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NOISE MONITORING

LEHIGH QUARRY

SANTA CLARA COUNTY

Prepared for

The County of Santa Clara

Prepared by
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Project No. 41-020

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I. Executive Summary

Noise monitoring of the operations at the Lehigh Quarry in Santa Clara County indicated that the noise exposures and noise levels at the property boundaries are in compliance with the adopted standards of the Santa Clara County Noise Element of the General Plan and the Santa Clara County Noise Ordinance. Quarry noise levels at residences in Cupertino are within the limits of the City of Cupertino Noise Ordinance. In addition, noise measurements performed at the DeAnza Oaks residential complex along Stevens Creek Boulevard revealed that the traffic noise levels due to quarry traffic are within the limits of the City of Cupertino Noise Element and the Santa Clara County Noise Element and are within reasonable sound levels for residential properties.

Two days of continuous noise monitoring occurred at four locations. Inclement weather prohibited further noise measurements. Location 1 was at the property line of the quarry slightly north of due east of the main quarry buildings. Location 2 was southeast of the quarry (main buildings) and approximately 900 ft. within the quarry property from the property line. Location 3 was at the north end of the quarry near the future pond site approximately 325 ft. within the quarry property from the property line. Location 4 was on the DeAnza Oaks residential property, behind the soundwall, 80 ft. from the centerline of Stevens Creek Boulevard. These measurement locations were chosen to represent the noise environments at the most impacted quarry property boundaries that are accessible.

In addition to the noise measurement locations chosen for this study, a location at the Cristo Rey residential development adjacent to the Gate of Heaven Cemetery was included herein as this residential development had a partial line-of-sight to the plant operations and was a possible area of concern. Edward L. Pack Associates, Inc. performed the environmental noise study for this development in 1995, and at that time analyzed the quarry operations in detail. Calculations of the noise exposure at the development were again performed for the present study from the latest data, which confirmed the noise exposure measured in 1995.

The residential areas to the east of the quarry, some of which are close to the quarry property line, are generally below the ridge tops of the hills that separate the quarry from the residences. Therefore, topographic shielding provides moderate to significant amounts of natural noise mitigation for the homes, the least amount of which is on the order of 12 decibels, where one ridge top home is close to the property line to the southeast of the quarry, near measurement Location 2. Background traffic noise significantly masks quarry noise to a point where quarry noise cannot be accurately measured, at least during daytime hours or for extended period of time.

Although the quarry operations are audible at many residences from Cupertino to Saratoga, the noise levels are very low and are typically audible only at night when background sound levels diminish. In residential areas in the vicinity of Stevens Creek Boulevard, Foothill Boulevard, I-280 and Highway 85, quarry noise is difficult to distinguish from traffic noise, and for the most part, is inaudible.

The aerial photograph on the following page shows an overview of the quarry area and the noise monitoring locations. The quarry property boundaries to the north and east are represented by the yellow line in the photo. The residence nearest the quarry is indicated by the red arrow.

Because the sound levels at the residences generated by quarry operations are below the thresholds of significance for noise impacts, do not threaten the health and welfare of residents in the area, the Lehigh Quarry is in compliance with the Santa Clara County standards. Mitigation measures will not be required.

II. Background Information on Acoustics

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing. The decibel scale is logarithmic, whereby a sound 10 dB higher than another contains 10 times the sound energy. Decibels are combined using the equation,

$$\text{sum} = 10\log_{10}(10^{SL/10} + 10^{SL/10}).$$



Google

Eye alt 11017 ft

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37°19'03.87" N 122°04'58.05" W elev 683 ft

2915 ft

Imagery Date: Jun 2007 - Jul 2007

The sum of two sound sources of the same level is 3 dB higher than the sound level of one of the sources. For example, $60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB}$. The sum of two sound levels that are 10 dB apart is merely the higher of the two levels, that is, the lower level does not add to the higher level. For example, $50 \text{ dB} + 60 \text{ dB} = 60 \text{ dB}$.

Most of the sounds which we hear in our normal environment do not consist of a single frequency, but rather a broad range of frequencies. As humans do not have perfect hearing, environmental sound measuring instruments have a built-in electrical filter that allows the instrument's detector to replicate human hearing. This filter is called the "A-weighting" network which filters out low and very high frequencies. All environmental noise is reported in terms of A-weighted decibels, notated as dBA. All sound levels used in this report are A-weighted unless otherwise noted. Table I provides the typical human response and noise sources for A-weighted noise levels.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_n , are commonly used. They are the A-weighted noise levels exceeded during n% of a stated time period. Common L_n values are the L_1 , L_{10} , L_{50} and L_{90} , i.e., those levels of noise exceeded 1%, 10%, 50% and 90% of the time. The continuous equivalent-energy level (L_{eq}) is also a common noise descriptor and is the level of a steady state noise which has the same sound energy as a time varying noise. It is often considered the average noise level.

TABLE I

The A-Weighted Decibel Scale, Human Response and Typical Noise Sources

<u>Noise Level, dBA</u>	<u>Human Response</u>	<u>Noise Source</u>	<u>Sound Level</u>
120-150+	Painfully Loud	Sonic Boom	140 dBA
100-120	Physical Discomfort	Fast Motorcycle at 20 ft. Train Horn at 50 ft. Power Mower	110 dBA 104 dBA 100 dBA
70-100	Annoying	Discotheque Diesel Pump at 100 ft. Jet Aircraft at 1000 ft. Freeway at 100 ft.	98 dBA 95 dBA 85 dBA 80 dBA
50-70	Intrusive	Average Traffic at 100 ft. Vacuum Cleaner Television	70 dBA 70 dBA 53 dBA
0-50	Quiet	Normal Conversation Light Traffic at 100 ft. Refrigerator Desktop Computer Whispering	50 dBA 45 dBA 43 dBA 38 dBA 35 dBA

III. Noise Standards

The **noise exposures** presented herein are shown in reference to the Santa Clara County Noise Element, Ref. (a), which utilizes the Day-Night Level (DNL) 24-hour noise descriptor to define community noise impacts. The Noise Element identifies a Land Use Compatibility standard of 55 dB DNL for residential exterior living areas. The DNL is a 24-hour noise descriptor that uses the measured L_{eq} values to calculate a 24-hour time-weighted average noise exposure with a 10 decibel “penalty” to noise that is created at night (10:00 p.m. to 7:00 a.m.). The formula used to calculate the DNL is described in Appendix B.

The **noise levels** were evaluated against the standards of the County of Santa Clara Noise Ordinance, Ref. (b), which limits noise, not by a function of the ambient condition, but by the time of occurrence, duration and noise type. The Santa Clara County Noise Ordinance specifies a basic standard for constant (more than 30 minutes per hour of occurrence) noise, with level limit adjustments depending on the actual duration of the source. A 5 dB upward adjustment is then incorporated for zoning boundaries changes. The noise limits at the residences sharing property lines with the quarry are 5 dB higher than the standard limit.

L_n values can be applied to the corresponding noise source durations so that programmable sound meters can directly measure source noise for direct evaluation against the Noise Ordinance. The County of Santa Clara Noise Ordinance standards are shown in Table II, below.

TABLE II

Santa Clara County Noise Ordinance Limits

		Daytime (7 am - 10 pm)	Nighttime (10 pm - 7 am)
Residential Noise Standard		55 dBA	45 dBA
Zoning Boundary Adjustment (+5 dB)		60 dBA	50 dBA
<u>Adjustments for Duration</u>	<u>L_n</u>		
more than 30 min./hr.	L_{50}	60	50
+5 dB more than 15 min./hr.	L_{25}	65	55
+10 dB more than 5 min./hr.	L_8	70	60
+15 dB more than 1 min./hr.	L_2	75	65
+ 20 dB any time	L_{max}	80	70

The noise exposures for noise sensitive receptors in the City of Cupertino were evaluated against the standards of the City of Cupertino Noise Element, Ref. (c), which also utilizes the DNL descriptor, and identifies a Land Use Compatibility standard of 65 dB DNL for multi-family residential exterior living areas and 60 dB DNL for single-family residences.

The noise levels at noise sensitive receptors were evaluated against the standards of the City of Cupertino Noise Ordinance, Ref. (d), which limits noise to 60 dBA daytime and 50 dBA nighttime.

IV. Acoustical Setting

The Lehigh Quarry is situated near the base of the San Andreas Mountain Range west of the City of Cupertino and south of the City of Los Altos in Santa Clara County. The base elevation of the main quarry plant area (kilns, crushers, dryers, silos and offices) ranges from approximately 600-700 ft. above sea level. A series of ridges is interposed between the residences of Cupertino and the quarry, shielding most of the quarry plant from view. All but a few of the residences are well below the tops of the ridges and do not have a view of the quarry plant. These ridges also provide significant acoustical shielding for the residential areas.

The cement plant operates 24 hours per day while quarrying operations occur for 16 hours (two 8-hour shifts – day and swing) per day. Products for the manufacture of concrete are mined from the hillside to the northwest of the quarry plant. Conveyors and trucks bring raw materials from the hillside down to the plant for sorting, crushing and aggregating. Mixed materials are shipped to nearby batching plants via truck or rail.

