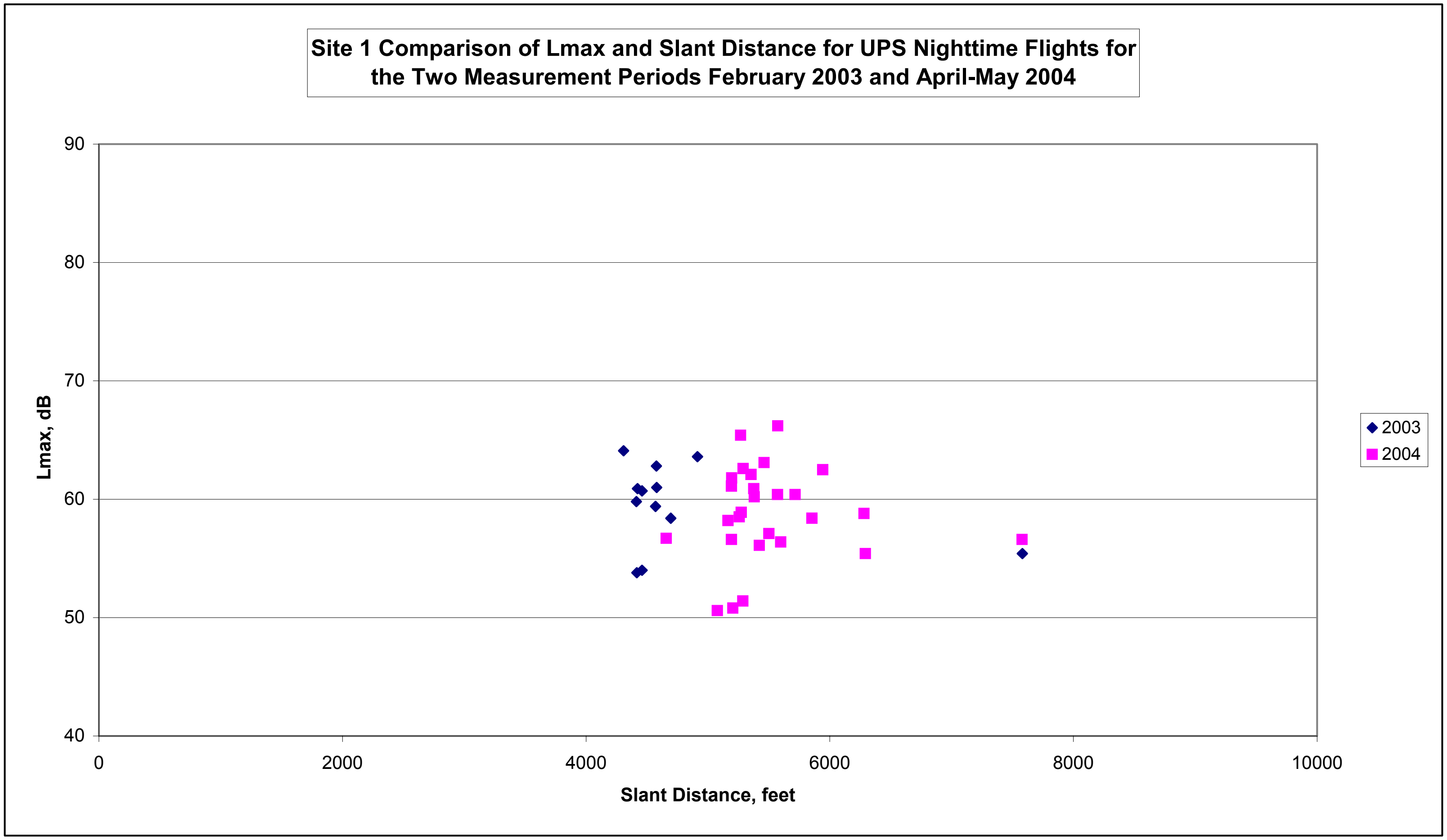

Site 1 Comparison of Lmax and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
90
80
70
60
50
40
Lmax, dB
0
2000
4000
6000
8000
10000
Slant Distance, feet
2003
2004

**Figure 5**

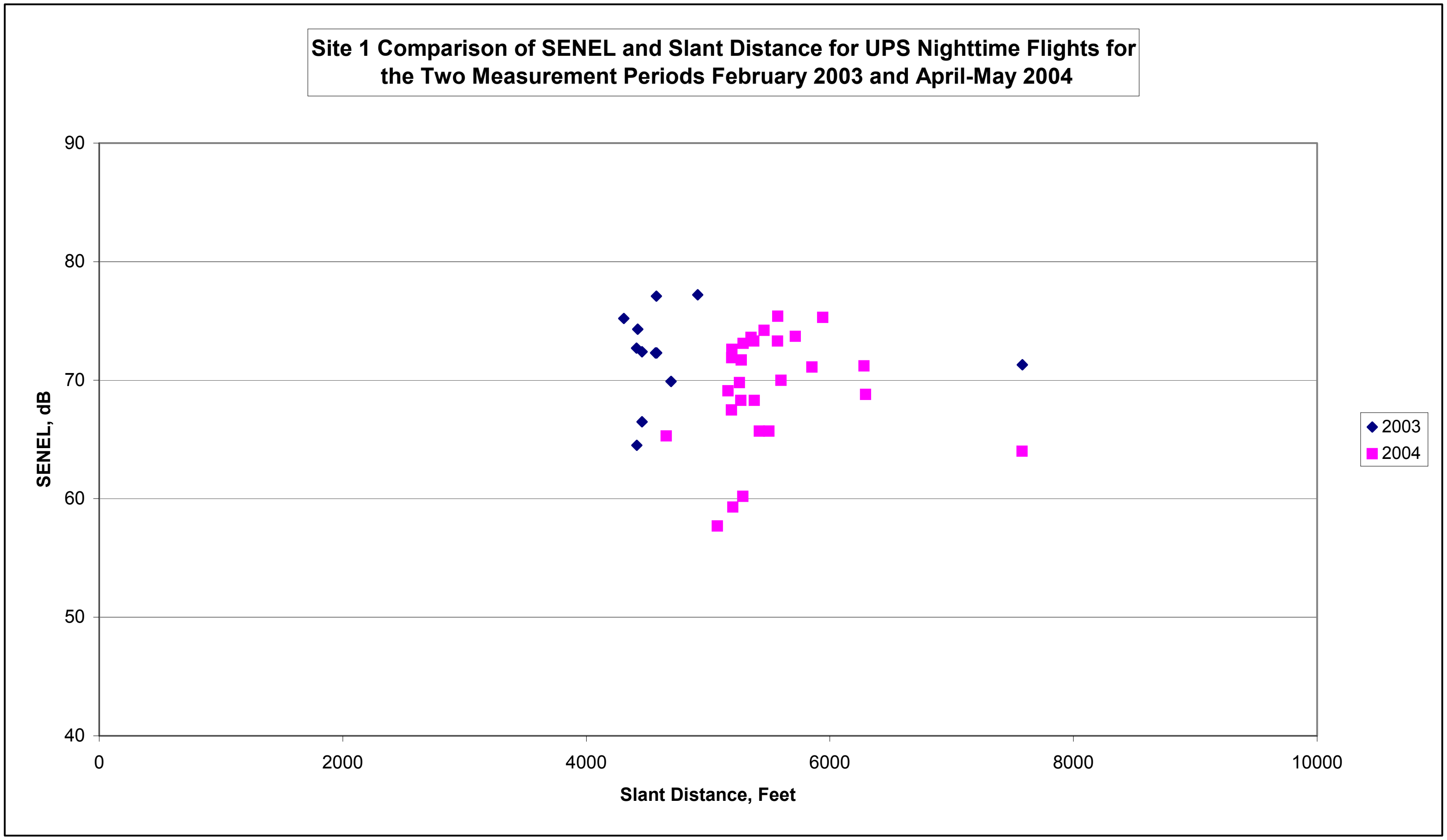

Site 1 Comparison of SENEL and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
SENEL, dB
90
80
70
60
50
40
0
2000
4000
6000
8000
10000
Slant Distance, Feet
2003
2004

**Figure 6**

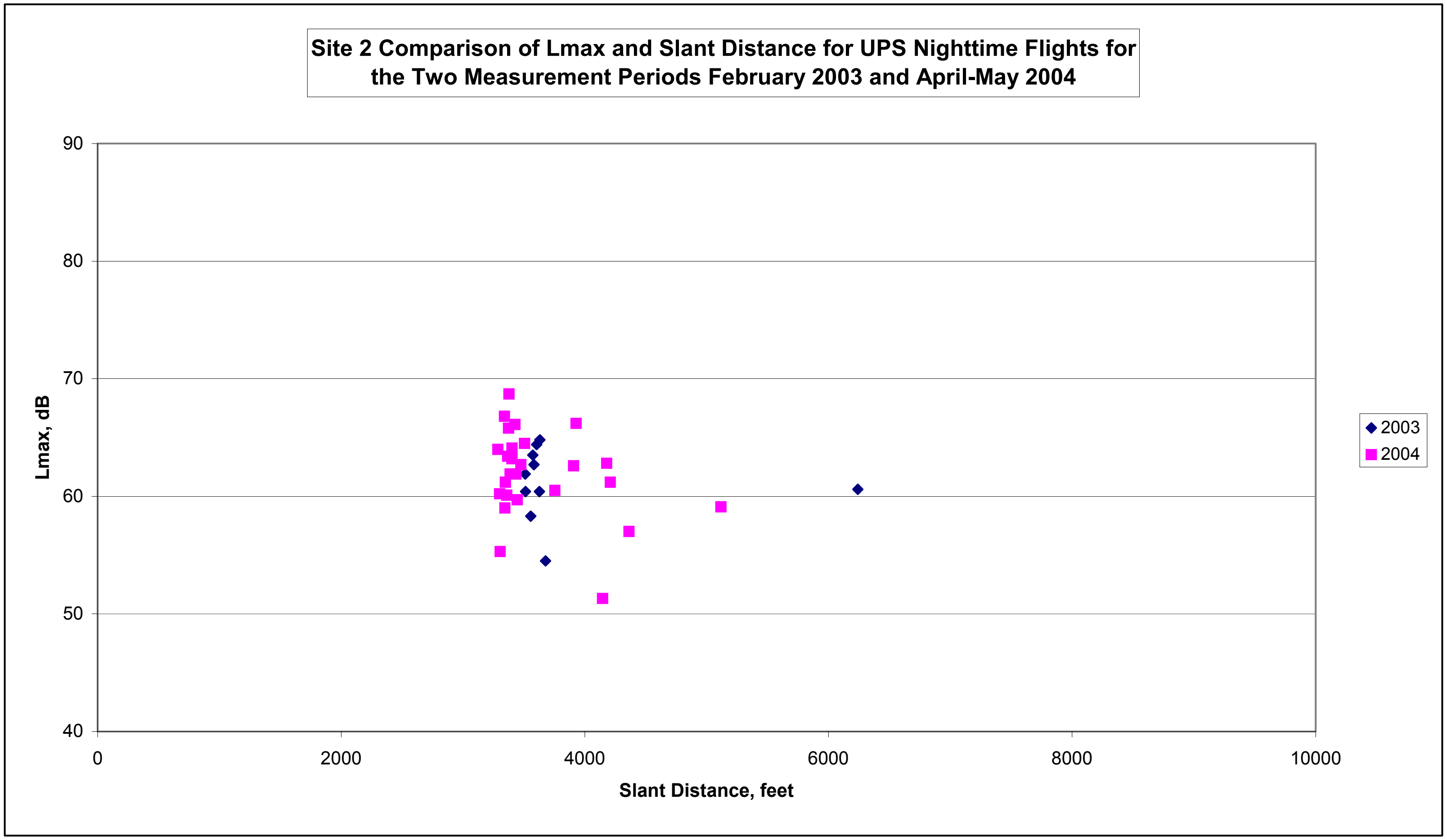

Site 2 Comparison of Lmax and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
90
80
70
60
50
40
Lmax, dB
0
2000
4000
6000
8000
10000
Slant Distance, feet
2003
2004

**Figure 7**

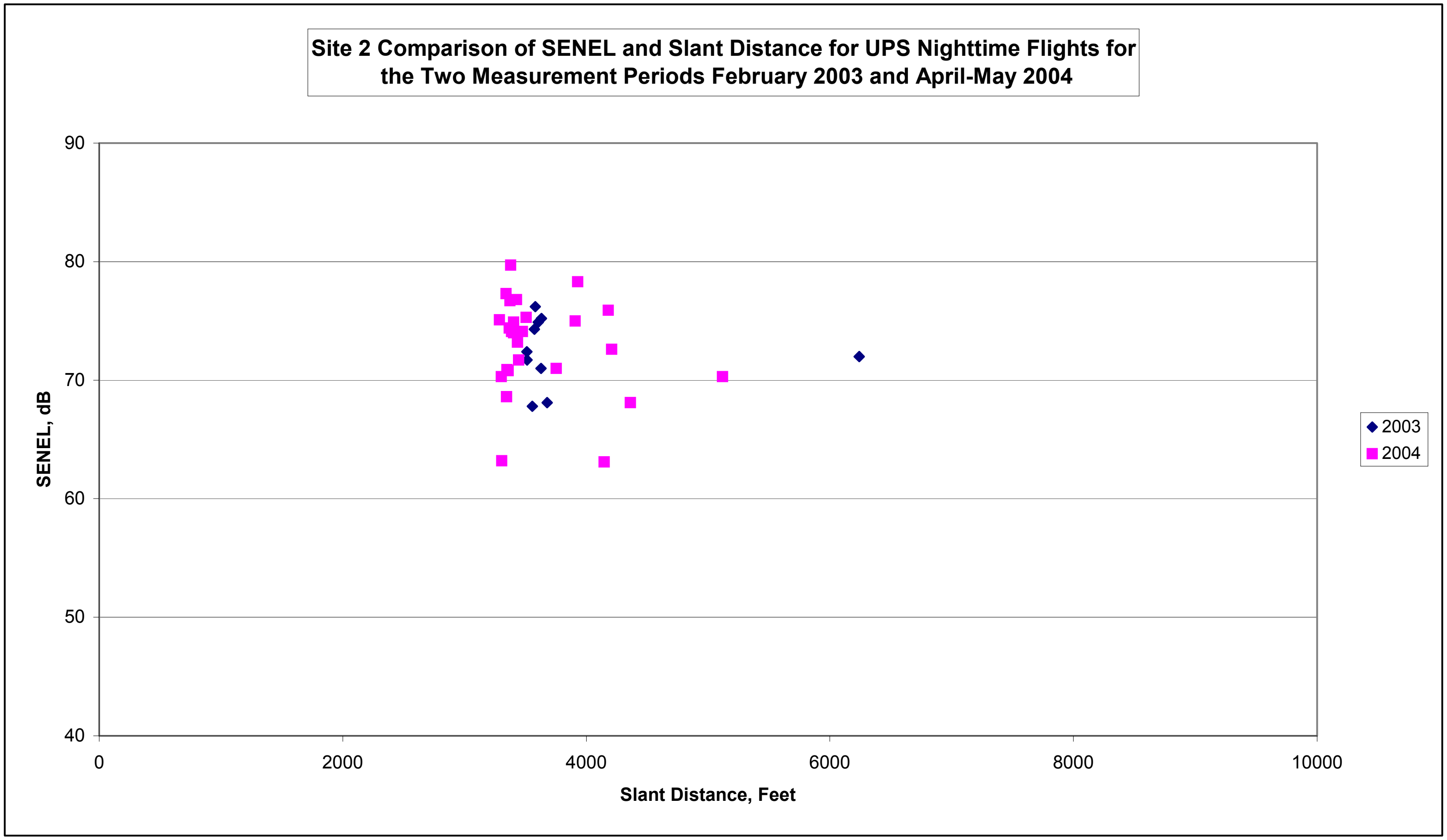

Site 2 Comparison of SENEL and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
90
80
70
60
50
40
SENEL, dB
0
2000
4000
6000
8000
10000
Slant Distance, Feet
2003
2004