Haul trucks access the quarry via Stevens Creek Boulevard, which turns into Permanente Road as it enters the quarry. Single-family and multi-family residential, with some various commercial uses, line both sides of Stevens Creek Boulevard. DeAnza Oaks (multi-family residential) is the last series of homes before entering the quarry. Vehicular traffic on Stevens Creek Boulevard at DeAnza Oaks is due primarily to the quarry.

The City of Los Altos is due north of the quarry with a substantial ridge between Los Altos and the quarry. The ridge rises to approximately 1,300 above sea level and noses down to the quarry base elevation as it nears Stevens Creek Boulevard. The Gate of Heaven Cemetery and a County park are the closest uses to the quarry to the northeast. Single-family homes are adjacent to the cemetery, as is a PG & E substation. Single-family and multi-family homes are to the east, but diverge from the quarry from the northeast to the southeast as they follow the base of the hillside. The Stevens Creek Quarry is adjacent to the south. Scattered, rural homes along Montebello Ridge are to the south and southeast of the quarry property but are approximately 8,000 ft. and more from the plant. The San Andreas Mountain Range is to the west.

V. **Noise Monitoring Results**

A. **Noise Exposures**

Table III provides the measured noise exposures at each of the noise monitoring locations and the noise exposures extrapolated to the nearest quarry property boundary.

TABLE III				
Lehigh Quarry Generated Noise Exposures, dB DNL				
Location	Measurement Location		Property Boundary	
	Day 1	Day 2	Day 1	Day 2
1 – N.E of Plant	55	54	55	54
2 – SE of Plant	54	54	52	50
3- North of Plant	56	57	38	38
4 – DeAnza Oaks	54	54		
5. – Cristo Rey Res.*	49	49		

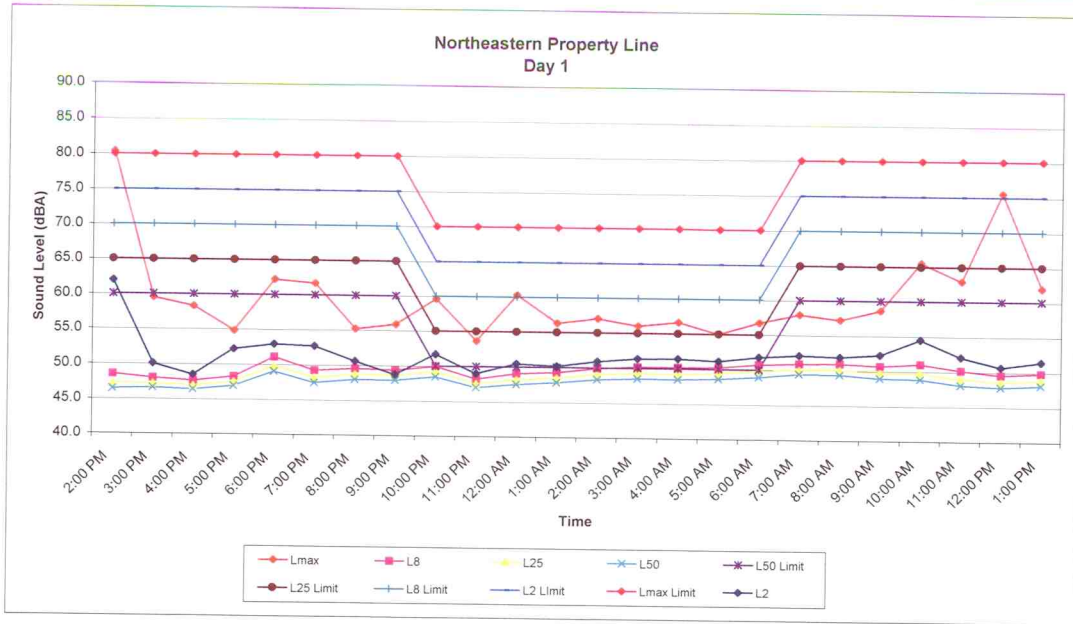
* Measurements made April 25-26, 1995

As shown above, the noise exposures generated by the quarry operations and trucking are within the 55 dB DNL limit of the Santa Clara County Noise Element at the most impacted property boundaries in the vicinity of residential areas or the County Park.

B. Noise Levels

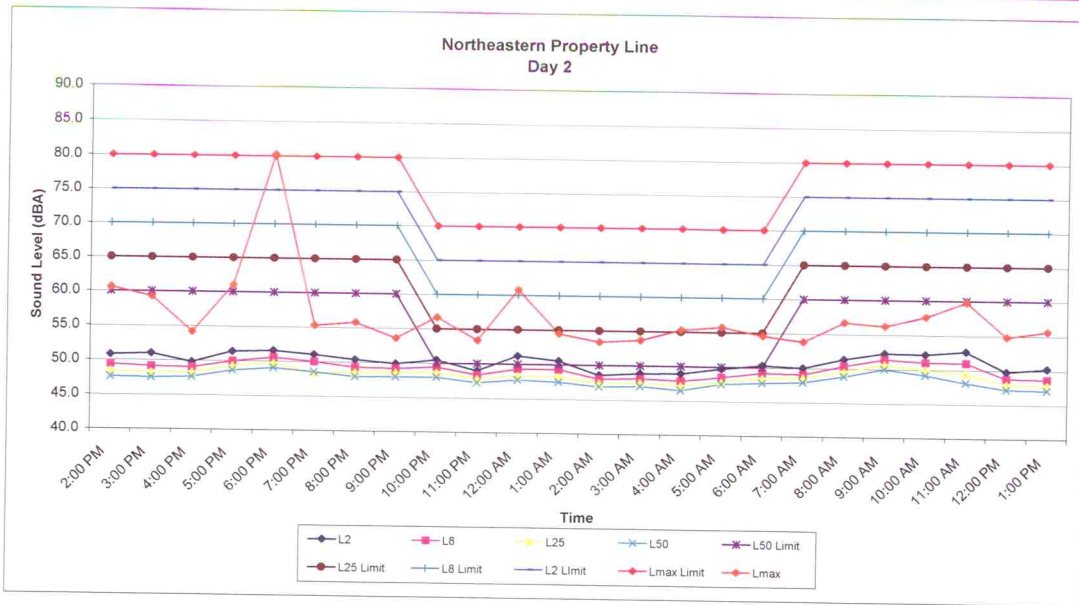
The noise levels presented in the section are in terms of the “L” exceedance values that correspond to the noise limits of the Santa Clara County Noise Ordinance, as described in Section III.

The tables and graphs on the following pages provide the L_{max} , L_2 , L_8 , L_{25} and L_{50} values at the measurement locations and at the most impacted property boundaries nearest the measurement locations. The higher measured maximum sound levels (L_{max}) were due primarily to wildlife sounds and aircraft flyovers. Maximum sound levels in the mid-40 to mid-50 decibel range were due primarily to quarry operations, however, higher maximum sound levels do not represent quarry generated noise.



LEHIGH QUARRY MEAS. LOCATION 1					
DAY 1	Lmax	L2	L8	L25	L50
2:00 PM	80.4	62.0	48.5	47.2	46.4
3:00 PM	59.5	50.0	48.0	47.2	46.6
4:00 PM	58.3	48.4	47.6	46.9	46.4
5:00 PM	54.8	52.1	48.3	47.5	46.9
6:00 PM	62.2	52.9	51.1	49.8	49.0
7:00 PM	61.7	52.6	49.2	48.2	47.5
8:00 PM	55.2	50.6	49.5	48.7	47.9
9:00 PM	55.9	48.7	49.3	48.6	47.9
10:00 PM	59.6	51.6	49.9	49.2	48.4
11:00 PM	53.6	49.0	48.2	47.5	47.0
12:00 AM	60.3	50.4	49.0	48.1	47.5
1:00 AM	56.3	50.2	49.3	48.4	47.8
2:00 AM	57.0	50.9	49.9	49.0	48.3
3:00 AM	56.0	51.3	50.2	49.2	48.5
4:00 AM	56.6	51.4	50.2	49.2	48.4
5:00 AM	55.0	51.1	50.2	49.3	48.6
6:00 AM	56.7	51.7	50.7	49.8	48.9
7:00 AM	57.9	52.1	50.9	50.0	49.4
8:00 AM	57.2	51.9	50.9	50.0	49.4
9:00 AM	58.6	52.3	50.7	49.6	48.9
10:00 AM	65.5	54.5	51.0	49.7	48.8
11:00 AM	62.9	52.0	50.1	48.9	48.0
12:00 PM	75.5	50.6	49.5	48.5	47.8
1:00 PM	61.9	51.4	49.8	48.7	48.0

LEHIGH QUARRY PROPERTY LINE NORTHEAST					
DAY 1	Lmax	L2	L8	L25	L50
2:00 PM	80.4	62.0	48.5	47.2	46.4
3:00 PM	59.5	50.0	48.0	47.2	46.6
4:00 PM	58.3	48.4	47.6	46.9	46.4
5:00 PM	54.8	52.1	48.3	47.5	46.9
6:00 PM	62.2	52.9	51.1	49.8	49.0
7:00 PM	61.7	52.6	49.2	48.2	47.5
8:00 PM	55.2	50.6	49.5	48.7	47.9
9:00 PM	55.9	48.7	49.3	48.6	47.9
10:00 PM	59.6	51.6	49.9	49.2	48.4
11:00 PM	53.6	49.0	48.2	47.5	47.0
12:00 AM	60.3	50.4	49.0	48.1	47.5
1:00 AM	56.3	50.2	49.3	48.4	47.8
2:00 AM	57.0	50.9	49.9	49.0	48.3
3:00 AM	56.0	51.3	50.2	49.2	48.5
4:00 AM	56.6	51.4	50.2	49.2	48.4
5:00 AM	55.0	51.1	50.2	49.3	48.6
6:00 AM	56.7	51.7	50.7	49.8	48.9
7:00 AM	57.9	52.1	50.9	50.0	49.4
8:00 AM	57.2	51.9	50.9	50.0	49.4
9:00 AM	58.6	52.3	50.7	49.6	48.9
10:00 AM	65.5	54.5	51.0	49.7	48.8
11:00 AM	62.9	52.0	50.1	48.9	48.0
12:00 PM	75.5	50.6	49.5	48.5	47.8
1:00 PM	61.9	51.4	49.8	48.7	48.0



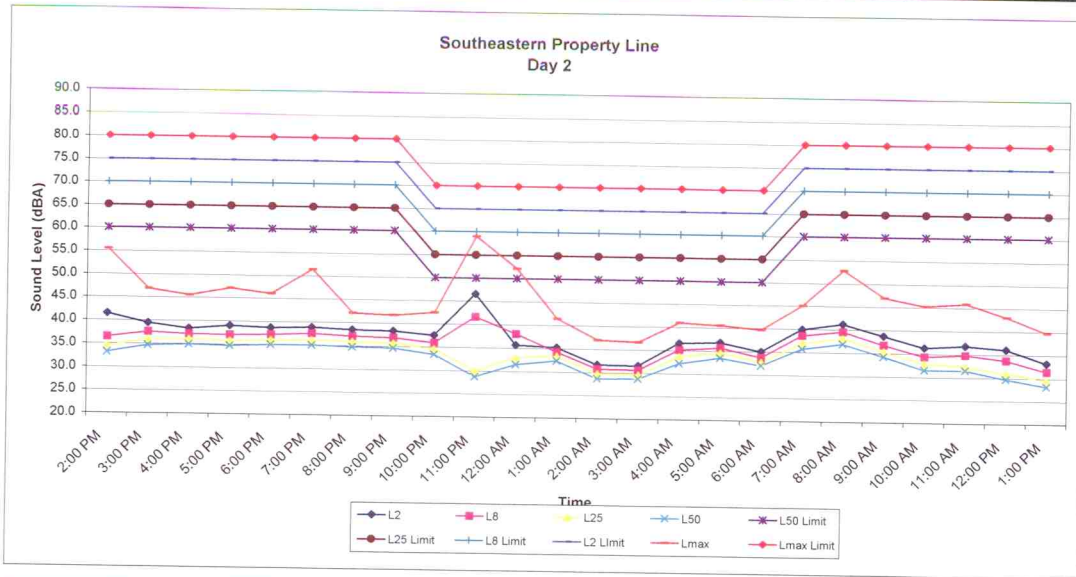
LEHIGH QUARRY MEAS. LOCATION 1					
DAY 2	Lmax	L2	L8	L25	L50
2:00 PM	60.6	50.8	49.4	48.4	47.6
3:00 PM	59.3	51.0	49.1	48.2	47.5
4:00 PM	54.2	49.8	49.0	48.3	47.7
5:00 PM	61.0	51.3	50.0	49.3	48.6
6:00 PM	80.2	51.6	50.6	49.7	49.0
7:00 PM	55.3	51.0	50.0	48.3	48.5
8:00 PM	55.8	50.4	49.2	48.5	47.9
9:00 PM	53.6	49.9	49.2	48.6	48.0
10:00 PM	56.7	50.5	49.5	48.6	48.0
11:00 PM	53.4	49.0	48.4	47.8	47.3
12:00 AM	60.8	51.2	49.3	48.3	47.7
1:00 AM	54.5	50.6	49.3	48.3	47.5
2:00 AM	53.4	48.6	48.0	47.4	46.9
3:00 AM	53.7	48.9	48.2	47.5	47.0
4:00 AM	55.3	48.9	47.9	47.2	46.5
5:00 AM	55.8	49.7	48.5	47.8	47.5
6:00 AM	54.6	50.3	49.2	48.4	47.7
7:00 AM	53.8	50.0	49.1	48.6	47.9
8:00 AM	56.7	51.4	50.4	49.5	48.9
9:00 AM	56.2	52.3	51.4	50.6	49.9
10:00 AM	57.6	52.2	51.1	50.0	49.2
11:00 AM	59.8	52.6	51.0	49.4	48.1
12:00 PM	54.8	49.8	48.8	47.9	47.2
1:00 PM	55.6	50.2	48.7	47.8	47.1

LEHIGH QUARRY PROPERTY LINE NORTHEAST					
DAY 2	Lmax	L2	L8	L25	L50
2:00 PM	60.6	50.8	49.4	48.4	47.6
3:00 PM	59.3	51.0	49.1	48.2	47.5
4:00 PM	54.2	49.8	49.0	48.3	47.7
5:00 PM	61.0	51.3	50.0	49.3	48.6
6:00 PM	80.2	51.6	50.6	49.7	49.0
7:00 PM	55.3	51.0	50.0	48.3	48.5
8:00 PM	55.8	50.4	49.2	48.5	47.9
9:00 PM	53.6	49.9	49.2	48.6	48.0
10:00 PM	56.7	50.5	49.5	48.6	48.0
11:00 PM	53.4	49.0	48.4	47.8	47.3
12:00 AM	60.8	51.2	49.3	48.3	47.7
1:00 AM	54.5	50.6	49.3	48.3	47.5
2:00 AM	53.4	48.6	48.0	47.4	46.9
3:00 AM	53.7	48.9	48.2	47.5	47.0
4:00 AM	55.3	48.9	47.9	47.2	46.5
5:00 AM	55.8	49.7	48.5	47.8	47.5
6:00 AM	54.6	50.3	49.2	48.4	47.7
7:00 AM	53.8	50.0	49.1	48.6	47.9
8:00 AM	56.7	51.4	50.4	49.5	48.9
9:00 AM	56.2	52.3	51.4	50.6	49.9
10:00 AM	57.6	52.2	51.1	50.0	49.2
11:00 AM	59.8	52.6	51.0	49.4	48.1
12:00 PM	54.8	49.8	48.8	47.9	47.2
1:00 PM	55.6	50.2	48.7	47.8	47.1



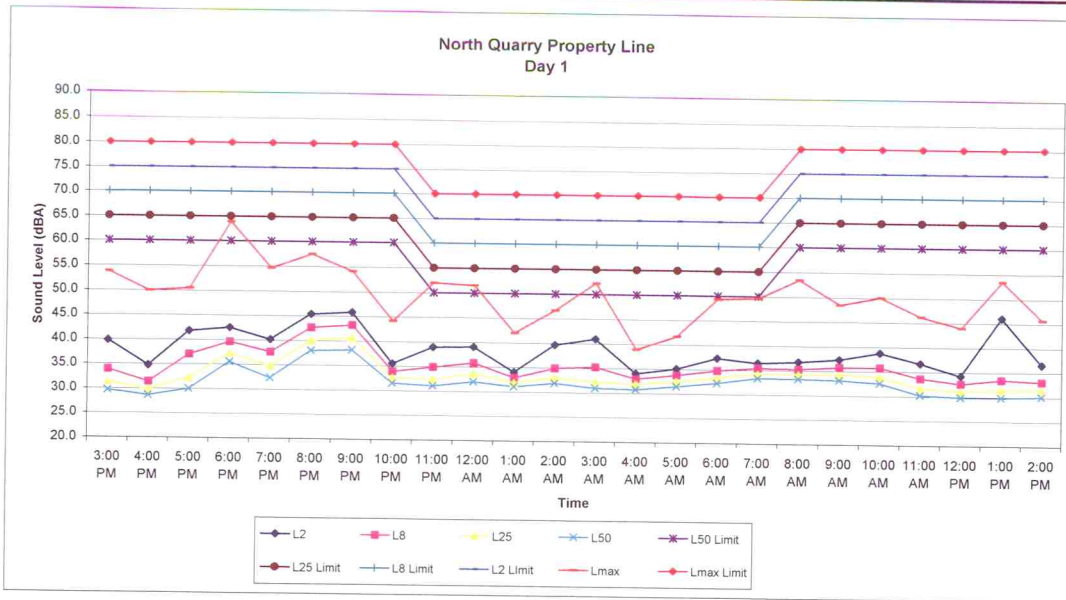
LEHIGH QUARRY LOCATION 2					
DAY 1	Lmax	L2	L8	L25	L50
2:00 PM	62.3	51.1	46.1	44.5	42.9
3:00 PM	57.3	47.7	46.2	44.9	43.7
4:00 PM	59.9	52.5	47.8	45.7	44.2
5:00 PM	65.2	54.2	52.3	50.7	49.1
6:00 PM	62.3	50.8	48.3	46.1	44.7
7:00 PM	65.0	50.2	47.5	45.1	43.7
8:00 PM	59.8	51.1	49.4	47.7	46.3
9:00 PM	61.6	51.9	48.9	46.9	45.5
10:00 PM	62.2	49.0	46.7	44.6	43.1
11:00 PM	64.9	51.6	48.2	45.6	43.6
12:00 AM	57.7	51.2	49.4	47.6	46.1
1:00 AM	55.3	50.3	48.7	47.1	45.7
2:00 AM	55.6	50.1	48.4	46.6	45.0
3:00 AM	54.4	49.9	48.1	46.3	44.9
4:00 AM	56.7	48.9	47.9	46.2	44.6
5:00 AM	56.7	50.6	49.1	47.4	46.1
6:00 AM	55.3	51.6	50.3	49.0	47.9
7:00 AM	58.7	52.7	50.8	49.3	48.1
8:00 AM	61.9	52.8	51.0	49.2	48.0
9:00 AM	64.0	54.8	51.2	48.9	47.5
10:00 AM	66.1	52.4	49.9	48.0	46.7
11:00 AM	60.0	52.3	50.4	48.6	47.2
12:00 PM	60.8	51.3	49.6	47.9	46.7
1:00 PM	67.1	53.5	49.5	47.5	46.2