**Figure 8**

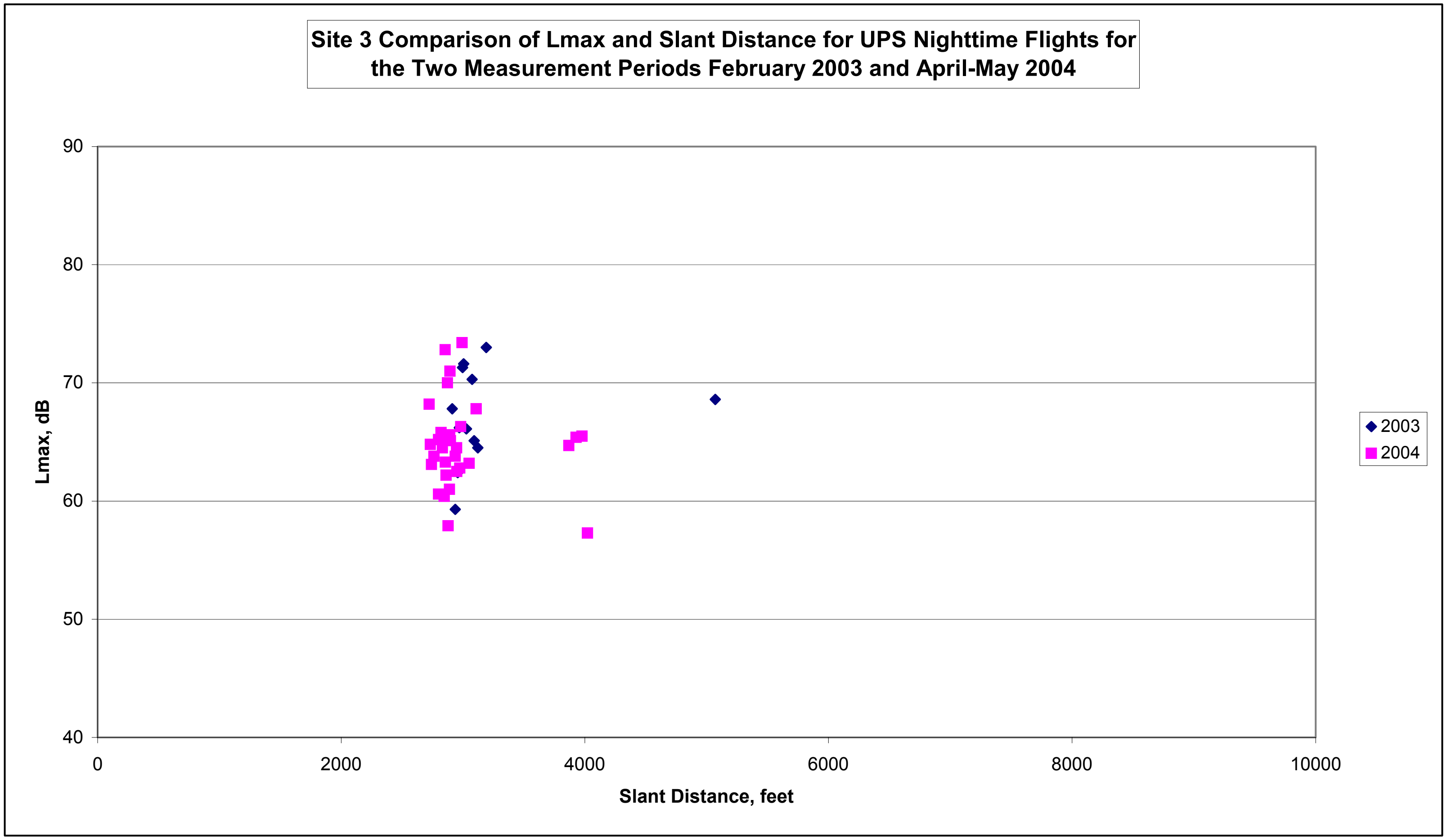

Site 3 Comparison of Lmax and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
Lmax, dB
90
80
70
60
50
40
0
2000
4000
6000
8000
10000
Slant Distance, feet
2003
2004

**Figure 9**

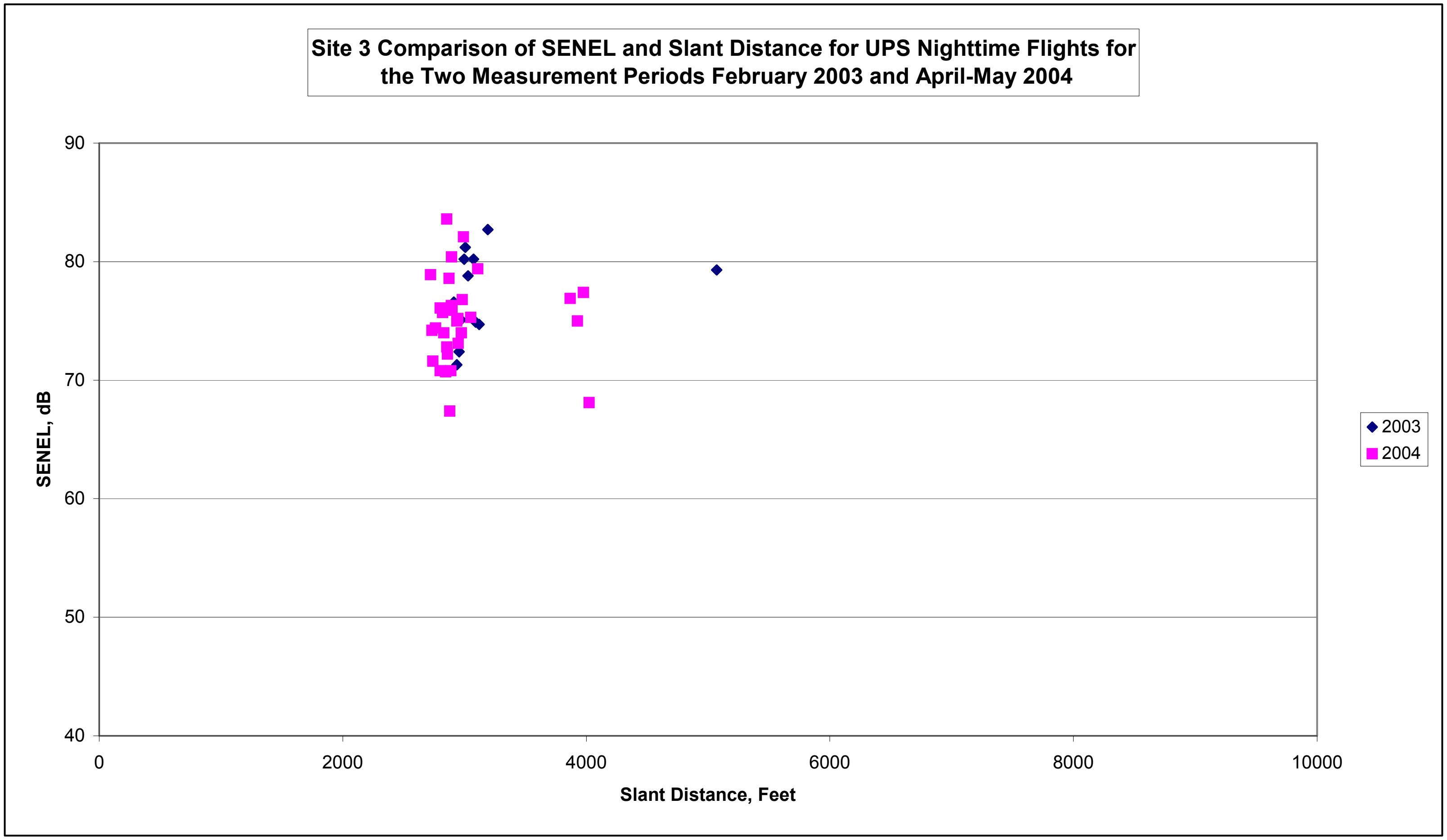

Site 3 Comparison of SENEL and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
SENEL, dB
90
80
70
60
50
40
0
2000
4000
6000
8000
10000
Slant Distance, Feet
2003
2004

**Figure 10**

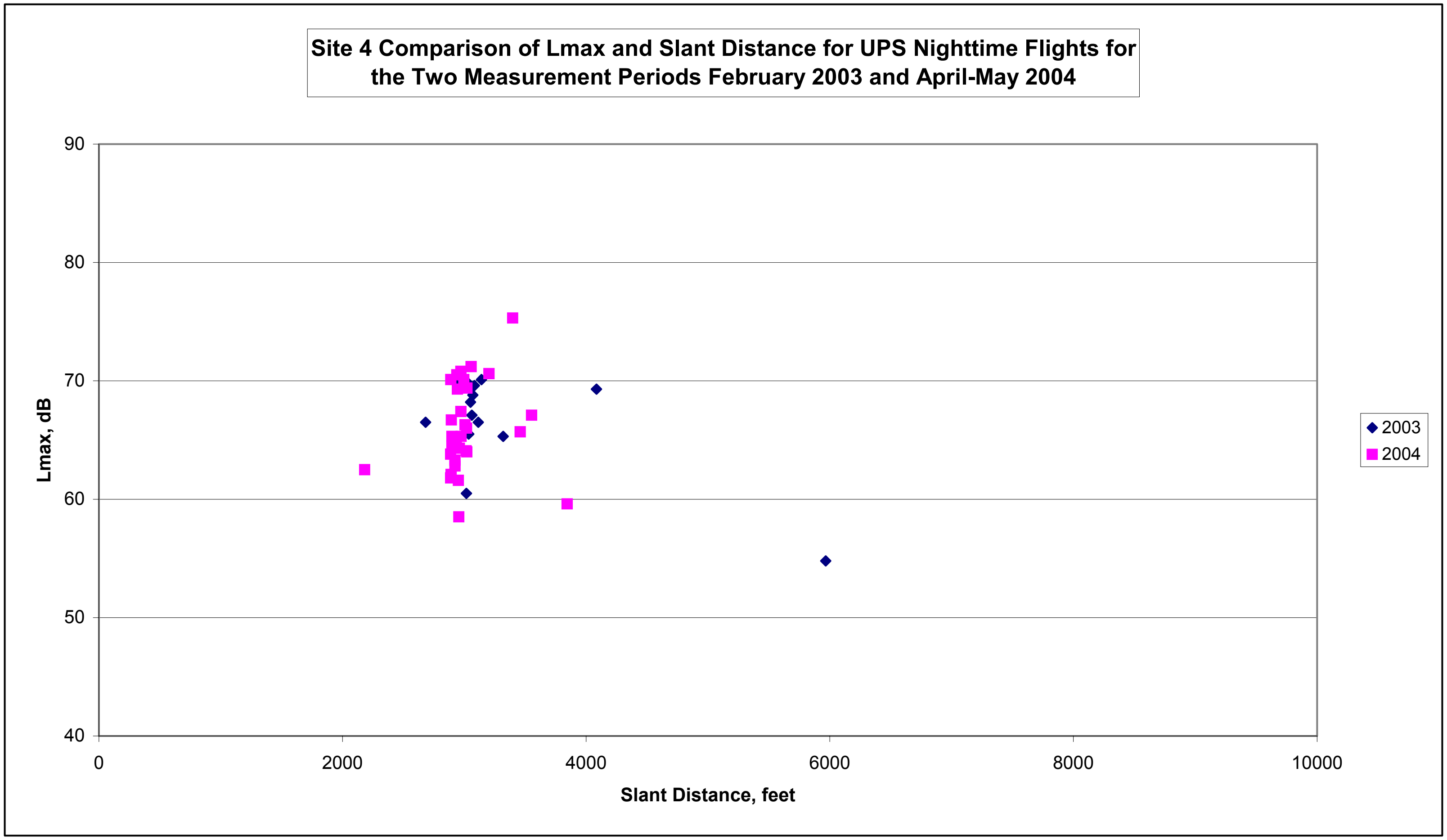

Site 4 Comparison of Lmax and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
90
80
70
60
50
40
Lmax, dB
0
2000
4000
6000
8000
10000
Slant Distance, feet
2003
2004