LEHIGH QUARRY PROPERTY LINE SOUTHEAST					
DAY 1	Lmax	L2	L8	L25	L50
2:00 PM	50.3	39.1	34.1	32.5	30.9
3:00 PM	45.3	35.7	34.2	32.9	31.7
4:00 PM	47.9	40.5	35.8	33.7	32.2
5:00 PM	53.2	42.2	40.3	38.7	37.1
6:00 PM	50.3	38.8	36.3	34.1	32.7
7:00 PM	53.0	38.2	35.5	33.1	31.7
8:00 PM	47.8	39.1	37.4	35.7	34.3
9:00 PM	49.6	39.9	36.9	34.9	33.5
10:00 PM	50.2	37.0	34.7	32.6	31.1
11:00 PM	52.9	39.6	36.2	33.6	31.6
12:00 AM	45.7	39.2	37.4	35.6	34.1
1:00 AM	43.3	38.3	36.7	35.1	33.7
2:00 AM	43.6	38.1	36.4	34.6	33.0
3:00 AM	42.4	37.9	36.1	34.3	32.9
4:00 AM	44.7	36.9	35.9	34.2	32.6
5:00 AM	44.7	38.6	37.1	35.4	34.1
6:00 AM	43.3	39.6	38.3	37.0	35.9
7:00 AM	46.7	40.7	38.8	37.3	36.1
8:00 AM	49.9	40.8	39.0	37.2	36.0
9:00 AM	52.0	42.8	39.2	36.9	35.5
10:00 AM	54.1	40.4	37.9	36.0	34.7
11:00 AM	48.0	40.3	38.4	36.6	35.2
12:00 PM	48.8	39.3	37.6	35.9	34.7
1:00 PM	55.1	41.5	37.5	35.5	34.2



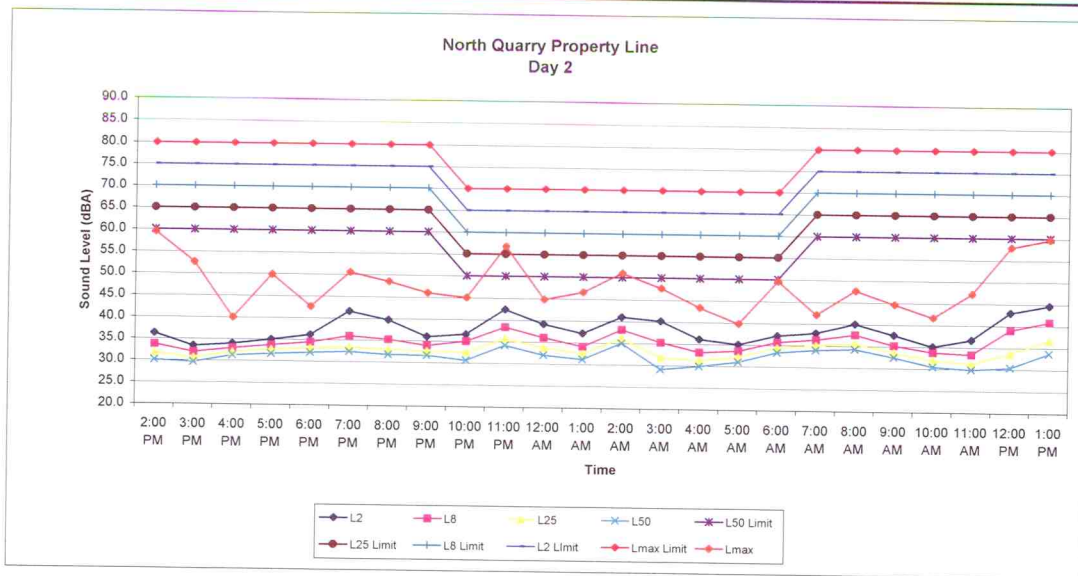
LEHIGH QUARRY LOCATION 2					
DAY 2	Lmax	L2	L8	L25	L50
2:00 PM	67.4	53.5	48.4	46.4	45.1
3:00 PM	58.8	51.4	49.6	47.9	46.6
4:00 PM	57.5	50.3	49.1	48.0	46.9
5:00 PM	59.1	51.0	49.1	47.7	46.6
6:00 PM	58.0	50.6	49.2	47.9	47.0
7:00 PM	63.4	50.9	49.5	48.0	47.0
8:00 PM	54.1	50.4	49.0	47.8	46.7
9:00 PM	53.7	50.3	48.9	47.6	46.6
10:00 PM	54.4	49.5	47.9	46.4	45.3
11:00 PM	71.0	58.5	53.6	41.9	40.7
12:00 AM	64.1	47.6	50.0	44.8	43.4
1:00 AM	53.4	47.2	46.2	45.3	44.3
2:00 AM	48.9	43.6	42.7	41.6	40.6
3:00 AM	48.6	43.5	42.6	41.5	40.7
4:00 AM	52.9	48.5	47.1	45.5	44.1
5:00 AM	52.5	48.8	47.7	46.5	45.4
6:00 AM	51.7	46.9	45.7	44.6	43.9
7:00 AM	57.0	51.9	50.6	48.8	47.6
8:00 AM	64.7	53.1	51.5	50.0	48.8
9:00 AM	58.9	50.7	48.7	47.3	46.2
10:00 AM	57.2	48.2	46.3	44.7	43.4
11:00 AM	57.8	48.7	46.7	44.2	43.4
12:00 PM	55.0	48.0	45.7	42.9	41.6
1:00 PM	51.6	45.1	43.4	41.4	40.1

LEHIGH QUARRY PROPERTY LINE SOUTHEAST					
DAY 2	Lmax	L2	L8	L25	L50
2:00 PM	55.4	41.5	36.4	34.4	33.1
3:00 PM	46.8	39.4	37.6	35.9	34.6
4:00 PM	45.5	38.3	37.1	36.0	34.9
5:00 PM	47.1	39.0	37.1	35.7	34.6
6:00 PM	46.0	38.6	37.2	35.9	35.0
7:00 PM	51.4	38.9	37.5	36.0	35.0
8:00 PM	42.1	38.4	37.0	35.8	34.7
9:00 PM	41.7	38.3	36.9	35.6	34.6
10:00 PM	42.4	37.5	35.9	34.4	33.3
11:00 PM	59.0	46.5	41.6	29.9	28.7
12:00 AM	52.1	35.6	38.0	32.8	31.4
1:00 AM	41.4	35.2	34.2	33.3	32.3
2:00 AM	36.9	31.6	30.7	29.6	28.6
3:00 AM	36.6	31.5	30.6	29.5	28.7
4:00 AM	40.9	36.5	35.1	33.5	32.1
5:00 AM	40.5	36.8	35.7	34.5	33.4
6:00 AM	39.7	34.9	33.7	32.6	31.9
7:00 AM	45.0	39.9	38.6	36.8	35.6
8:00 AM	52.7	41.1	39.5	38.0	36.8
9:00 AM	46.9	38.7	36.7	35.3	34.2
10:00 AM	45.2	36.2	34.3	32.7	31.4
11:00 AM	45.8	36.7	34.7	32.2	31.4
12:00 PM	43.0	36.0	33.7	30.9	29.6
1:00 PM	39.6	33.1	31.4	29.4	28.1



LEHIGH QUARRY LOCATION 3					
DAY 1	Lmax	L2	L8	L25	L50
3:00 PM	70.8	56.8	50.9	48.3	46.7
4:00 PM	66.9	51.7	48.4	46.8	45.6
5:00 PM	67.4	58.7	54.0	49.2	46.9
6:00 PM	80.9	59.4	56.6	54.3	52.5
7:00 PM	71.6	57.1	54.6	51.7	49.3
8:00 PM	74.5	62.3	59.6	57.0	54.9
9:00 PM	71.1	62.8	60.2	57.6	55.1
10:00 PM	61.1	52.5	50.9	49.6	48.5
11:00 PM	69.0	55.9	51.9	49.3	48.0
12:00 AM	68.5	56.0	52.8	50.6	48.9
1:00 AM	58.9	51.0	49.9	48.8	48.0
2:00 AM	63.6	56.6	51.9	49.9	48.8
3:00 AM	69.2	57.9	52.2	49.2	47.9
4:00 AM	55.8	51.0	49.9	48.8	47.7
5:00 AM	58.6	52.0	50.7	49.4	48.4
6:00 AM	66.3	54.3	51.8	50.3	49.2
7:00 AM	66.6	53.4	52.4	51.2	50.3
8:00 AM	70.4	53.7	52.3	51.2	50.2
9:00 AM	65.4	54.3	52.7	51.1	50.0
10:00 AM	67.0	55.7	52.7	50.8	49.5
11:00 AM	63.1	53.6	50.6	48.6	47.2
12:00 PM	60.9	51.2	49.6	48.0	46.8
1:00 PM	70.4	63.0	50.4	48.3	46.8
2:00 PM	62.5	53.5	50.0	48.3	47.0

LEHIGH QUARRY PROPERTY LINE NORTH					
DAY 1	Lmax	L2	L8	L25	L50
3:00 PM	53.8	39.8	33.9	31.3	29.7
4:00 PM	49.9	34.7	31.4	29.8	28.6
5:00 PM	50.4	41.7	37.0	32.2	29.9
6:00 PM	63.9	42.4	39.6	37.3	35.5
7:00 PM	54.6	40.1	37.6	34.7	32.3
8:00 PM	57.5	45.3	42.6	40.0	37.9
9:00 PM	54.1	45.8	43.2	40.6	38.1
10:00 PM	44.1	35.5	33.9	32.6	31.5
11:00 PM	52.0	38.9	34.9	32.3	31.0
12:00 AM	51.5	39.0	35.8	33.6	31.9
1:00 AM	41.9	34.0	32.9	31.8	31.0
2:00 AM	46.6	39.6	34.9	32.9	31.8
3:00 AM	52.2	40.9	35.2	32.2	30.9
4:00 AM	38.8	34.0	32.9	31.8	30.7
5:00 AM	41.6	35.0	33.7	32.4	31.4
6:00 AM	49.3	37.3	34.8	33.3	32.2
7:00 AM	49.6	36.4	35.4	34.2	33.3
8:00 AM	53.4	36.7	35.3	34.2	33.2
9:00 AM	48.4	37.3	35.7	34.1	33.0
10:00 AM	50.0	38.7	35.7	33.8	32.5
11:00 AM	46.1	36.6	33.6	31.6	30.2
12:00 PM	43.9	34.2	32.6	31.0	29.8
1:00 PM	53.4	46.0	33.4	31.3	29.8
2:00 PM	45.5	36.5	33.0	31.3	30.0



LEHIGH QUARRY LOCATION 3					
DAY 2	Lmax	L2	L8	L25	L50
3:00 PM	76.5	53.2	50.7	48.7	47.0
4:00 PM	69.6	50.3	48.9	47.6	46.6
5:00 PM	56.9	50.9	49.9	48.9	48.2
6:00 PM	66.9	51.9	50.7	49.6	48.6
7:00 PM	59.6	53.1	51.4	50.0	49.0
8:00 PM	67.5	58.6	52.9	50.3	49.3
9:00 PM	65.5	56.7	52.2	49.9	48.7
10:00 PM	63.0	52.9	50.9	49.6	48.6
11:00 PM	62.0	53.6	52.0	49.4	47.6
12:00 AM	73.8	59.4	55.3	52.6	51.1
1:00 AM	61.8	56.1	53.0	50.7	49.0
2:00 AM	63.5	54.1	51.0	49.4	48.1
3:00 AM	68.0	57.9	55.0	53.1	51.9
4:00 AM	64.6	57.1	52.2	48.8	46.1
5:00 AM	60.3	53.1	50.1	48.2	46.9
6:00 AM	56.8	52.0	50.5	49.1	48.0
7:00 AM	66.6	54.1	52.6	51.3	50.2
8:00 AM	59.0	54.8	53.3	52.0	50.9
9:00 AM	64.6	57.0	54.5	52.4	51.2
10:00 AM	61.6	54.5	52.1	50.5	49.4
11:00 AM	58.6	52.0	50.7	48.9	47.4
12:00 PM	64.1	53.6	50.2	48.1	46.8
1:00 PM	74.8	59.9	55.9	50.6	47.3
2:00 PM	76.6	61.6	57.8	53.6	50.6

LEHIGH QUARRY PROPERTY LINE NORTH					
DAY 2	Lmax	L2	L8	L25	L50
3:00 PM	59.5	36.2	33.7	31.7	30.0
4:00 PM	52.6	33.3	31.9	30.6	29.6
5:00 PM	39.9	33.9	32.9	31.9	31.2
6:00 PM	49.9	34.9	33.7	32.6	31.6
7:00 PM	42.6	36.1	34.4	33.0	32.0
8:00 PM	50.5	41.6	35.9	33.3	32.3
9:00 PM	48.5	39.7	35.2	32.9	31.7
10:00 PM	46.0	35.9	33.9	32.6	31.6
11:00 PM	45.0	36.6	35.0	32.4	30.6
12:00 AM	56.8	42.4	38.3	35.6	34.1
1:00 AM	44.8	39.1	36.0	33.7	32.0
2:00 AM	46.5	37.1	34.0	32.4	31.1
3:00 AM	51.0	40.9	38.0	36.1	34.9
4:00 AM	47.6	40.1	35.2	31.8	29.1
5:00 AM	43.3	36.1	33.1	31.2	29.9
6:00 AM	39.8	35.0	33.5	32.1	31.0
7:00 AM	49.6	37.1	35.6	34.3	33.2
8:00 AM	42.0	37.8	36.3	35.0	33.9
9:00 AM	47.6	40.0	37.5	35.4	34.2
10:00 AM	44.6	37.5	35.1	33.5	32.4
11:00 AM	41.6	35.0	33.7	31.9	30.4
12:00 PM	47.1	36.6	33.2	31.1	29.8
1:00 PM	57.8	42.9	38.9	33.6	30.3
2:00 PM	59.6	44.6	40.8	36.6	33.6

Location 1, Northeast of the Quarry

Location 1 was located at N 37°19'15.37", W 122°4'53.97", which is approximately 2,950 ft. northeast of the center of the plant. The quarry property boundary is near the measurement location and approximately 3,100 ft. from the center of the plant. Therefore, the sound levels are approximately the same. This location has a line-of-sight to most of the quarry. Heavy vegetation obscures much of the view, but there is little topographic influence on the line-of-sight to the noise producing equipment and operations. The primary sources of noise at this location are the kilns and haul trucks are certain areas in this vicinity as the haul truck route is at the toe of the slope on which this measurement location is situated. Minor movements along the property boundary yield significant shielding of truck noise, thus, the measurement location was a least shielded area.



VIEW OF QUARRY FROM LOCATION 1



VIEW OF VALLEY TO NORTHEAST FROM LOCATION 1

As shown in the graphs and tables, the L_{\max} (1 second rms of a peak acoustic event in the hour) values at measurement Location 1, ranged from 54.8 to 80.4 dBA during the daytime on Day 1 and from 53.6 to 80.2 dBA during the daytime on Day 2. The L_2 's ranged from 53.6 to 60.3 dBA at night on Day 1 and from 53.4 to 60.8 dBA at night on Day 2. The L_2 's at the property boundary to the northeast are within the 80 dBA daytime and 70 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_2 (1 minute out of the hour) values at measurement Location 1 ranged from 48.4 to 62.0 dBA during the daytime on Day 1 and from 49.8 to 52.6 dBA during the daytime on Day 2. The L_2 's ranged from 49.0 to 51.7 dBA at night on Day 1 and from 48.6 to 51.2 dBA at night on Day 2. The quarry property boundary is near the measurement location and approximately 3,100 ft. from the center of the plant. Therefore, the sound levels are approximately the same. The L_2 's at the property boundary to the northeast are within the 75 dBA daytime and 65 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_8 (5 minutes out of the hour) values at measurement Location 1 and at the property boundary to the northeast ranged from 47.6 to 51.1 dBA during the daytime on Day 1 and from 48.7 to 51.4 dBA during the daytime on Day 2. The L_8 's ranged from 48.2 to 50.7 dBA at night on Day 1 and from 47.9 to 49.5 dBA at night on Day 2. Thus, the L_8 values to the northeast of the quarry are within the 70 dBA daytime and 60 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{25} (15 minutes out of the hour) values at measurement Location 1 and the property boundary to the northeast ranged from 46.9 to 50.0 dBA during the daytime on Day 1 and from 47.8 to 51.4 dBA during the daytime on Day 2. The L_{25} 's ranged from 47.5 to 49.8 dBA at night on Day 1 and from 47.2 to 48.6 dBA at night on Day 2. Thus, the L_{25} values to the northeast of the quarry are within the 65 dBA daytime and 55 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{50} (30 minutes out of the hour) values at measurement Location 1 and the property boundary to the northeast ranged from 46.4 to 49.4 dBA during the daytime on Day 1 and from 47.1 to 49.9 dBA during the daytime on Day 2. The L_{50} 's ranged from 47.0 to 48.9 dBA at night on Day 1 and from 46.5 to 48.0 dBA at night on Day 2. Thus, the L_{50} values to the northeast of the quarry the quarry property boundaries are within the 60 dBA daytime and 50 dBA nighttime limits of the Santa Clara County Noise Ordinance.