**Figure 11**

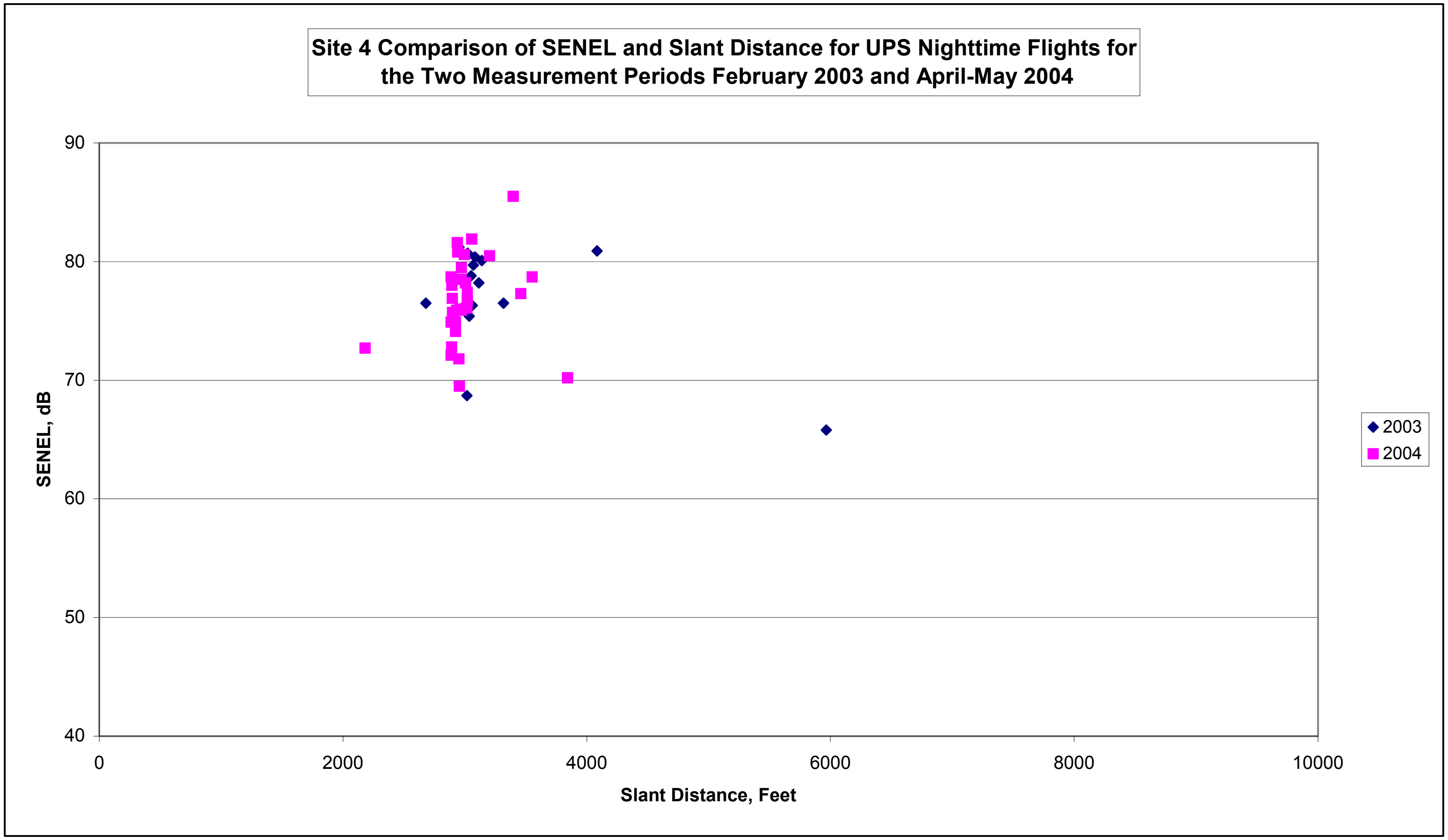

Site 4 Comparison of SENEL and Slant Distance for UPS Nighttime Flights for the Two Measurement Periods February 2003 and April-May 2004
90
80
70
60
50
40
SENEL, dB
0
2000
4000
6000
8000
10000
Slant Distance, Feet
2003
2004

**Figure 12**

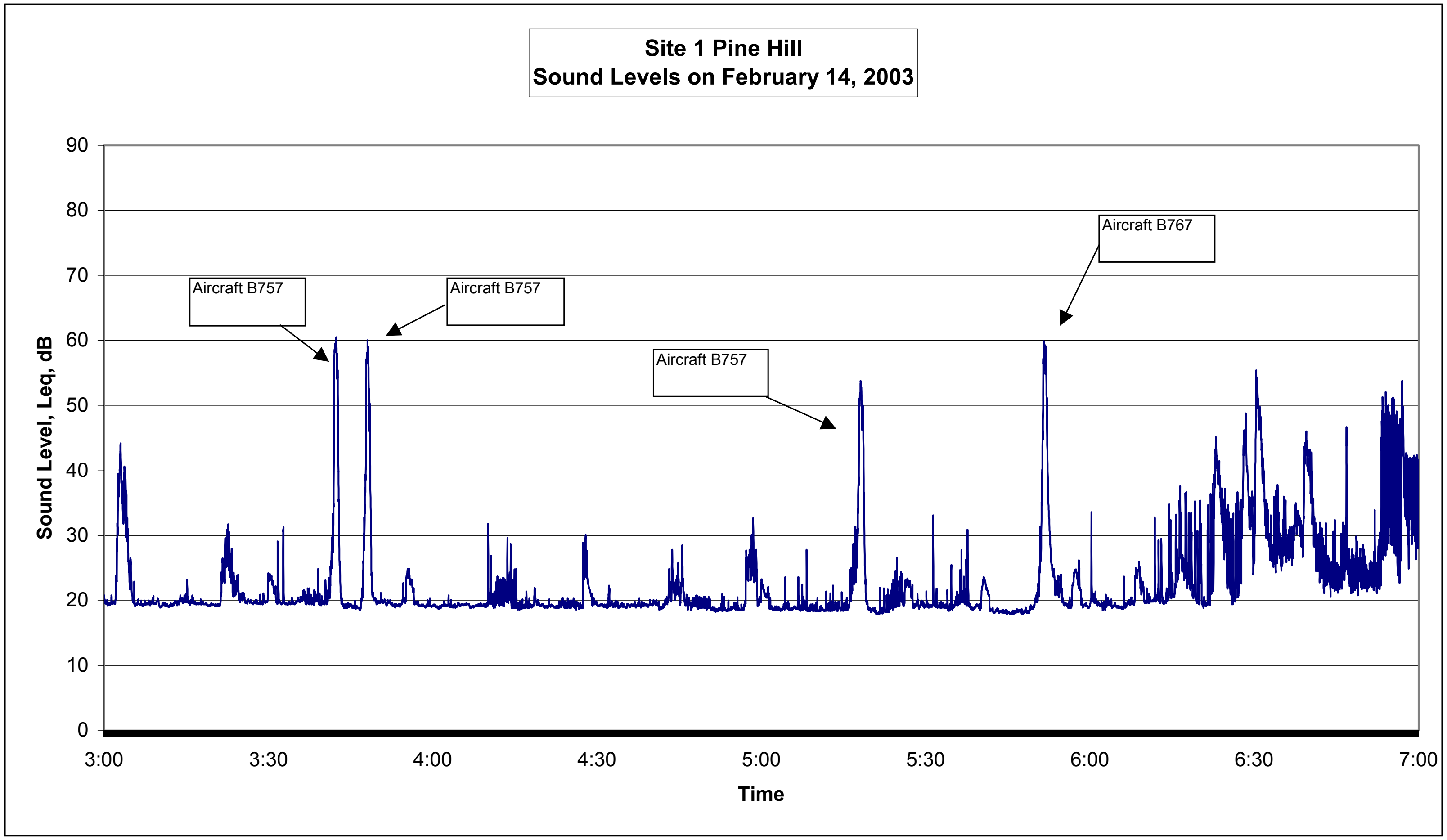

Site 1 Pine Hill
Sound Levels on February 14, 2003
Aircraft B757
Aircraft B757
Aircraft B757
Aircraft B767
Sound Level, Leq, dB
0
10
20
30
40
50
60
70
80
90
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 13**

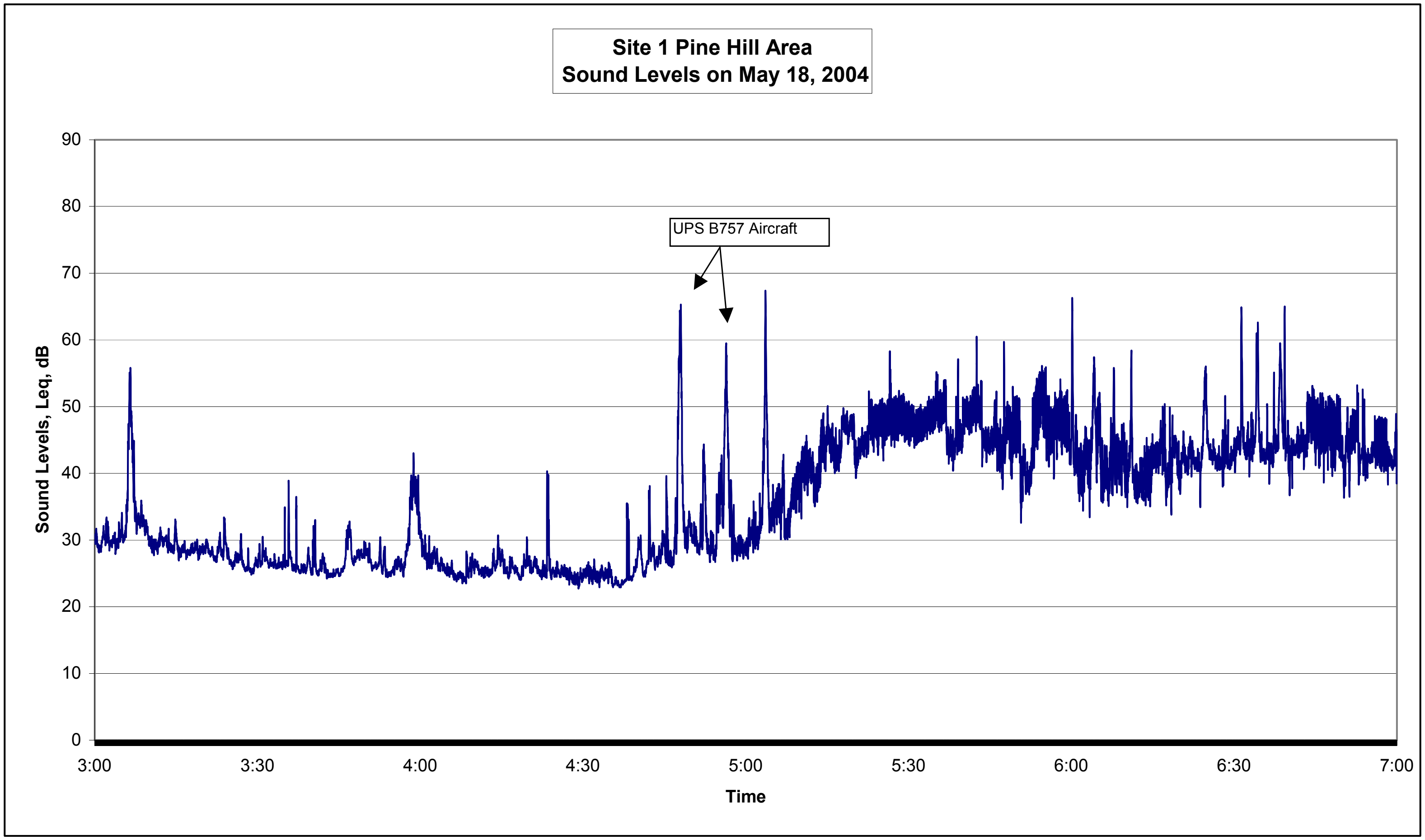

Site 1 Pine Hill Area
Sound Levels on May 18, 2004
UPS B757 Aircraft
Sound Levels, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 14**

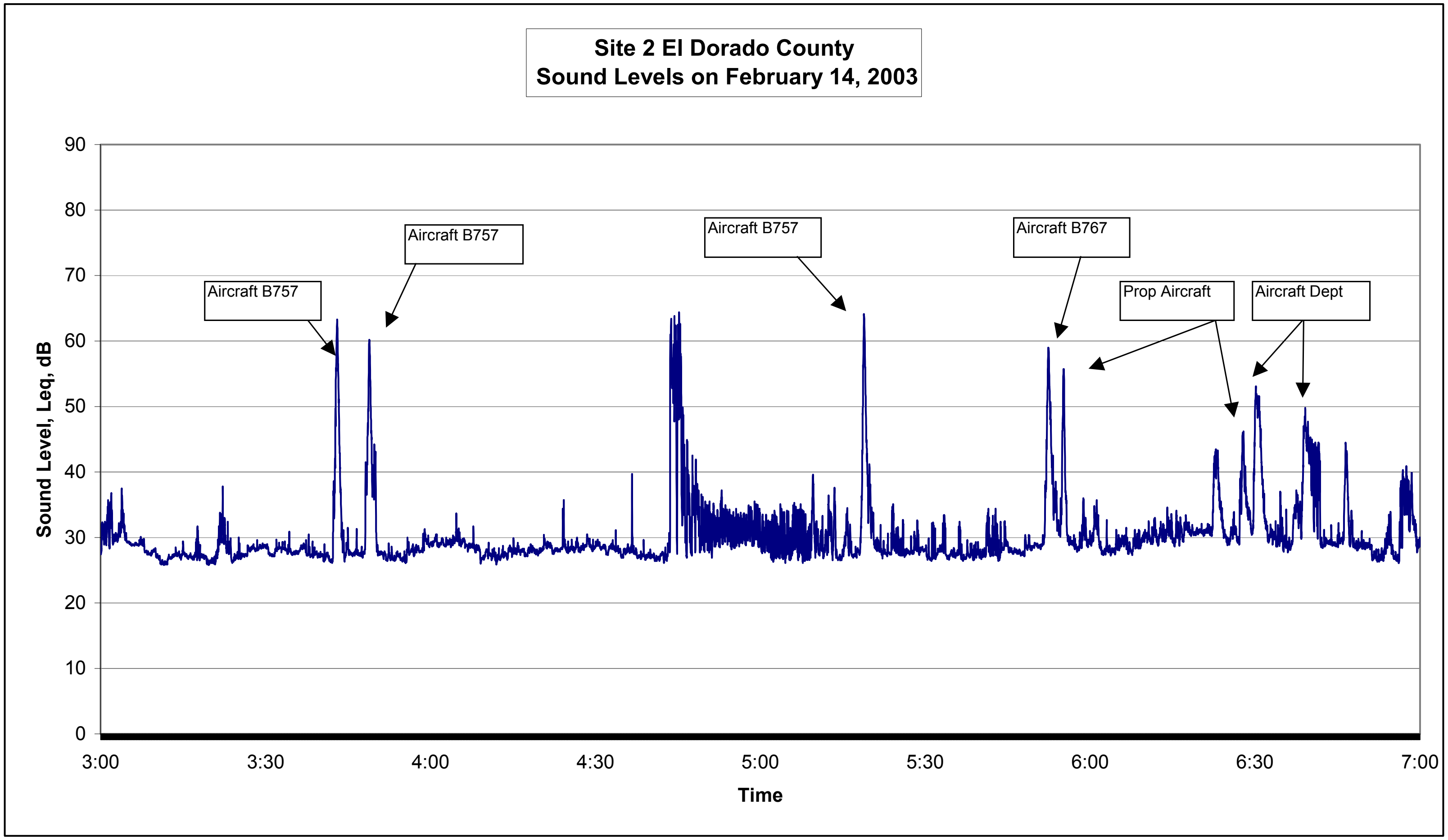

Site 2 El Dorado County
Sound Levels on February 14, 2003
Sound Level, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time
Aircraft B757
Aircraft B757
Aircraft B757
Aircraft B767
Prop Aircraft
Aircraft Dept