Location 2, Southeast of the Quarry

Location 2 was located at N 37°18'41.28", W 22°4'53.97", which is approximately 3,400 ft. southeast of the center of the plant. The quarry property boundary is approximately 900 ft. farther from the center of the plant than the measurement location. The property boundary is also down slope from the top of the ridge at the measurement location. Note that the trail to the property boundary was overgrown and inaccessible. The increase in distance yields a 2 decibel reduction from the measured noise levels and the topographic shielding from the hill yields a 12 dB reduction in the measured noise levels. The following photograph was taken approximately 1,250 closer to the quarry than the measurement location. Although the elevation is higher, the view from the measurement location is completely obscured by vegetation. The only sound audible from the quarry are the kilns, which are slightly audible.



VIEW OF QUARRY FROM WEST OF LOCATION 2

The L_{\max} 's at measurement Location 2 ranged from 47.7 to 54.8 dBA during the daytime on Day 1 and from 51.6 to 67.4 dBA during the daytime on Day 2. The L_{\max} 's ranged from 48.9 to 51.6 dBA at night on Day 1 and from 48.6 to 71.0 dBA at night on Day 2.

The L_{\max} values at the property boundary ranged from 45.3 to 55.1 dBA during the daytime on Day 1 and from 39.6 to 55.4 dBA during the daytime on Day 2. The L_{\max} 's ranged from 42.4 to 52.9 dBA at night on Day 1 and from 36.6 to 59.0 dBA at night on Day 2. The L_{\max} 's at the property boundary to the southeast are within the 80 dBA daytime and 70 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_2 values at measurement Location 2 ranged from 47.7 to 54.8 dBA during the daytime on Day 1 and from 45.1 to 53.5 dBA during the daytime on Day 2. The L_2 's ranged from 48.9 to 51.6 dBA at night on Day 1 and from 43.5 to 58.5 dBA at night on Day 2.

The L_2 values at the property boundary ranged from 35.7 to 42.8 dBA during the daytime on Day 1 and from 33.1 to 41.5 dBA during the daytime on Day 2. The L_2 's ranged from 36.9 to 39.6 dBA at night on Day 1 and from 31.5 to 46.5 dBA at night on Day 2. The L_2 's at the property boundary to the southeast are within the 75 dBA daytime and 65 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_8 values at measurement Location 2 ranged from 46.1 to 52.3 dBA during the daytime on Day 1 and from 43.4 to 51.5 dBA during the daytime on Day 2. The L_8 's ranged from 46.7 to 50.3 dBA at night on Day 1 and from 42.6 to 53.6 dBA at night on Day 2.

The L_8 values at the property boundary ranged from 34.1 to 40.3 dBA during the daytime on Day 1 and from 31.4 to 39.5 dBA during the daytime on Day 2. The L_8 's ranged from 34.7 to 37.4 dBA at night on Day 1 and from 30.6 to 41.6 dBA at night on Day 2. Thus, the L_8 values to the southeast of the quarry are within the 70 dBA daytime and 60 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{25} values at measurement Location 2 ranged from 44.5 to 50.7 dBA during the daytime on Day 1 and from 41.4 to 50.0 dBA during the daytime on Day 2. The L_{25} 's ranged from 44.6 to 49.0 dBA at night on Day 1 and from 41.5 to 46.5 dBA at night on Day 2.

The L_{25} values at the property boundary ranged from 32.5 to 38.7 dBA during the daytime on Day 1 and from 29.4 to 38.0 dBA during the daytime on Day 2. The L_{25} 's ranged from 32.6 to 37.0 dBA at night on Day 1 and from 29.5 to 34.5 dBA at night on Day 2. Thus, the L_{25} values to the southeast of the quarry are within the 65 dBA daytime and 55 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{50} values at measurement Location 2 ranged from 42.9 to 49.1 dBA during the daytime on Day 1 and from 40.1 to 48.8 dBA during the daytime on Day 2. The L_{50} 's ranged from 43.1 to 47.9 dBA at night on Day 1 and from 40.6 to 45.4 dBA at night on Day 2.

The L_{50} values at the property boundary ranged from 30.9 to 37.1 dBA during the daytime on Day 1 and from 28.1 to 36.8 dBA during the daytime on Day 2. The L_{50} 's ranged from 31.1 to 35.9 dBA at night on Day 1 and from 28.6 to 33.4 dBA at night on Day 2. Thus, the L_{50} values to the southeast of the quarry are within the 60 dBA daytime and 50 dBA nighttime limits of the Santa Clara County Noise Ordinance.

Location 3, North of the Quarry

Measurement Location 3 was at N 37°19'26.27", W 22°05'04.2", which is approximately 2,875 ft. north of the center of the plant. The quarry property boundary is approximately 325 ft. farther from the center of the plant than the measurement location. The property boundary is also down slope from the shoulder of the slope at the measurement location. The hillside slopes steeply down from the measurement location to the property boundary.

Most of the cement plant/quarry operational noise sources are audible at the measurement location, with the exception of quarrying equipment (bulldozers, loaders, etc.) in the rock quarry area. The kilns, crushers, haul trucks and other sources of noise at the main plant area are audible.

The access to the property boundary would be from the County park, however, due to the acoustical shielding from the natural topography, quarry noise would not have been measurable because of background traffic noise. The increase in distance yields a 1 decibel reduction from the measured noise levels and topographic shielding from the hill yields a 17 dB reduction in the measured noise levels.



VIEW OF SOUND METER AT LOCATION 3



VIEW OF QUARRY FROM LOCATION 3

The L_{\max} values at measurement Location 3 ranged from 60.9 to 80.9 dBA during the daytime on Day 1 and from 56.9 to 76.6 dBA during the daytime on Day 2. The L_{\max} 's ranged from 55.8 to 69.2 dBA at night on Day 1 and from 56.8 to 73.8 dBA at night on Day 2.

The L_{\max} values at the property boundary ranged from 43.9 to 63.9 dBA during the daytime on Day 1 and from 39.9 to 59.6 dBA during the daytime on Day 2. The L_{\max} 's ranged from 38.8 to 52.2 dBA at night on Day 1 and from 39.8 to 56.8 dBA at night on Day 2. The L_{\max} 's at the property boundary to the north are within the 80 dBA daytime and 70 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_2 values at measurement Location 3 ranged from 51.2 to 63.0 dBA during the daytime on Day 1 and from 50.3 to 61.6 dBA during the daytime on Day 2. The L_2 's ranged from 51.0 to 57.9 dBA at night on Day 1 and from 52.0 to 59.4 dBA at night on Day 2.

The L_2 values at the property boundary ranged from 34.2 to 46.0 dBA during the daytime on Day 1 and from 33.3 to 44.6 dBA during the daytime on Day 2. The L_2 's ranged from 34.0 to 40.9 dBA at night on Day 1 and from 35.0 to 42.4 dBA at night on Day 2. The L_2 's at the property boundary to the north are within the 75 dBA daytime and 65 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_8 values at measurement Location 3 ranged from 48.4 to 60.2 dBA during the daytime on Day 1 and from 48.9 to 57.8 dBA during the daytime on Day 2. The L_8 's ranged from 49.9 to 52.8 dBA at night on Day 1 and from 50.1 to 55.3 dBA at night on Day 2.

The L_8 values at the property boundary ranged from 31.4 to 43.2 dBA during the daytime on Day 1 and from 31.9 to 40.8 dBA during the daytime on Day 2. The L_8 's ranged from 32.9 to 35.8 dBA at night on Day 1 and from 33.1 to 38.3 dBA at night on Day 2. Thus, the L_8 values to the north of the quarry are within the 70 dBA daytime and 60 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{25} values at measurement Location 3 ranged from 46.8 to 57.6 dBA during the daytime on Day 1 and from 47.6 to 53.6 dBA during the daytime on Day 2. The L_{25} 's ranged from 48.8 to 50.6 dBA at night on Day 1 and from 48.2 to 53.1 dBA at night on Day 2.

The L_{25} values at the property boundary ranged from 29.8 to 40.6 dBA during the daytime on Day 1 and from 30.6 to 36.6 dBA during the daytime on Day 2. The L_{25} 's ranged from 31.8 to 33.6 dBA at night on Day 1 and from 31.2 to 36.1 dBA at night on Day 2. Thus, the L_{25} values to the north of the quarry are within the 65 dBA daytime and 55 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{50} values at measurement Location 3 ranged from 45.6 to 55.1 dBA during the daytime on Day 1 and from 46.6 to 51.2 dBA during the daytime on Day 2. The L_{50} 's ranged from 47.7 to 49.2 dBA at night on Day 1 and from 46.1 to 51.9 dBA at night on Day 2.

The L_{50} values at the property boundary ranged from 28.6 to 38.1 dBA during the daytime on Day 1 and from 29.6 to 34.2 dBA during the daytime on Day 2. The L_{50} 's ranged from 30.7 to 32.2 dBA at night on Day 1 and from 29.1 to 34.9 dBA at night on Day 2. Thus, the L_{50} values to the north of the quarry are within the 60 dBA daytime and 50 dBA nighttime limits of the Santa Clara County Noise Ordinance.

Location 4, DeAnza Oaks

The Santa Clara County Noise Ordinance does not apply to vehicular traffic on public thoroughfares. As the DeAnza Oaks property is in the City of Cupertino, the noise exposures at the measurement location are shown in relation to the land use compatibility standards of the City of Cupertino Noise Element of 60 dB DNL single-family residential and 65 dB DNL for multi-family residential and the Santa Clara County Noise Element of 55 dB DNL. Noise from the quarry is not audible at the measurement location along Stevens Creek Boulevard. However, at areas within the development, such as the swimming pool locations, noise from the kilns are slightly audible during lulls in background traffic. The noise levels are too low to measure accurately.