**Figure 15**

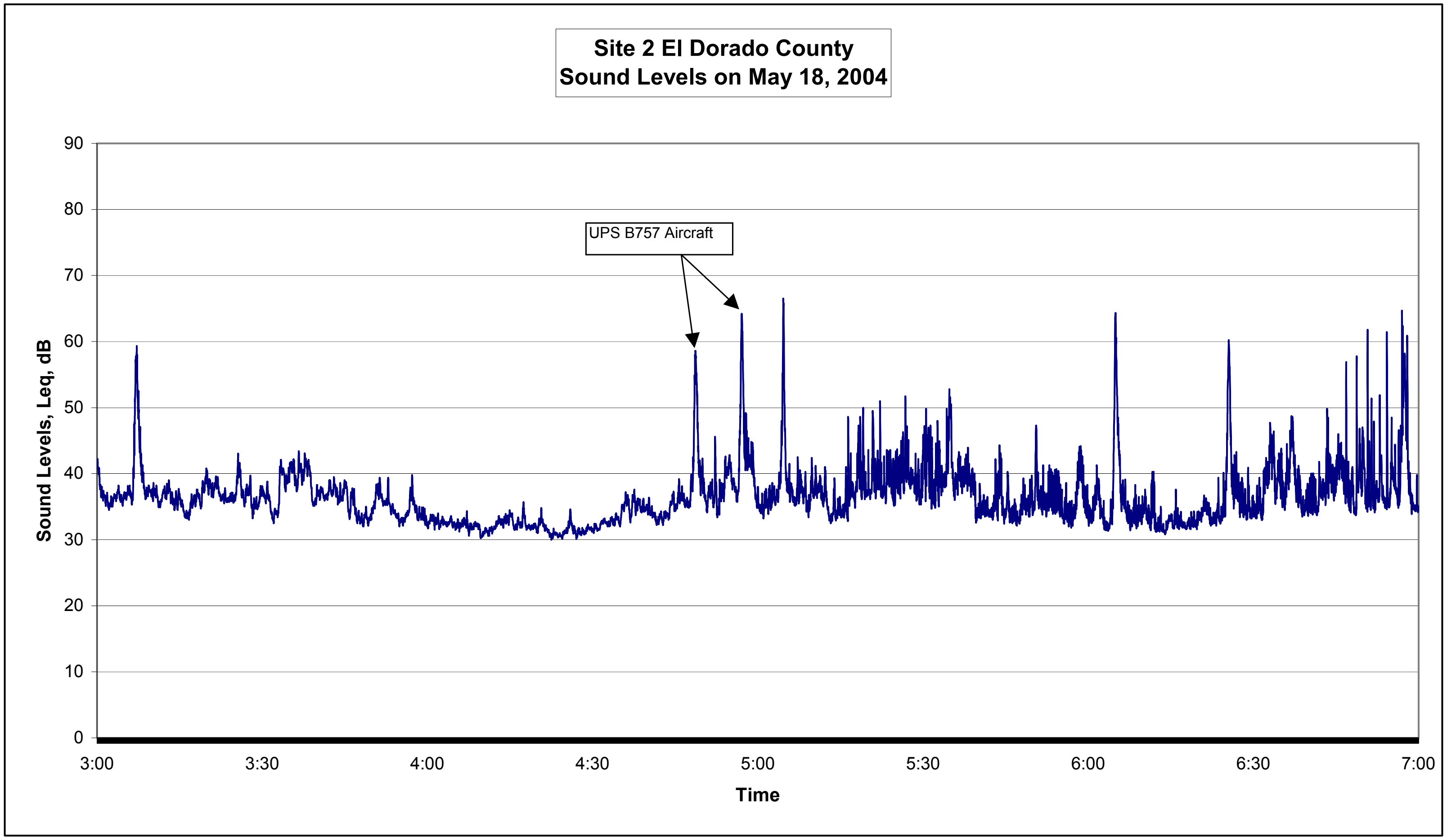

Site 2 El Dorado County
Sound Levels on May 18, 2004
UPS B757 Aircraft
Sound Levels, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 16**

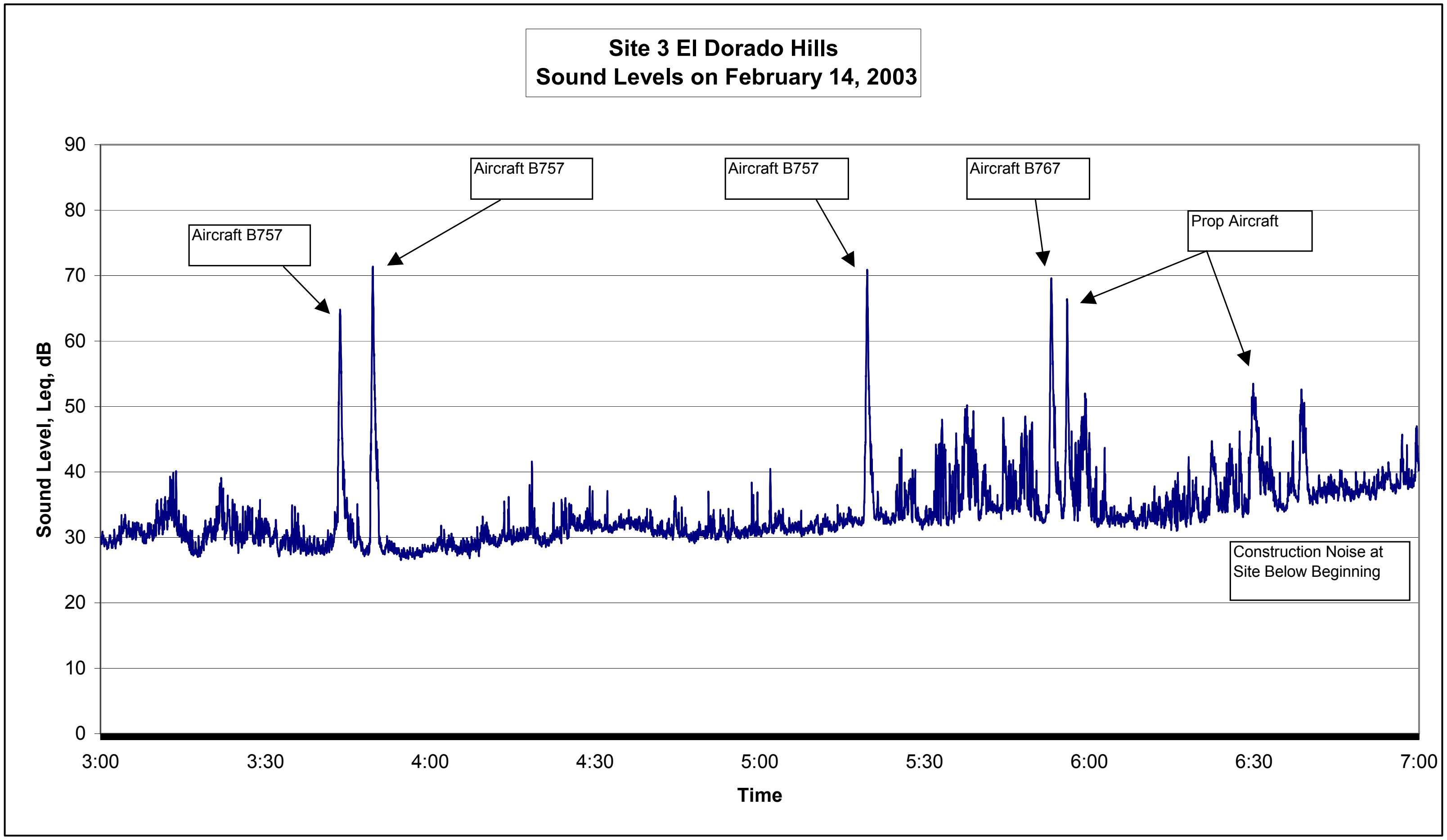

Site 3 El Dorado Hills
Sound Levels on February 14, 2003
Aircraft B757
Aircraft B757
Aircraft B757
Aircraft B767
Prop Aircraft
Construction Noise at Site Below Beginning
Sound Level, Leq, dB
0
10
20
30
40
50
60
70
80
90
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 17**

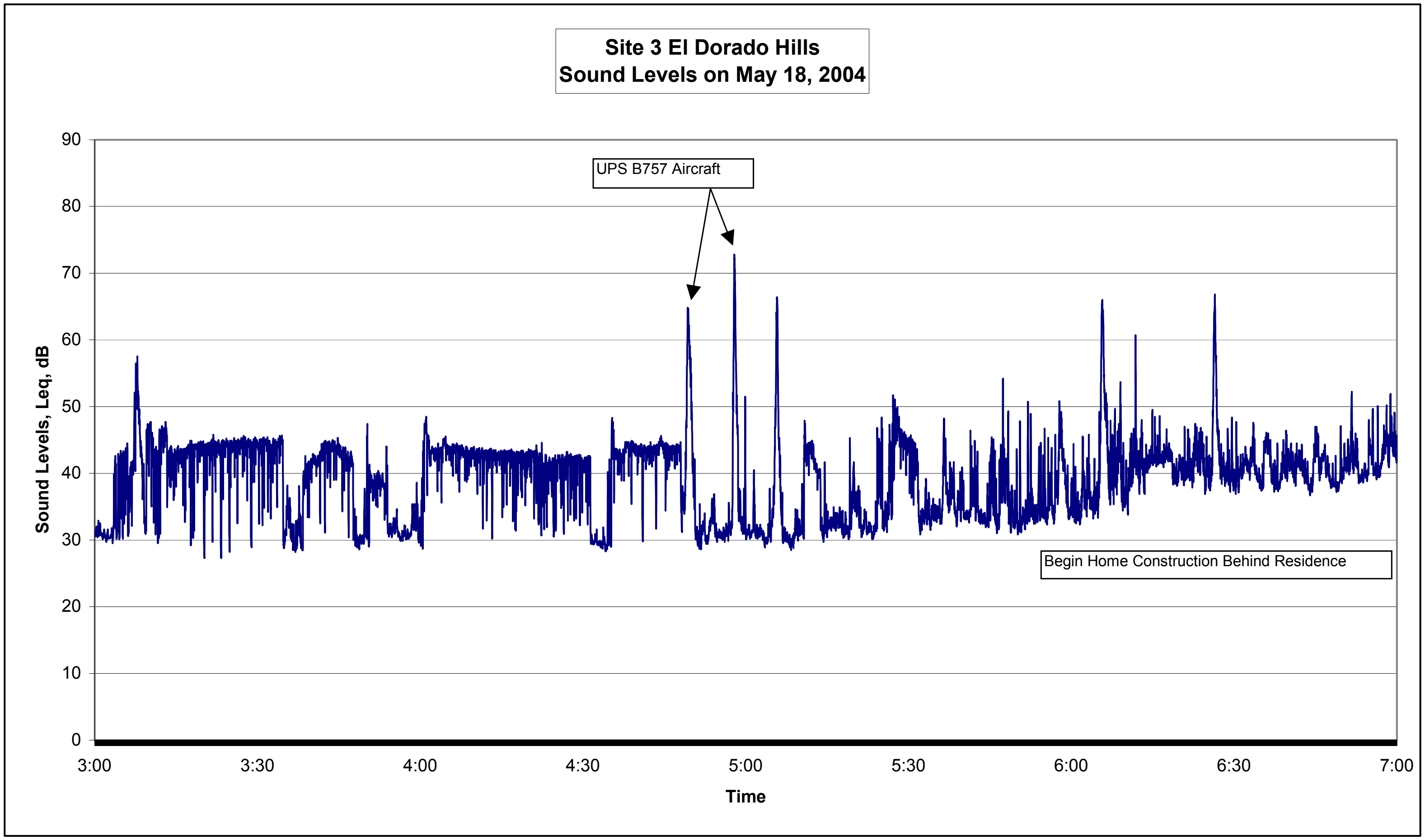

Site 3 El Dorado Hills
Sound Levels on May 18, 2004
UPS B757 Aircraft
Begin Home Construction Behind Residence
Sound Levels, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 18**

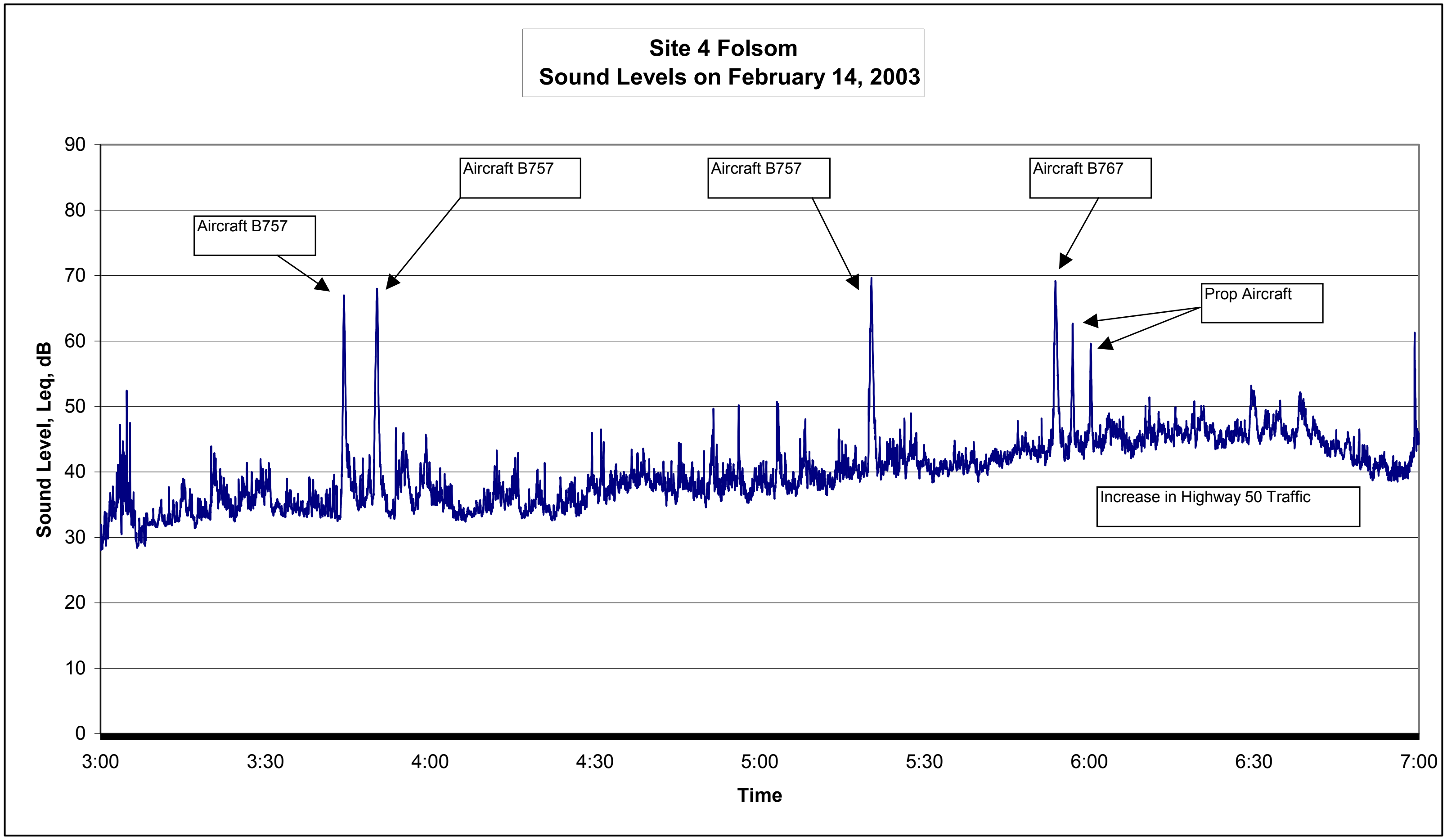
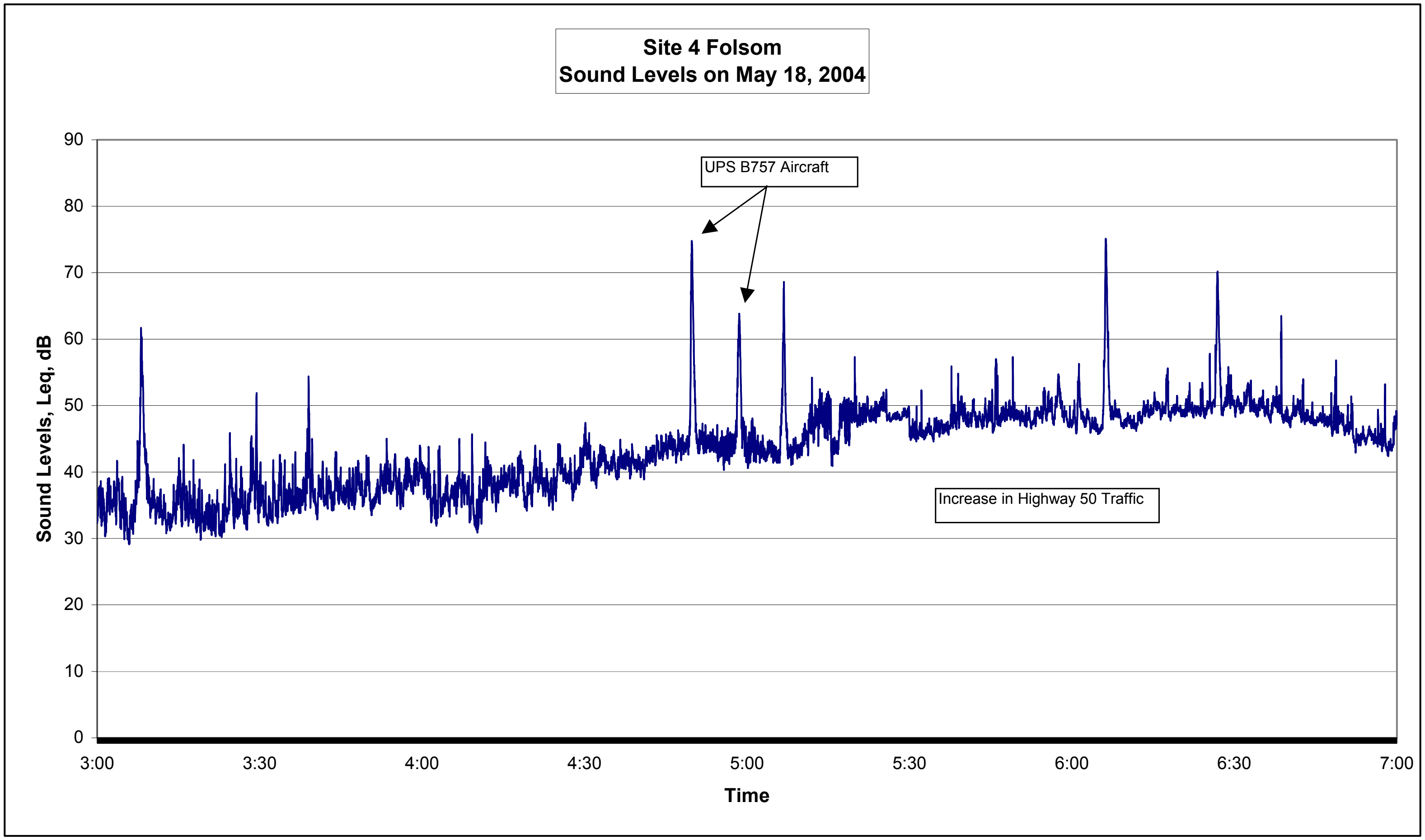

Site 4 Folsom
Sound Levels on February 14, 2003
Aircraft B757
Aircraft B757
Aircraft B757
Aircraft B767
Prop Aircraft
Increase in Highway 50 Traffic
Sound Level, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

**Figure 19**


Site 4 Folsom
Sound Levels on May 18, 2004
UPS B757 Aircraft
Increase in Highway 50 Traffic
Sound Levels, Leq, dB
90
80
70
60
50
40
30
20
10
0
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
7:00
Time

# APPENDIX A

## Aircraft Noise Terminology

To assist reviewers in interpreting the complex noise metrics used in evaluating airport noise, we present below an introduction to relevant fundamentals of acoustics and noise terminology.

### Introduction to Acoustics and Noise Terminology

Six acoustical descriptors of noise are introduced here in increasing degree of complexity:

- Decibel, dB;
- A-weighted decibel;
- Maximum Noise Level, Lmax;
- Single Event Noise Exposure Level, SENEL;
- Equivalent Sound Level, Leq; and
- Community Noise Equivalent Level, CNEL.

These noise metrics form the basis for the majority of noise analysis conducted at most airports throughout the U.S. In addition, a brief description of slant distance versus altitude is introduced.

### Decibel, dB

All sounds come from a sound source -- a musical instrument, a voice speaking, an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in sound waves -- tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear.

Our ears are sensitive to a wide range of sound pressures. Although the loudest sounds that we hear without pain have about one million times more energy than the quietest sounds we hear, our ears are incapable of detecting small differences in these pressures. Thus, to better match how we hear this sound energy, we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level.

Sound pressure levels are measured in decibels (or dB). Decibels are logarithmic quantities reflecting the ratio of the two pressures, the numerator being the pressure of the sound source of interest, and the denominator being a reference pressure (the quietest sound we can hear).

The logarithmic conversion of sound pressure to sound pressure *level* (SPL) means that the quietest sound that we can hear (the reference pressure) has a sound pressure level of about 0 dB, while the loudest sounds that we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels on the order of 30 to 100 dB.

Because decibels are logarithmic quantities, combining decibels is unlike common arithmetic. For example, if two sound sources each produce 100 dB operating individually and they are then operated together, they produce 103 dB -- not the 200 decibels we might expect. Four equal sources operating simultaneously produce another three decibels of noise, resulting in a total sound pressure level of 106 dB. For every doubling of the number of equal sources, the sound pressure level goes up another three decibels. A tenfold increase in the number of sources makes the sound pressure level go up 10 dB. A hundredfold increase makes the level go up 20 dB, and it takes a thousand equal sources to increase the level 30 dB.

If one noise source is much louder than another, the two sources operating together will produce virtually the same sound pressure level (and sound to our ears) that the louder source would produce alone. For example, a 100 dB source plus an 80 dB source produce approximately 100 dB of noise when operating together (actually, 100.04 dB). The louder source "masks" the quieter one. But if the quieter source gets louder, it will have an increasing effect on the total sound pressure level such that, when the two sources are equal, as described above, they produce a level three decibels above the sound of either one by itself.

Conveniently, people also hear in a logarithmic fashion. Two useful rules of thumb to remember when comparing sound levels are: (1) a 6 to 10 dB increase in the sound pressure level is sometime described to be about a doubling of loudness, and (2) changes in sound pressure level of less than about three decibels are not readily detectable outside of a laboratory environment.

**A-Weighted Decibel**

Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of the sound pressure oscillations as they reach our ear. When analyzing the total noise of any source, acousticians often break the noise into frequency components (or bands) to determine how much is low-frequency noise, how much is middle-frequency noise, and how much is high-frequency noise. This breakdown is important for two reasons:

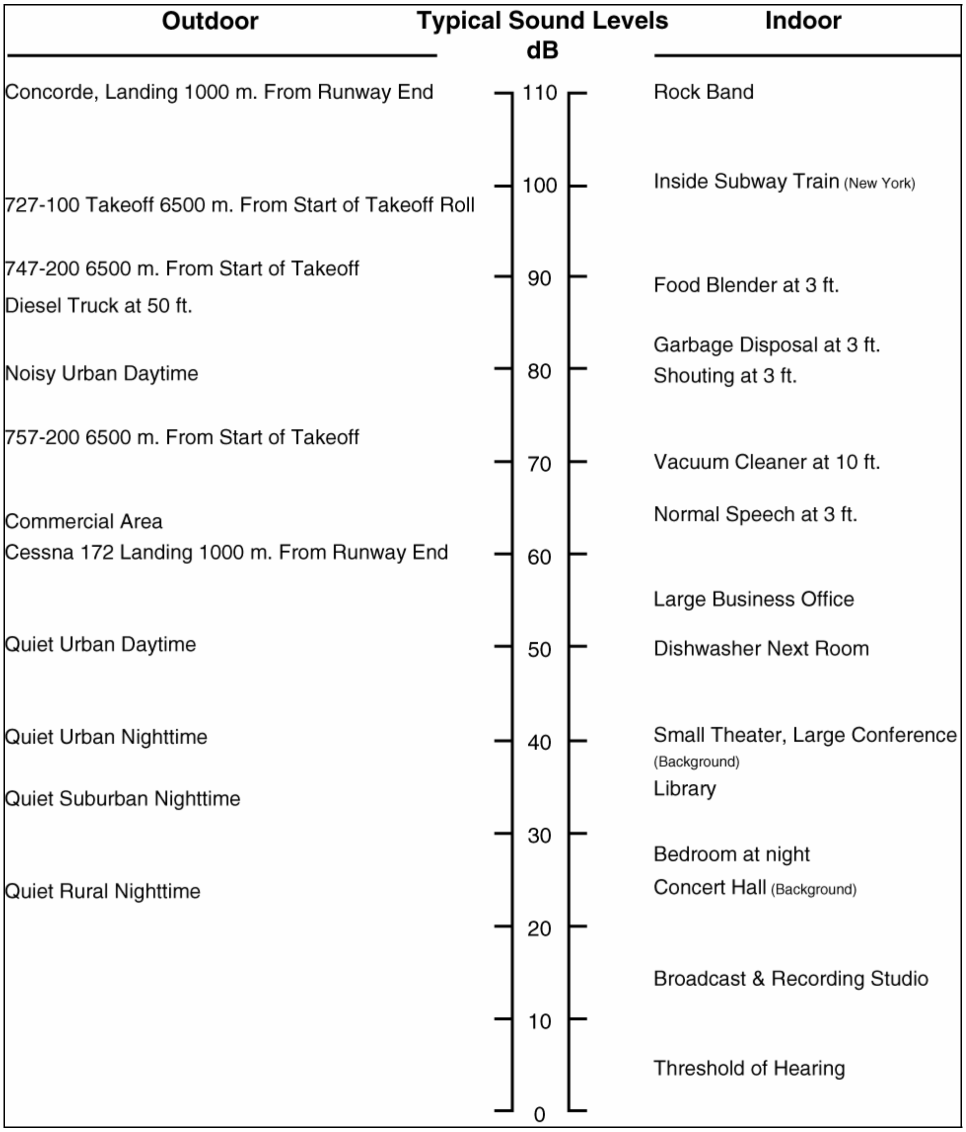
(1) People react differently to low-, mid-, and high-frequency noise levels. This is because our ear is better equipped to hear mid and high frequencies but is quite insensitive to lower frequencies. Thus, we find mid- and high-frequency noise to be more annoying.

(2) Engineering solutions to a noise problem are different for different frequency ranges. Low-frequency noise is generally harder to control.

The normal frequency range of hearing for most people extends from a low frequency of about 20 Hz to a high frequency of about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, typically around 1,000 to 2,000 Hz. Psycho-acousticians have developed several filters which roughly match this sensitivity of our ear and thus help us to judge the relative loudness of various sounds made up of many different frequencies. The so-called A-weighting network does this best for most environmental noise sources. Sound pressure levels measured through this filter are referred to as A-weighted sound levels (measured in A-weighted decibels).

The A-weighting network significantly discounts those parts of the total noise that occur at lower frequencies (those below about 500 Hz) and also at very high frequencies (above 10,000 Hz) where we do not hear as well. The network has very little effect, or is nearly "flat," in the middle range of frequencies between 500 and 10,000 Hz where our hearing is most sensitive. Because this network generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are judged to be louder than those with lower A-weighted sound levels, a relationship which otherwise might not be true. It is for this reason that A-weighted sound levels are normally used to evaluate environmental noise sources. Figure A.1 presents typical A-weighted sound levels of several common environmental sources.

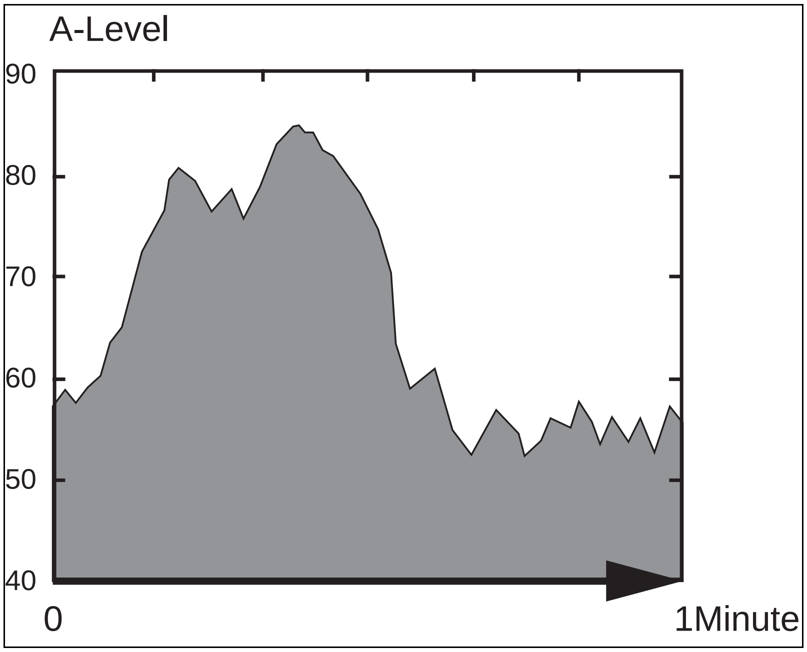
### FIGURE A.1 COMMON ENVIRONMENTAL SOUND LEVELS, IN dB



**Maximum Noise Level, Lmax**

An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance (though even the background varies as birds chirp, the wind blows, or a vehicle passes by). This is illustrated in Figure A.2.