The DNL for the survey location was calculated using the measured L_{eq} 's. The L_{eq} 's at 80 ft. from the centerline of the Stevens Creek Boulevard and behind the 6 ft. high soundwall along the property ranged from 41.6 to 55.0 dBA during the daytime on Day 1 and from 42.8 to 58.3 dBA during the daytime on Day 2. The L_{eq} 's also ranged from 40.5 to 51.7 dBA during the night on Day 1 and from 41.5 to 50.8 dBA at night on Day 2.

The noise exposures due to quarry traffic (trucks and automobiles) at the DeAnza Oaks multi-family development behind the soundwall were calculated to be 54 dB DNL on Day 1 and 54 dB DNL on Day 2.

For locations along Steven Creek Boulevard that do not have noise control barriers for traffic noise reduction, which are mostly single-family homes that face the road, the noise exposures due to quarry traffic (calculated from the DeAnza Oaks data as this location is exposed only to quarry traffic noise) is 60 dB DNL at a distance of 80 ft. from the centerline of the road. Residences along Stevens Creek Boulevard that do not have noise barriers are to the east of the DeAnza Oaks development and are exposed to traffic from other local sources.

Location 5, Cristo Rey Residential

The nearest residential area beyond the property line to the north (northeast) is the Cristo Rey development adjacent to the north of the Gate of Heaven Cemetery. This development is in the City of Cupertino. In 1995, Edward L. Pack Associates, Inc. performed a noise assessment study for the developer of the project, Ref. (e), which analyzed noise from the (at the time) Kaiser Permanente quarry. That study revealed that the noise levels at the project site from the quarry/cement plant ranged from 37 to 44 dBA. The noise exposure was calculated to be 49 dB DNL. Extrapolating the measured noise exposures of 54 and 55 dB DNL at measurement Location 3 from 2,875 ft. to 5,400 ft. from the plant, the additional distance provides a 5 dB reduction of the measured noise levels. Topography provides 4 dB of plant noise reduction. The total change in noise exposure from measurement Location 3 and the residential development was calculated to be 9 decibels. Thus, the noise exposures at the Cristo Rey residences were calculated to be 47-48 dB DNL. Thus, noise from the quarry/cement plant has not changed insignificantly over the last 15 years.

The photograph on the following page was taken from measurement Location 3.



VIEW OF CEMETERY, PARK AND CRISTO REY DEVELOPMENT

The L_n values at the Cristo Rey development from quarry operations were calculated from the measured noise levels at the site during the environmental noise study for the project.

The L_{max} 's ranged from 41 to 44 dBA during the daytime and from 41 to 44 dBA at night. The L_{max} 's at the Cristo Rey residences to the north are within the 80 dBA daytime and 70 dBA nighttime limits of the Santa Clara County Noise Ordinance and the 60 dBA daytime and 50 dBA nighttime limits of the City of Cupertino Noise Ordinance.

The L_2 's ranged from 41 to 42 dBA during the daytime and from 39 to 43 dBA at night. The L_2 's at the Cristo Rey residences to the north are within the 75 dBA daytime and 65 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_8 's ranged from 40 to 41 dBA during the daytime and from 38 to 41 dBA at night. Thus, the L_8 values at the Cristo Rey residences to the north of the quarry are within the 70 dBA daytime and 60 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{25} 's ranged from 39 to 40 dBA during the daytime and from 39 to 40 dBA at night. Thus, the L_{25} values at the Cristo Rey residences to the north of the quarry are within the 65 dBA daytime and 55 dBA nighttime limits of the Santa Clara County Noise Ordinance.

The L_{50} 's were 39 dBA during the daytime and nighttime periods. Thus, the L_{50} values at the Cristo Rey residences to the north of the quarry are within the 60 dBA daytime and 50 dBA nighttime limits of the Santa Clara County Noise Ordinance.

VI. Description of the Analytical Methodologies

To determine the noise environment at the measurement locations and ultimately, the property boundaries, continuous recordings of the sound levels were made at the previously described measurement locations to the northeast, to the southeast, to the north and at the DeAnza Oaks property. The sound level measurements were made on November 17-19, 2009 (2:00 p.m. Tuesday to 2:00 p.m. Thursday) for a continuous 48-hour period and were recorded and processed using Larson-Davis LDL 812 Precision Integrating Sound Level Meters.

The meters yield, by direct readout, a series of descriptors of the sound levels versus time, as described in Appendix A. The results of the sound level measurements are shown in the data tables in Section V-B. The measured descriptors included the L_2 , L_8 , L_{25} and L_{50} , i.e., those levels exceeded for 2% (1 minute/hour), 8% (5 minutes/hour), 25% (15 minutes/hour), and 50% (30 minutes/hour) of the time. Also measured were the maximum and minimum levels and the continuous equivalent-energy levels (L_{eq}), which are used to calculate the DNL.

To evaluate the noise exposures against the Santa Clara County standards, the DNL's for the survey locations were calculated by decibel averaging of the L_{eq} 's as they apply to the daily time periods of the DNL index. The DNL is a 24-hour noise descriptor that uses the measured L_{eq} values to calculate a 24-hour time-weighted average noise exposure. The formula used to calculate the DNL's is described in Appendix B. The results of the calculations are shown in Appendix C.

According to Lehigh Quarry personnel, Ref. (f), that during the 48-hour measurement period, the cement plant was operating 24-hours per day with the exception of the rock crusher which was non-operational during the day shift on Thursday the 19th. All of the remaining major equipment at the plant including the mills and the kilns were fully operational during the measurement period. Truck volumes were normal for full capacity operations.

The truck (cement and aggregate) volumes were reported to be:

378 trucks Tuesday (midnight to midnight)

426 trucks Wednesday (midnight to midnight)

330 trucks Thursday (midnight to midnight).

VII. Conclusions

In conclusion, the sound levels generated by the Lehigh Quarry operations are within the limits of the County of Santa Clara Noise Element and Noise Ordinance standards and within the City of Cupertino Noise Element and Noise Ordinance standards. Future noise exposures and noise levels are predicted to remain similar to present levels as the main noise producing sources analyzed in this study are not expected to re-locate or operate for increased durations.

The above report presents the results of noise monitoring of Lehigh Quarry plant and trucking operations in Santa Clara County. If you have any questions or would like an elaboration on this report, please call me.

Prepared By:

EDWARD L. PACK ASSOC., INC.

A handwritten signature in blue ink, appearing to read "Jeffrey K. Pack", is written over a horizontal line.

Jeffrey K. Pack
President

APPENDIX A

References

- (a) Noise Ordinance of the County of Santa Clara, Chapter VII, Section B11-192, 1981
- (b) Santa Clara County General Plan, Health and Safety Element, Section I, 1995
- (c) City of Cupertino Draft General Plan, Public Health and Safety Element, “Noise Pollution”, Chapter 6, 2001
- (d) City of Cupertino Municipal Code, Title 10, Chapter 10-48, “Community Noise Control”
- (e) “Kaiser Permanente Cement Plant Noise Assessment Study For the Planned ‘Cristo Rey’ Single-Family Residential Development, Cupertino”, by Edward L. Pack Associates, Inc., Project No. 27-034, April 28, 1995
- (f) Information on Lehigh Quarry and Trucking Operations Provided by Mr. Henrik Wesserling, via email to Edward L. Pack Associates, Inc., March 9, 2010

APPENDIX B

Terminology, Instrumentation,

1. Terminology

A. Statistical Noise Levels

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the sound level meters. The statistical levels used in the Santa Clara County Noise Ordinance to describe community noise violations are defined as follows:

- L_{max} - The maximum 1 second root-mean-square of a sound's waveform
- L_2 - A noise level exceeded for 2% of the time
- L_8 - A noise level exceeded for 8% of the time, considered to be an "intrusive" level.
- L_{25} - The noise level exceeded 50% of the time.
- L_{50} - The noise level exceeded 90 % of the time, representing the "mean" noise level.

B. A-Weighted Sound Level

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.

2. Instrumentation

The on-site field measurement data were acquired by the use of one of the instruments specified below, which provides a direct readout of the L exceedance statistical levels including the equivalent-energy level (L_{eq}). Input to the instrument was provided by a microphone extended to a height of 5 ft. above the ground on using a tripod or mast. The "A" weighting network and the "Fast" response setting of the instruments were used in conformance with the applicable standards. The instruments conform to American National Standards Institute (ANSI) standard S1.4 for Type I instruments, and all instrumentation was acoustically calibrated before and after field tests to assure accuracy.