**FIGURE A.2 VARIATION IN THE A-WEIGHTED SOUND LEVEL OVER TIME**



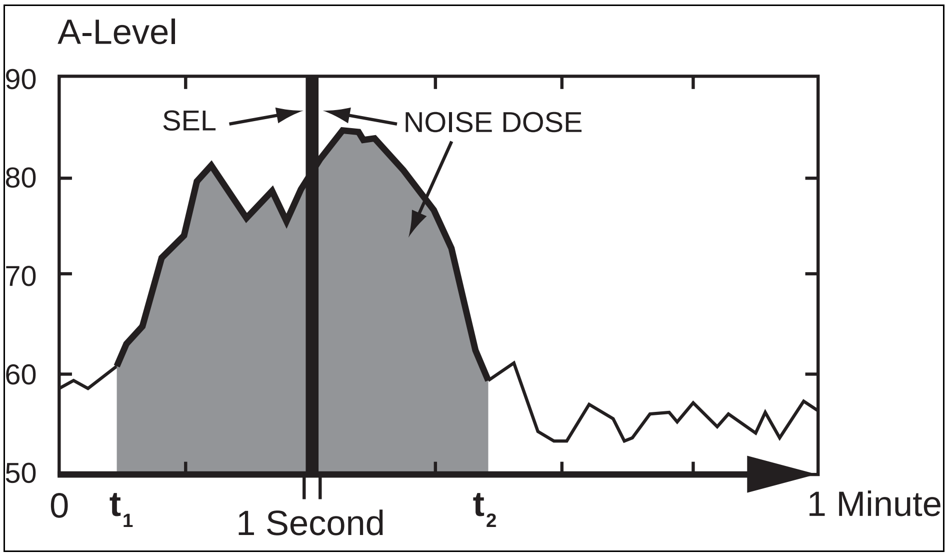

Because of this variation, it is often convenient to describe a particular noise "event" by its maximum sound level, abbreviated as $L_{max}$. In Figure A.2, the $L_{max}$ is approximately 85 dB. However, the maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical maximum levels may produce very different total exposures. One may be of very short duration, while the other may continue for an extended period and be judged much more annoying. The next section introduces a measure that accounts for this concept of a noise "dose."

**Single Event Noise Exposure Level, SENEL**

The measure of cumulative noise exposure for a single aircraft fly-over in California is the Single Event Noise Exposure Level, or SENEL. SENEL may be thought of as an accumulation of the sound energy over the duration of an event, where duration is defined as the period from when the A-weighted sound level first exceeds a threshold level to when the sound level drops back below the threshold.

SENEL is similar to the Sound Exposure Level (SEL) metric. For SENEL measurements, the threshold is 30 dB below an upper SENEL limit which depends on the aircraft type and distance from either the start of the take-off roll or the landing threshold[1]. For the SEL, the threshold is referenced to the background noise level. These two metrics are functionally equal.

**FIGURE A.3 SINGLE EVENT NOISE EXPOSURE LEVEL**




Source: HMMH

The lightly shaded area in Figure A.3 illustrates the portion of the sound energy included in this dose. To account for the variety of durations that occur among different noise events, the noise dose is normalized (standardized) to a one-second duration. This normalized dose is the SENEL or SEL; it is shown as the darkly shaded area in Figure A.3. It has exactly the same sound energy as the longer event.

Note that because the SENEL is normalized to one second, it will almost always be larger in magnitude than the maximum A-weighted level for the event. In fact, for most aircraft overflights, the SEL is on the order of 7 to 12 dB higher than the $L_{max}$. Also, the fact that it is a cumulative measure means that not only do louder fly-overs have higher SENEL than do quieter ones, but also fly-overs with longer durations have greater SENEL than do shorter ones.

With this metric, we now have a basis for comparing noise events that generally matches our impression of the sound -- the higher the SENEL, the more annoying it is likely to be. In addition, SENEL provides a comprehensive way to describe a noise event for use in modeling noise exposure.

**Equivalent Sound Level, Leq**

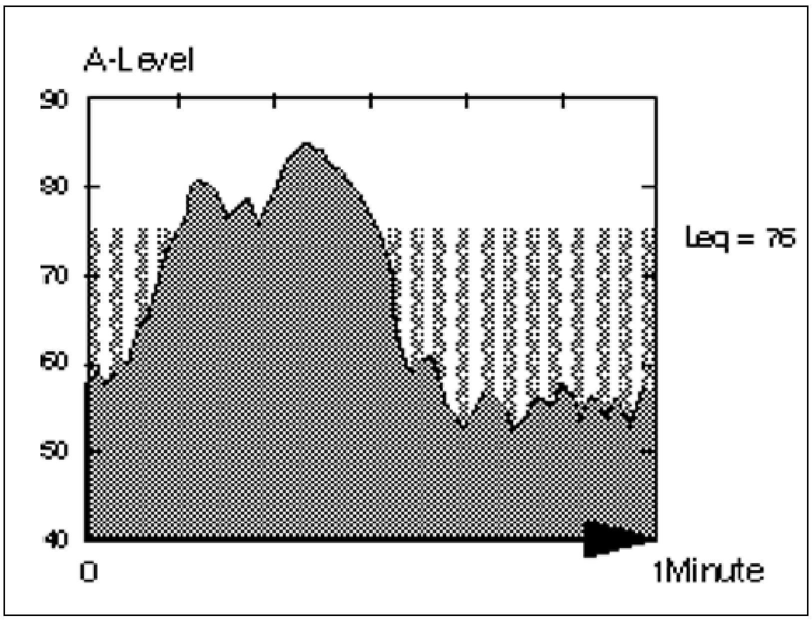
The Equivalent Sound Level, abbreviated $L_{eq}$, is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest -- for example, an hour, an eight-hour school day, nighttime, or a full 24-hour day. However, because the length of

[1]California Department of Aeronautics, "Noise Standards," California Code of Regulations, Title 21 §5025 and §5040 (Register 78, No. 22—6-3-78).

the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric.

$L_{eq}$ may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level. This is illustrated in Figure A.4. The equivalent level is, in a sense, the total sound energy that occurred during the time in question, but spread evenly over the time period. It is a way of assigning a single number to a time-varying sound level. Since $L_{eq}$ includes all sound energy, it is strongly influenced by the louder events.

**FIGURE A.4 EXAMPLE OF A 1-MINUTE EQUIVALENT SOUND LEVEL**




As for its application to airport noise issues, $L_{eq}$ is often presented for consecutive one-hour periods to illustrate how the hourly noise dose rises and falls throughout a 24-hour period as well as how certain hours are significantly affected by a few loud aircraft.

**Community Noise Equivalent Level, CNEL**

In the previous sections, we have been addressing noise measures that account for the moment-to-moment or short-term fluctuations in A-weighted levels as sound sources come and go affecting our overall noise environment. The Community Noise Equivalent Level (CNEL) represents a concept of noise dose as it occurs over a 24-hour period. The State of California developed the CNEL and promulgated "Noise Standards" in 1970.[2]

Earlier, we illustrated the A-weighted level due to an aircraft event. The example is repeated in the top frame of Figure A.5. The level increases as the aircraft approaches, reaching a maximum of 85 dB, and then decreases as the aircraft passes by. The ambient A-weighted level around 55 dB is due to the background sounds that dominate after the aircraft passes. The shaded area reflects the noise dose that a listener receives during the one-minute period of the sample.

[2] California Department of Aeronautics, "Noise Standards," California Code of Regulations, Title 21 §5000 and §5090 (Register 90, No. 10—3-10-90).

The center frame of Figure A.5 includes this one-minute interval within a full hour. Now the shaded area represents the noise dose during that hour when sixteen aircraft pass nearby, each producing a single event dose represented by an SENEL. Similarly, the bottom frame includes the one-hour interval within a full 24 hours. Here the shaded area represents the noise dose over a complete day. Note that several overflights occur at night, when the background noise drops some 10 decibels, to approximately 45 dB.

An important note here is that CNEL treats evening (7:00 PM - 9:59 PM) and nighttime (10:00 PM - 6:59 AM) noise differently from daytime (7:00 AM - 6:59 PM) noise. CNEL multiplies each evening operation by 3 and each nighttime operation by 10. This weighting of the operations effectively adds 4.8 decibels to the A-weighted levels of each evening operation and 10.0 decibels to the A-weighted levels occurring at night. These penalties are applied to account for people's greater sensitivity to evening and nighttime noise. In addition, events during the evening and night are often more intrusive because the ambient sound levels during those times are usually lower than daytime ambient sound levels.

The CNEL noise metric is very similar to the Day-Night Level Average Sound (DNL) metric required by the FAA for aircraft noise studies. The difference is that the CNEL metric applies a weighting factor to evening operations; the DNL metric treats the evening hours the same as the daytime hours. For an airport with evening operations, the noise measured as CNEL will be slightly higher than the noise measured as DNL.

Values of CNEL are normally measured with standard monitoring equipment or are predicted with computer models. Measurements are practical for obtaining CNEL values for only relatively limited numbers of locations, and, in the absence of a permanently installed monitoring system, only for relatively short time periods. Thus, most airport noise studies utilize computer-generated estimates of CNEL, determined by accounting for all of the SENEL from individual aircraft operations which comprise the total noise dose at a given location on the ground. This principle is used in all airport noise modeling.

Computed values of CNEL are usually depicted as noise contours that are lines of equal exposure around an airport (much as topographic maps have contour lines of equal elevation). The contours usually reflect long-term (annual average) operating conditions, taking into account the average flights per day, how often each runway is used throughout the year, and where over the surrounding communities the aircraft normally fly.

**FIGURE A.5 A-WEIGHTED LEVEL FLUCTUATIONS AND NOISE DOSE**

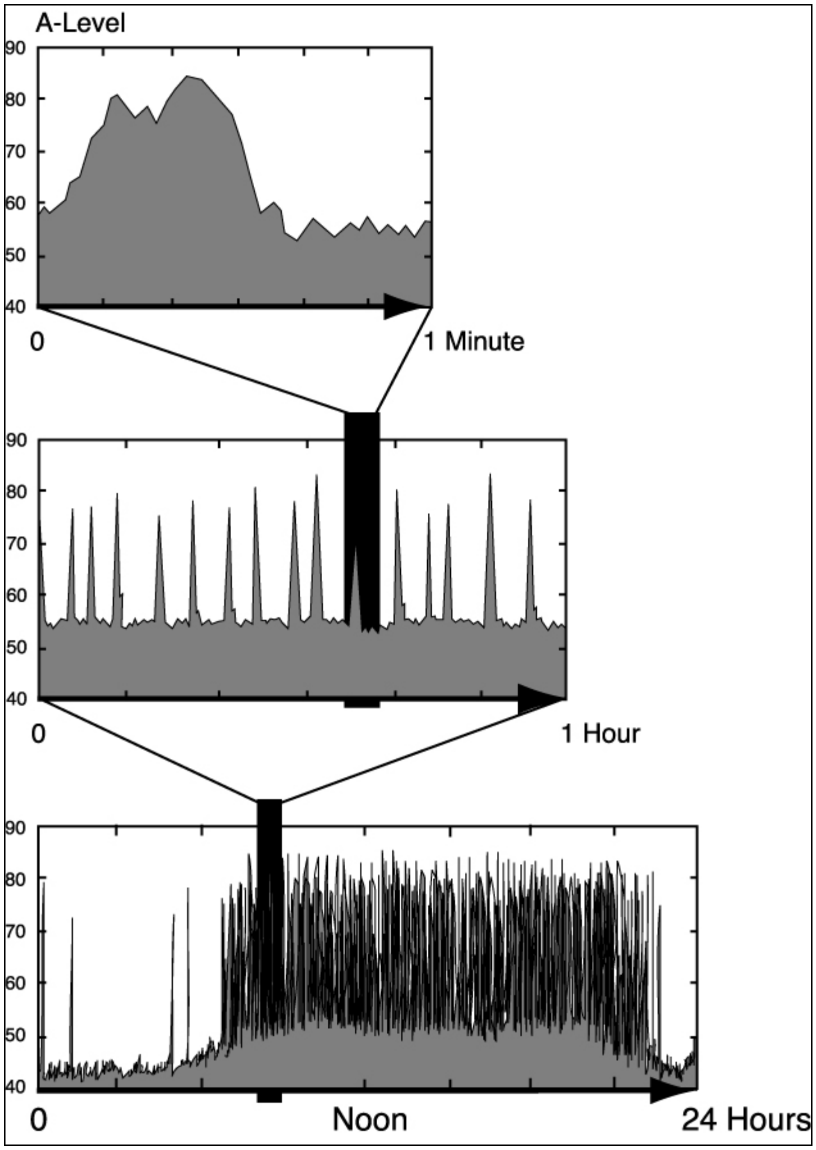
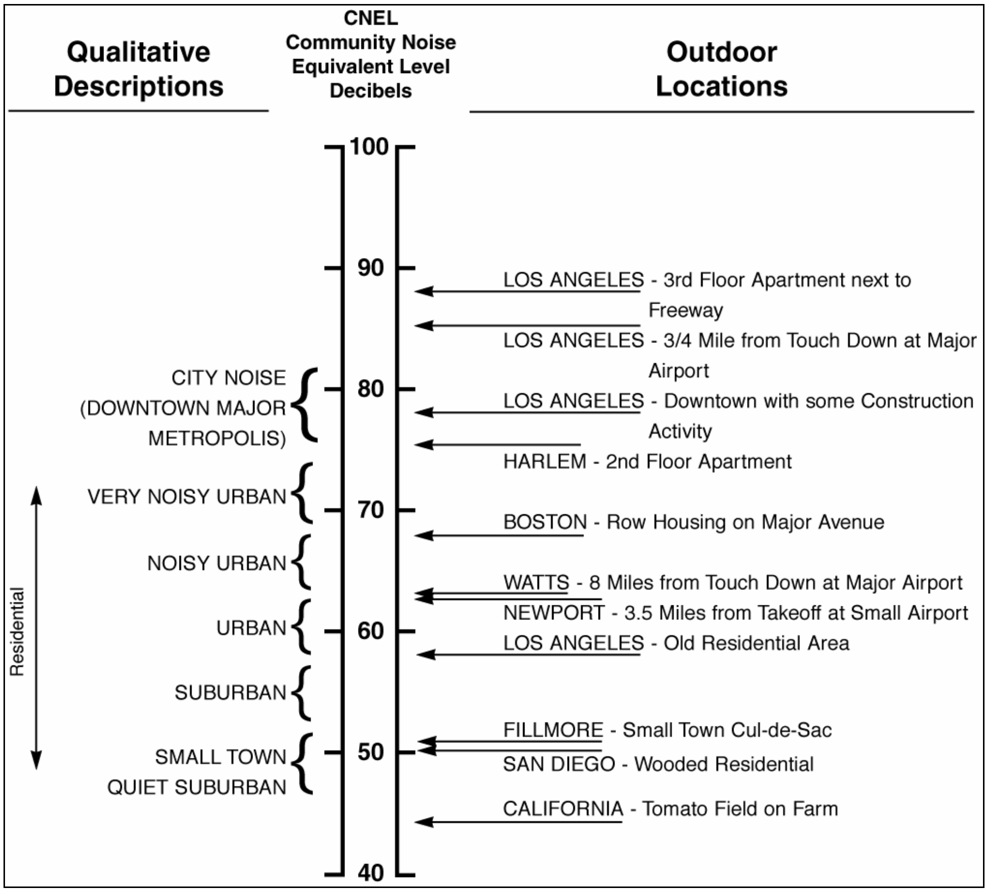



Figure A.6 shows that representative values of DNL (or CNEL) in our environment range from a low of 40 to 45 decibels in extremely quiet, isolated locations, to highs of 80 or 85 decibels immediately adjacent to a busy truck route or off the end of a runway at an active Air Force base. More typical values would be in the range of 50 or 55 decibels for a quiet residential community to 60 or 65 decibels in an urban residential neighborhood.

**FIGURE A.6 REPRESENTATIVE EXAMPLES OF MEASURED COMMUNITY NOISE EQUIVALENT LEVELS**

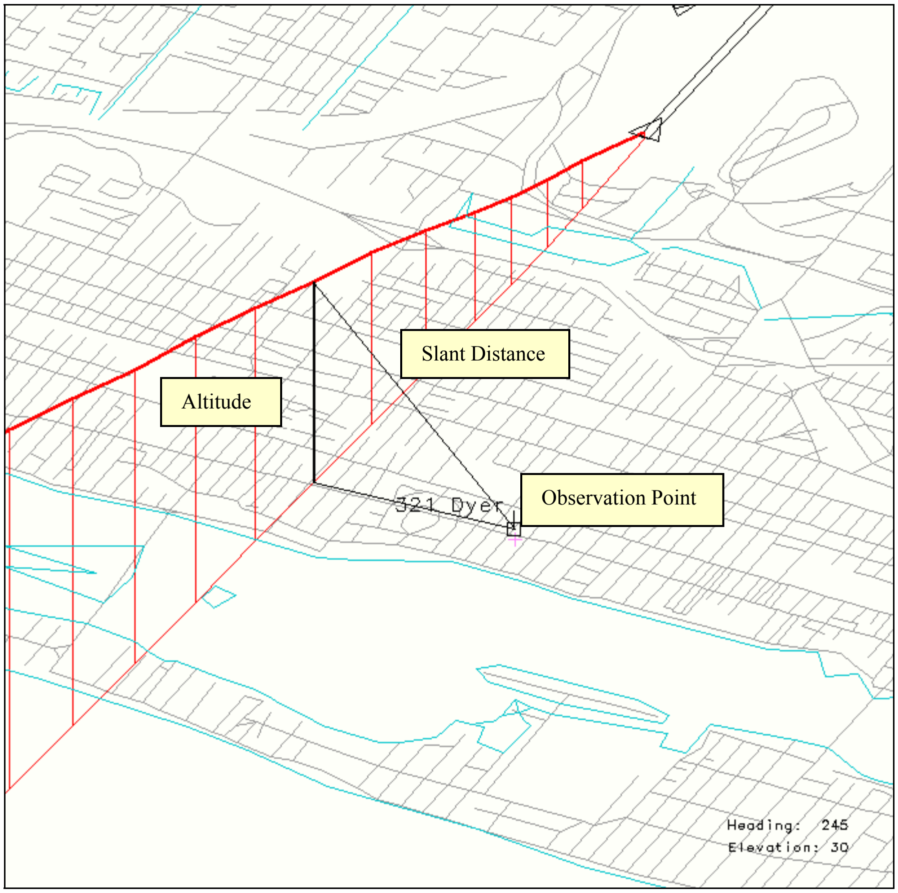



Source: United States Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974, p.14

### Slant Distance and Aircraft Altitude

When determining the distance between the observer or measurement location and an overflying aircraft, several factors need to be considered. As shown in Figure A-7, aircraft altitude is normally given as height in feet above mean sea level (MSL) or above ground level (AGL). The slant distance is the line of sight distance in feet from the observation point to the aircraft. If the aircraft were flying directly over the observation point, then the slant distance would be the same as the aircraft's altitude AGL. This slant distance at the aircraft's point-of-closest-approach will vary with each aircraft overflight and will have an affect on the sound level heard or measured.

**FIGURE A-7 RELATIONSHIP BETWEEN ALTITUDE AND SLANT DISTANCE**



# Appendix B

## Correlated Noise and Operations Data
## Nighttime UPS Boeing 757
## 11 February 2003 – 19 February 2003
## 27 April 2004 – 24 May 2004

| Site 1: Pine Hill Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Feb-03** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 2/12/2003 | 4:12:18 | UPS956 | B752 | ARR | 4412 | 5671 | 72.7 | 59.8 |
| 2/12/2003 | 5:06:38 | UPS958 | B752 | ARR | 7580 | 9023 | 71.3 | 55.4 |
| | | | | | | | | |
| 2/13/2003 | 4:00:21 | UPS956 | B752 | ARR | 4307 | 5772 | 75.2 | 64.1 |
| 2/13/2003 | 4:56:08 | UPS958 | B752 | ARR | 4914 | 6336 | 77.2 | 63.6 |
| | | | | | | | | |
| 2/14/2003 | 3:42:15 | UPS956 | B752 | ARR | 4422 | 5725 | 74.3 | 60.9 |
| 2/14/2003 | 3:48:04 | UPS898 | B752 | ARR | 4458 | 5767 | 72.4 | 60.7 |
| 2/14/2003 | 5:18:05 | UPS958 | B752 | ARR | 4458 | 5769 | 66.5 | 54.0 |
| | | | | | | | | |
| 2/15/2003 | 6:13:04 | UPS958 | B752 | ARR | 4576 | 5759 | 77.1 | 62.8 |
| | | | | | | | | |
| 2/18/2003 | 4:10:32 | UPS956 | B752 | ARR | 4415 | 5846 | 64.5 | 53.8 |
| 2/18/2003 | 5:51:49 | UPS958 | B752 | ARR | 4695 | 5918 | 69.9 | 58.4 |
| | | | | | | | | |
| 2/19/2003 | 3:55:35 | UPS956 | B752 | ARR | 4578 | 5660 | 72.3 | 61.0 |
| 2/19/2003 | 5:02:11 | UPS958 | B752 | ARR | 4569 | 5764 | 72.3 | 59.4 |

| Site 2 Ethel Dr | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| Feb-03 | | | | | SLANT DIST | ALTITUDE | SENEL | LMAX |
| DATE | TIME | IDENT | TYPE | OPS | feet | Feet MSL | dB | dB |
| 2/12/2003 | 4:13:16 | UPS956 | B752 | ARR | 3514 | 4614 | 71.7 | 60.4 |
| 2/12/2003 | 5:07:23 | UPS958 | B752 | ARR | 6241 | 7303 | 72.0 | 60.6 |
| | | | | | | | | |
| 2/13/2003 | 4:01:03 | UPS956 | B752 | ARR | 3515 | 4691 | Data Lost | |
| 2/13/2003 | 4:56:53 | UPS958 | B752 | ARR | 3621 | 4700 | Data Lost | |
| | | | | | | | | |
| 2/14/2003 | 3:42:56 | UPS956 | B752 | ARR | 3573 | 4728 | 74.3 | 63.5 |
| 2/14/2003 | 3:48:51 | UPS898 | B752 | ARR | 3628 | 4723 | 71.0 | 60.4 |
| 2/14/2003 | 5:18:51 | UPS958 | B752 | ARR | 3605 | 4695 | 74.9 | 64.4 |
| | | | | | | | | |
| 2/15/2003 | 6:14:12 | UPS958 | B752 | ARR | 3582 | 4724 | 76.2 | 62.7 |
| | | | | | | | | |
| 2/18/2003 | 4:11:21 | UPS956 | B752 | ARR | 3557 | 4663 | 67.8 | 58.3 |
| 2/18/2003 | 5:52:32 | UPS958 | B752 | ARR | 3512 | 4670 | 72.4 | 61.9 |
| | | | | | | | | |
| 2/19/2003 | 3:56:22 | UPS956 | B752 | ARR | 3678 | 4835 | 68.1 | 54.5 |
| 2/19/2003 | 5:02:57 | UPS958 | B752 | ARR | 3631 | 4683 | 75.2 | 64.8 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Site 3 El Dorado Hills | | | | | | | | |
| Aircraft and Noise Data | | | | | | | | |
| **Feb-03** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 2/12/2003 | 3:41:44 | UPS898 | B752 | ARR | 12730 | 3136 | 61.6 | 51.5 |
| 2/12/2003 | 4:14:07 | UPS956 | B752 | ARR | 2936 | 3744 | 71.3 | 59.3 |
| 2/12/2003 | 5:08:03 | UPS958 | B752 | ARR | 5071 | 5767 | 79.3 | 68.6 |
| | | | | | | | | |
| 2/13/2003 | 3:35:25 | UPS898 | B752 | ARR | 17591 | 2910 | Lost in ambient | |
| 2/13/2003 | 4:01:42 | UPS956 | B752 | ARR | 2912 | 3745 | 76.6 | 67.8 |
| 2/13/2003 | 4:57:34 | UPS958 | B752 | ARR | 2970 | 3742 | 75.1 | 66.2 |
| | | | | | | | | |
| 2/14/2003 | 3:43:37 | UPS956 | B752 | ARR | 3092 | 3821 | 74.9 | 65.1 |
| 2/14/2003 | 3:49:32 | UPS898 | B752 | ARR | 3006 | 3834 | 81.2 | 71.6 |
| 2/14/2003 | 5:19:32 | UPS958 | B752 | ARR | 2996 | 3796 | 80.2 | 71.3 |
| | | | | | | | | |
| 2/15/2003 | 6:15:22 | UPS958 | B752 | ARR | 3029 | 3836 | 78.8 | 66.1 |
| | | | | | | | | |
| 2/18/2003 | 4:12:05 | UPS956 | B752 | ARR | 3074 | 3746 | 80.2 | 70.3 |
| 2/18/2003 | 5:53:14 | UPS958 | B752 | ARR | 2956 | 3754 | 72.4 | 62.4 |
| | | | | | | | | |
| 2/19/2003 | 3:57:08 | UPS956 | B752 | ARR | 3121 | 3851 | 74.7 | 64.5 |
| 2/19/2003 | 5:03:43 | UPS958 | B752 | ARR | 3191 | 3774 | 82.7 | 73.0 |

| Site 4 Folsom | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Feb-03** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 2/12/2003 | 3:42:00 | UPS898 | B752 | ARR | 2681 | 2927 | 76.5 | 66.5 |
| 2/12/2003 | 4:14:58 | UPS956 | B752 | ARR | 3017 | 2923 | 68.7 | 60.5 |
| 2/12/2003 | 5:08:41 | UPS958 | B752 | ARR | 4085 | 4027 | 80.9 | 69.3 |
| | | | | | | | | |
| 2/13/2003 | 3:35:40 | UPS898 | B752 | ARR | 5966 | 2747 | 65.8 | 54.8 |
| 2/13/2003 | 4:02:24 | UPS956 | B752 | ARR | 3036 | 2920 | 75.4 | 65.5 |
| 2/13/2003 | 4:58:21 | UPS958 | B752 | ARR | 3070 | 2926 | 79.7 | 68.8 |
| | | | | | | | | |
| 2/14/2003 | 3:44:15 | UPS956 | B752 | ARR | 3061 | 2999 | 76.3 | 67.1 |
| 2/14/2003 | 3:50:18 | UPS898 | B752 | ARR | 3051 | 2940 | 78.8 | 68.2 |
| 2/14/2003 | 5:20:19 | UPS958 | B752 | ARR | 3023 | 2943 | 80.7 | 69.9 |
| | | | | | | | | |
| 2/15/2003 | 6:16:28 | UPS958 | B752 | ARR | 3115 | 2979 | 78.2 | 66.5 |
| | | | | | | | | |
| 2/18/2003 | 4:12:48 | UPS956 | B752 | ARR | 3083 | 2972 | 80.4 | 69.6 |
| 2/18/2003 | 5:53:55 | UPS958 | B752 | ARR | 3318 | 2989 | 76.5 | 65.3 |
| | | | | | | | | |
| 2/19/2003 | 3:57:52 | UPS956 | B752 | ARR | 3140 | 3066 | 80.1 | 70.1 |
| 2/19/2003 | 5:04:30 | UPS958 | B752 | ARR | 2951 | 2974 | 81.2 | 70.0 |

| Site 1: Pine Hill Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 4/27/2004 | 4:43:47 | UPS958 | B752 | ARR | 5942 | 6477 | 75.3 | 62.5 |
| | | | | | | | | |
| 4/28/2004 | 3:45:42 | UPS956 | B752 | ARR | 5854 | 6461 | 71.1 | 58.4 |
| 4/28/2004 | 4:49:30 | UPS958 | B752 | ARR | 6293 | 6701 | 68.8 | 55.4 |
| | | | | | | | | |
| 4/30/2004 | 3:34:59 | UPS956 | B752 | ARR | 5076 | 5631 | 57.7 | 50.6 |
| 4/30/2004 | 4:54:44 | UPS958 | B752 | ARR | 5192 | 5713 | 67.5 | 56.6 |
| | | | | | | | | |
| 5/4/2004 | 3:52:16 | UPS956 | B752 | ARR | 5598 | 6215 | 70 | 56.4 |
| | | | | | | | | |
| 5/5/2004 | 3:47:32 | UPS956 | B752 | ARR | 5268 | 5559 | 68.3 | 65.4 |
| 5/5/2004 | 4:51:35 | UPS958 | B752 | ARR | 5204 | 5660 | 59.3 | 50.8 |
| | | | | | | | | |
| 5/6/2004 | 3:45:14 | UPS956 | B752 | ARR | 5257 | 5700 | 69.8 | 58.5 |
| 5/6/2004 | 4:49:44 | UPS958 | B752 | ARR | 5571 | 6146 | 73.3 | 60.4 |
| | | | | | | | | |
| 5/7/2004 | 5:00:00 | UPS958 | B752 | ARR | 7579 | 5470 | 64 | 56.6 |
| | | | | | | | | |
| 5/8/2004 | 5:47:41 | UPS958 | B752 | ARR | 5273 | 5769 | 71.7 | 58.9 |
| | | | | | | | | |
| 5/11/2004 | 3:45:19 | UPS956 | B752 | ARR | 5460 | 6012 | 74.2 | 63.1 |
| 5/11/2004 | 4:51:39 | UPS958 | B752 | ARR | 5286 | 5732 | 60.2 | 51.4 |
| | | | | | | | | |
| 5/12/2004 | 3:40:44 | UPS956 | B752 | ARR | 5500 | 5946 | 65.7 | 57.1 |
| 5/12/2004 | 4:48:49 | UPS958 | B752 | ARR | 5288 | 5756 | 73.1 | 62.6 |
| | | | | | | | | |
| 5/13/2004 | 3:48:49 | UPS956 | B752 | ARR | 6281 | 7032 | 71.2 | 58.8 |
| 5/13/2004 | 5:05:08 | UPS958 | B752 | ARR | 5164 | 5670 | 69.1 | 58.2 |
| | | | | | | | | |
| 5/14/2004 | 3:44:00 | UPS956 | B752 | ARR | 5949 | 6608 | 70 | 55.6 |
| 5/14/2004 | 4:58:22 | UPS958 | B752 | ARR | 5129 | 5611 | 65.7 | 53.9 |
| | | | | | | | | |
| 5/15/2004 | 5:50:43 | UPS958 | B752 | ARR | 4657 | 5008 | 65.3 | 56.7 |
| | | | | | | | | |
| 5/18/2004 | 4:48:02 | UPS956 | B752 | ARR | 5573 | 7042 | 75.4 | 66.2 |
| 5/18/2004 | 4:56:22 | UPS958 | B752 | ARR | 5380 | 5831 | 68.3 | 60.2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Site 1: Pine Hill Area | | Cont. | | | | | | |
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 5/19/2004 | 3:54:29 | UPS956 | B752 | ARR | 5353 | 5710 | 73.6 | 62.1 |
| 5/19/2004 | 5:03:31 | UPS958 | B752 | ARR | 5421 | 6422 | 65.7 | 56.1 |
| | | | | | | | | |
| 5/20/2004 | 3:58:18 | UPS956 | B752 | ARR | 5376 | 5765 | 73.3 | 60.9 |
| 5/20/2004 | 4:54:48 | UPS958 | B752 | ARR | 5193 | 5818 | 71.9 | 61.1 |
| | | | | | | | | |
| 5/21/2004 | 3:51:31 | UPS956 | B752 | ARR | 5195 | 5713 | 72.6 | 61.8 |
| | | | | | | | | |
| 5/22/2004 | 5:47:17 | UPS958 | B752 | ARR | 5716 | 6208 | 73.7 | 60.4 |

| Site 2 Ethel Dr | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 4/27/2004 | 4:24:27 | UPS956 | B752 | ARR | 3259 | 4318 | 74.6 | 63.8 |
| 4/27/2004 | 4:44:41 | UPS958 | B752 | ARR | 3790 | 5027 | 75.2 | 64.3 |
| | | | | | | | | |
| 4/28/2004 | 3:46:28 | UPS956 | B752 | ARR | 3754 | 4922 | 71 | 60.5 |
| 4/28/2004 | 4:50:30 | UPS958 | B752 | ARR | 4180 | 5260 | 75.9 | 62.8 |
| | | | | | | | | |
| 4/30/2004 | 3:35:44 | UPS956 | B752 | ARR | 3303 | 4511 | 64.7 | 53.3 |
| 4/30/2004 | 4:55:31 | UPS958 | B752 | ARR | 3349 | 4555 | 70.9 | 61.2 |
| | | | | | | | | |
| 5/1/2004 | 6:10:55 | UPS958 | B752 | ARR | 3969 | 4010 | 63.7 | 54.3 |
| | | | | | | | | |
| 5/4/2004 | 3:53:16 | UPS956 | B752 | ARR | 3909 | 5129 | 75 | 62.6 |
| | | | | | | | | |
| 5/5/2004 | 3:48:23 | UPS956 | B752 | ARR | 3305 | 4519 | 63.2 | 55.3 |
| 5/5/2004 | 4:52:31 | UPS958 | B752 | ARR | 3345 | 4558 | 68.6 | 59 |
| | | | | | | | | |
| 5/6/2004 | 3:46:14 | UPS956 | B752 | ARR | 3341 | 4525 | 77.3 | 66.8 |
| 5/6/2004 | 4:50:35 | UPS958 | B752 | ARR | 3387 | 4601 | 74.1 | 61.9 |
| | | | | | | | | |
| 5/7/2004 | 5:00:46 | UPS958 | B752 | ARR | 3445 | 4660 | 71.7 | 59.7 |
| | | | | | | | | |
| 5/8/2004 | 5:48:36 | UPS958 | B752 | ARR | 3379 | 4601 | 79.7 | 68.7 |
| | | | | | | | | |
| 5/11/2004 | 3:46:05 | UPS956 | B752 | ARR | 3403 | 4617 | 74 | 63.2 |
| 5/11/2004 | 4:52:33 | UPS958 | B752 | ARR | 3302 | 4509 | 70.3 | 60.2 |
| | | | | | | | | |
| 5/12/2004 | 3:41:25 | UPS956 | B752 | ARR | 4146 | 5378 | 63.1 | 51.3 |
| 5/12/2004 | 4:49:35 | UPS958 | B752 | ARR | 3435 | 4650 | 73.2 | 61.9 |
| | | | | | | | | |
| 5/13/2004 | 3:49:35 | UPS956 | B752 | ARR | 4209 | 5388 | 72.6 | 61.2 |
| 5/13/2004 | 5:05:59 | UPS958 | B752 | ARR | 3359 | 4571 | 70.8 | 60.1 |
| | | | | | | | | |
| 5/14/2004 | 3:44:50 | UPS956 | B752 | ARR | 4363 | 5592 | 68.1 | 57 |
| 5/14/2004 | 5:01:46 | UPS958 | B752 | ARR | 3287 | 4466 | 75.1 | 64 |
| | | | | | | | | |
| 5/18/2004 | 4:48:40 | UPS956 | B752 | ARR | 5118 | 6251 | 70.3 | 59.1 |
| 5/18/2004 | 4:57:04 | UPS958 | B752 | ARR | 3506 | 4706 | 75.3 | 64.5 |

| Site 2 Ethel Dr | | Cont. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 5/19/2004 | 3:55:22 | UPS956 | B752 | ARR | 3476 | 4647 | 74.1 | 62.7 |
| 5/19/2004 | 5:04:21 | UPS958 | B752 | ARR | 3929 | 5070 | 78.3 | 66.2 |
| | | | | | | | | |
| 5/20/2004 | 3:59:16 | UPS956 | B752 | ARR | 3374 | 4591 | 76.7 | 65.8 |
| 5/20/2004 | 4:55:44 | UPS958 | B752 | ARR | 3367 | 4532 | 74.4 | 63.4 |
| | | | | | | | | |
| 5/21/2004 | 3:52:28 | UPS956 | B752 | ARR | 3403 | 4581 | 74.9 | 64.1 |
| | | | | | | | | |
| 5/22/2004 | 5:47:59 | UPS958 | B752 | ARR | 3427 | 4634 | 76.8 | 66.1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Site 3 El Dorado Hills | | | | | | | | |
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 4/28/2004 | 3:47:10 | UPS956 | B752 | ARR | 2763 | 3610 | 74.4 | 63.8 |
| 4/28/2004 | 4:51:16 | UPS958 | B752 | ARR | 3109 | 3991 | 79.4 | 67.8 |
| | | | | | | | | |
| 4/29/2004 | 3:36:00 | UPS956 | B752 | ARR | 2733 | 3548 | 74.2 | 64.8 |
| 4/29/2004 | 4:38:30 | UPS958 | B752 | ARR | 2855 | 3715 | 72.8 | 63.3 |
| | | | | | | | | |
| 4/30/2004 | 3:36:26 | UPS956 | B752 | ARR | 2831 | 3544 | 74 | 64.5 |
| 4/30/2004 | 4:56:07 | UPS958 | B752 | ARR | 2846 | 3669 | 70.7 | 60.4 |
| | | | | | | | | |
| 5/1/2004 | 6:11:35 | UPS958 | B752 | ARR | 2741 | 3594 | 71.6 | 63.1 |
| | | | | | | | | |
| 5/4/2004 | 3:54:07 | UPS956 | B752 | ARR | 2722 | 3538 | 78.9 | 68.2 |
| | | | | | | | | |
| 5/5/2004 | 3:49:09 | UPS956 | B752 | ARR | 2800 | 3597 | 70.8 | 60.6 |
| 5/5/2004 | 4:53:17 | UPS958 | B752 | ARR | 2800 | 3662 | 76.1 | 65.2 |
| | | | | | | | | |
| 5/6/2004 | 3:47:09 | UPS956 | B752 | ARR | 2855 | 3646 | 75.9 | 65.2 |
| 5/6/2004 | 4:51:17 | UPS958 | B752 | ARR | 2854 | 3715 | 83.6 | 72.8 |
| | | | | | | | | |
| 5/7/2004 | 5:01:41 | UPS958 | B752 | ARR | 2947 | 3702 | 75.2 | 64.5 |
| | | | | | | | | |
| 5/8/2004 | 5:49:27 | UPS958 | B752 | ARR | 2893 | 3669 | 80.4 | 71 |
| | | | | | | | | |
| 5/11/2004 | 3:46:46 | UPS956 | B752 | ARR | 2861 | 3715 | 72.2 | 62.2 |
| 5/11/2004 | 4:53:15 | UPS958 | B752 | ARR | 2889 | 3722 | 70.8 | 61 |
| | | | | | | | | |
| 5/12/2004 | 3:42:12 | UPS956 | B752 | ARR | 4023 | 4939 | 68.1 | 57.3 |
| 5/12/2004 | 4:50:16 | UPS958 | B752 | ARR | 2873 | 3748 | 78.6 | 70 |
| | | | | | | | | |
| 5/13/2004 | 3:50:17 | UPS956 | B752 | ARR | 3928 | 4765 | 75 | 65.4 |
| 5/13/2004 | 5:06:40 | UPS958 | B752 | ARR | 2879 | 3672 | 67.4 | 57.9 |
| | | | | | | | | |
| 5/14/2004 | 3:48:19 | UPS956 | B752 | ARR | 3868 | 4611 | 76.9 | 64.7 |
| 5/14/2004 | 5:02:23 | UPS958 | B752 | ARR | 2821 | 3662 | 75.7 | 65.8 |
| | | | | | | | | |
| 5/15/2004 | 5:52:20 | UPS958 | B752 | ARR | 2949 | 3820 | 73.1 | 62.5 |

| Site 3 El Dorado Hills | Cont. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 5/18/2004 | 4:49:17 | UPS956 | B752 | ARR | 3977 | 4883 | 77.4 | 65.5 |
| 5/18/2004 | 4:57:54 | UPS958 | B752 | ARR | 2992 | 3741 | 82.1 | 73.4 |
| | | | | | | | | |
| 5/19/2004 | 3:56:19 | UPS956 | B752 | ARR | 2936 | 3692 | 75 | 63.8 |
| 5/19/2004 | 5:05:16 | UPS958 | B752 | ARR | 3051 | 3810 | 75.3 | 63.2 |
| | | | | | | | | |
| 5/20/2004 | 4:00:13 | UPS956 | B752 | ARR | 2897 | 3712 | 75.9 | 65.1 |
| 5/20/2004 | 4:56:30 | UPS958 | B752 | ARR | 2974 | 3810 | 74 | 62.8 |
| | | | | | | | | |
| 5/21/2004 | 3:53:14 | UPS956 | B752 | ARR | 2982 | 3748 | 76.8 | 66.3 |
| | | | | | | | | |
| 5/22/2004 | 5:48:47 | UPS958 | B752 | ARR | 2892 | 3738 | 76.3 | 65.6 |

| Site 4 Folsom | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 4/27/2004 | 4:26:07 | UPS956 | B752 | ARR | 2888 | 2727 | 74.9 | 63.8 |
| 4/27/2004 | 4:46:15 | UPS958 | B752 | ARR | 2973 | 2898 | 75.9 | 65.3 |
| | | | | | | | | |
| 4/29/2004 | 3:36:37 | UPS956 | B752 | ARR | 3203 | 2888 | 80.5 | 70.6 |
| 4/29/2004 | 4:39:12 | UPS958 | B752 | ARR | 3022 | 2816 | 77.4 | 69.4 |
| | | | | | | | | |
| 4/30/2004 | 3:37:03 | UPS956 | B752 | ARR | 2888 | 2829 | 72.1 | 61.8 |
| 4/30/2004 | 3:39:17 | UPS898 | B752 | ARR | 2182 | 2252 | 72.7 | 62.5 |
| 4/30/2004 | 4:56:44 | UPS958 | B752 | ARR | 2923 | 2852 | 74.1 | 62.8 |
| | | | | | | | | |
| 5/1/2004 | 6:12:17 | UPS958 | B752 | ARR | 2892 | 2786 | 72.8 | 62.1 |
| | | | | | | | | |
| 5/4/2004 | 3:54:58 | UPS956 | B752 | ARR | 2894 | 2734 | 78 | 66.7 |
| | | | | | | | | |
| 5/5/2004 | 3:49:55 | UPS956 | B752 | ARR | 2898 | 2819 | 76.9 | 65.3 |
| 5/5/2004 | 4:54:08 | UPS958 | B752 | ARR | 2952 | 2829 | 71.8 | 61.6 |
| | | | | | | | | |
| 5/6/2004 | 3:48:00 | UPS956 | B752 | ARR | 2923 | 2842 | 74.9 | 63.3 |
| 5/6/2004 | 4:52:03 | UPS958 | B752 | ARR | 2938 | 2855 | 81.6 | 70.5 |
| | | | | | | | | |
| 5/7/2004 | 5:02:27 | UPS958 | B752 | ARR | 3006 | 2921 | 78.2 | 66.3 |
| | | | | | | | | |
| 5/8/2004 | 5:50:18 | UPS958 | B752 | ARR | 2943 | 2865 | 80.8 | 69.3 |
| | | | | | | | | |
| 5/11/2004 | 3:47:28 | UPS956 | B752 | ARR | 2972 | 2914 | 79.5 | 70.8 |
| 5/11/2004 | 4:53:56 | UPS958 | B752 | ARR | 3018 | 2921 | 76.1 | 66 |
| | | | | | | | | |
| 5/12/2004 | 3:42:54 | UPS956 | B752 | ARR | 3844 | 3872 | 70.2 | 59.6 |
| 5/12/2004 | 4:50:58 | UPS958 | B752 | ARR | 2971 | 2921 | 78.5 | 67.4 |
| | | | | | | | | |
| 5/13/2004 | 3:50:59 | UPS956 | B752 | ARR | 3553 | 3544 | 78.7 | 67.1 |
| 5/13/2004 | 5:07:22 | UPS958 | B752 | ARR | 2955 | 2868 | 69.5 | 58.5 |
| | | | | | | | | |
| 5/14/2004 | 3:49:00 | UPS956 | B752 | ARR | 3459 | 3466 | 77.3 | 65.7 |
| 5/14/2004 | 5:03:05 | UPS958 | B752 | ARR | 2889 | 2770 | 78.7 | 70.1 |
| | | | | | | | | |
| 5/15/2004 | 5:53:06 | UPS958 | B752 | ARR | 2959 | 2803 | 76 | 64.3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Site 4 Folsom | | Cont. | | | | | | |
| Aircraft and Noise Data | | | | | | | | |
| **Apr-May 2004** | | | | | **SLANT DIST** | **ALTITUDE** | **SENEL** | **LMAX** |
| **DATE** | **TIME** | **IDENT** | **TYPE** | **OPS** | **feet** | **Feet MSL** | **dB** | **dB** |
| 5/18/2004 | 4:49:47 | UPS956 | B752 | ARR | 3397 | 3384 | 85.5 | 75.3 |
| 5/18/2004 | 4:58:33 | UPS958 | B752 | ARR | 3015 | 2937 | 76.1 | 64.1 |
| | | | | | | | | |
| 5/19/2004 | 3:56:53 | UPS956 | B752 | ARR | 2997 | 2849 | 80.6 | 70.1 |
| 5/19/2004 | 5:05:52 | UPS958 | B752 | ARR | 2934 | 2862 | 75.9 | 65.2 |
| | | | | | | | | |
| 5/20/2004 | 4:00:48 | UPS956 | B752 | ARR | 2913 | 2826 | 75.4 | 65 |
| 5/20/2004 | 4:57:09 | UPS958 | B752 | ARR | 2899 | 2839 | 75.7 | 64.5 |
| | | | | | | | | |
| 5/21/2004 | 3:53:51 | UPS956 | B752 | ARR | 3056 | 2947 | 81.9 | 71.2 |
| | | | | | | | | |
| 5/22/2004 | 5:49:21 | UPS958 | B752 | ARR | 3021 | 2836 | 76.7 | 64 |