Instruments used for field surveys:

Larson-Davis Model 812 Integrating Sound Level Meter

Brüel & Kjær Model 2231 Precision Sound Level Meter

Larson Davis Model 2900 Real Time Analyzer

APPENDIX C

Noise Measurement Data and Calculation Tables

DNL CALCULATIONS

CLIENT: SANTA CLARA CO.
 FILE: 41-020
 PROJECT: LEHIGH QUARRY
 DATE: 11/18-20/2009
 SOURCE: QUARRY OPERATIONS

LOCATION 1 Northeast Prop. Line		
TIME	DAY 1 Leq	10 ⁿ Leq/10
7:00 AM	49.6	91257.0
8:00 AM	49.5	89930.9
9:00 AM	49.2	83151.0
10:00 AM	49.5	89794.4
11:00 AM	48.5	71051.7
12:00 PM	48.2	65725.4
1:00 PM	48.4	68444.1
2:00 PM	52.7	187425.5
3:00 PM	46.9	48516.6
4:00 PM	46.5	44368.6
5:00 PM	47.4	54522.9
6:00 PM	49.4	87912.5
7:00 PM	48.0	63333.0
8:00 PM	48.2	65809.5
9:00 PM	48.1	64971.7
10:00 PM	48.6	1176215
11:00 PM	47.1	48.9
12:00 AM	47.7	73275.0
1:00 AM	48.0	51087.4
2:00 AM	48.0	58737.8
3:00 AM	48.5	62569.9
4:00 AM	48.5	70096.6
5:00 AM	48.7	73882.5
6:00 AM	48.9	76850.6
7:00 AM	49.0	79420.6
8:00 AM	49.3	85037.5
9:00 AM		SUM=
10:00 AM		1176215
11:00 AM		48.9
12:00 AM		73275.0
1:00 AM		Ld=
2:00 AM		51087.4
3:00 AM		58737.8
4:00 AM		62569.9
5:00 AM		70096.6
6:00 AM		73882.5
7:00 AM		76850.6
8:00 AM		79420.6
9:00 AM		85037.5
10:00 AM		SUM=
11:00 AM		630958
12:00 AM		48.5
1:00 AM		1.0
2:00 AM		1.0
3:00 AM		60.7
4:00 AM		68.0
5:00 AM		Daytime Level=
6:00 AM		Nighttime Level=
7:00 AM		60.7
8:00 AM		68.0
9:00 AM		DNL=
10:00 AM		55
11:00 AM		24-Hour Leq=
12:00 AM		48.8

LOCATION 1 Northeast Prop. Line		
TIME	DAY 2 Leq	10 ⁿ Leq/10
7:00 AM	48.1	64565.4
8:00 AM	49.2	83176.4
9:00 AM	49.8	95499.3
10:00 AM	48.8	75857.8
11:00 AM	47.6	57544.0
12:00 PM	47.6	57544.0
1:00 PM	47.8	60256.0
2:00 PM	47.9	62096.6
3:00 PM	47.8	60395.0
4:00 PM	47.8	60419.7
5:00 PM	48.8	76487.4
6:00 PM	49.8	95491.6
7:00 PM	48.7	74150.8
8:00 PM	48.1	64532.9
9:00 PM	48.1	64137.1
10:00 PM	48.1	SUM=
11:00 PM	47.3	1052154
12:00 AM	48.0	48.5
1:00 AM	47.8	65112.1
2:00 AM	47.8	Ld=
3:00 AM	46.9	53849.6
4:00 AM	46.9	62858.7
5:00 AM	47.2	59583.5
6:00 AM	46.8	49180.2
7:00 AM	47.2	51949.8
8:00 AM	46.8	47333.7
9:00 AM	47.3	54092.8
10:00 AM	48.0	62479.2
11:00 AM		SUM=
12:00 AM		506440
1:00 AM		1.0
2:00 AM		1.0
3:00 AM		60.3
4:00 AM		67.0
5:00 AM		Daytime Level=
6:00 AM		Nighttime Level=
7:00 AM		60.3
8:00 AM		67.0
9:00 AM		DNL=
10:00 AM		54
11:00 AM		24-Hour Leq=
12:00 AM		48.1

DNL CALCULATIONS

CLIENT: SANTA CLARA CO.
 FILE: 41-020
 PROJECT: LEHIGH QUARRY
 DATE: 11/18-20/2009
 SOURCE: QUARRY OPERATIONS

LOCATION 2		Near Southeast Prop. Line	
TIME	Day 1 Leq	10 ⁿ Leq/10	
7:00 AM	44.1	25946.0	
8:00 AM	44.1	25912.5	
9:00 AM	45.5	35845.5	
10:00 AM	49.9	96630.3	
11:00 AM	45.6	36698.9	
12:00 PM	44.8	30447.2	
1:00 PM	47.0	49995.7	
2:00 PM	46.4	44045.4	
3:00 PM	44.1	25928.6	
4:00 PM	45.4	34369.0	
5:00 PM	46.8	47993.3	
6:00 PM	46.2	42051.9	
7:00 PM	45.6	36711.8	
8:00 PM	45.6	36016.6	
9:00 PM	45.3	34212.9	SUM= 602806
10:00 PM	46.7	46930.6	Ld= 46.0
11:00 PM	48.3	67524.3	
12:00 AM	48.7	73972.1	
1:00 AM	48.7	73435.0	
2:00 AM	48.7	74134.9	
3:00 AM	47.5	56747.4	
4:00 AM	48.0	62393.8	
5:00 AM	47.3	53088.8	
6:00 AM	47.5	55814.1	SUM= 564041
			Ld= 48.0
			Daytime Level= 57.8
			Nighttime Level= 67.5
			DNL= 54
			24-Hour Leq= 46.9

LOCATION 2		Near Southeast Prop. Line	
TIME	Day 2 Leq	10 ⁿ Leq/10	
7:00 AM	46.7	46765.3	
8:00 AM	47.2	52490.6	
9:00 AM	47.2	52570.1	
10:00 AM	47.1	51243.3	
11:00 AM	47.4	54493.3	
12:00 PM	47.8	60177.7	
1:00 PM	47.1	51398.5	
2:00 PM	46.9	48981.1	
3:00 PM	45.8	37618.1	
4:00 PM	48.0	63637.9	
5:00 PM	45.5	35727.7	
6:00 PM	44.5	28365.4	
7:00 PM	40.9	12314.3	
8:00 PM	40.6	11586.4	
9:00 PM	44.7	29287.9	SUM= 636658
10:00 PM	45.7	37118.7	Ld= 46.3
11:00 PM	44.1	25774.2	
12:00 AM	48.2	65562.5	
1:00 AM	49.3	85996.2	
2:00 AM	46.7	46985.1	
3:00 AM	44.0	25194.6	
4:00 AM	44.2	26124.7	
5:00 AM	42.6	18278.4	
6:00 AM	40.9	12303.3	SUM= 343338
			Ld= 45.8
			Daytime Level= 58.1
			Nighttime Level= 65.3
			DNL= 52
			24-Hour Leq= 46.1

DNL CALCULATIONS

CLIENT: SANTA CLARA CO.
 FILE: 41-020
 PROJECT: LEHIGH QUARRY
 DATE: 11/18-20/2009
 SOURCE: QUARRY OPERATIONS

LOCATION 3 North Quarry Area @ Future Pond Site		
TIME	Day 1 Leq	10 ⁿ Leq/10
7:00 AM	50.6	114815.4
8:00 AM	50.6	114815.4
9:00 AM	50.6	114815.4
10:00 AM	50.7	117489.8
11:00 AM	48.3	67608.3
12:00 PM	47.3	53703.2
1:00 PM	48.0	63095.7
2:00 PM	48.0	63095.7
3:00 PM	49.4	87096.4
4:00 PM	46.8	47863.0
5:00 PM	50.2	104712.9
6:00 PM	54.2	263026.8
7:00 PM	51.5	141253.8
8:00 PM	56.5	446683.6
9:00 PM	56.6	457088.2
10:00 PM	49.0	79432.8
11:00 PM	49.4	87096.4
12:00 AM	50.2	104712.9
1:00 AM	48.2	66069.3
2:00 AM	50.0	100000.0
3:00 AM	49.9	97723.7
4:00 AM	48.0	63095.7
5:00 AM	48.7	74131.0
6:00 AM	50.0	100000.0
		SUM=
		Ld=
		772262
		49.3
Daytime Level=		63.6
Nighttime Level=		68.8
DNL=		56
24-Hour Leq=		51.0

LOCATION 3 North Quarry Area @ Future Pond Site		
TIME	Day 2 Leq	10 ⁿ Leq/10
7:00 AM	50.5	112201.8
8:00 AM	51.3	134896.3
9:00 AM	52.1	162181.0
10:00 AM	50.0	100000.0
11:00 AM	48.1	64565.4
12:00 PM	47.9	61659.5
1:00 PM	51.9	154881.7
2:00 PM	54.3	269153.5
3:00 PM	48.5	70794.6
4:00 PM	47.1	51286.1
5:00 PM	48.4	69183.1
6:00 PM	49.1	81283.1
7:00 PM	49.5	89125.1
8:00 PM	51.0	125892.5
9:00 PM	50.2	104712.9
10:00 PM	49.2	83176.4
11:00 PM	48.9	77624.7
12:00 AM	52.9	194984.5
1:00 AM	50.2	104712.9
2:00 AM	49.0	79432.8
3:00 AM	52.7	186208.7
4:00 AM	49.1	81283.1
5:00 AM	47.7	58884.4
6:00 AM	48.4	69183.1
		SUM=
		Ld=
		935490
		50.2
Daytime Level=		62.2
Nighttime Level=		69.7
DNL=		57
24-Hour Leq=		50.3

DNL CALCULATIONS

CLIENT: SANTA CLARA CO.
 FILE: 41-020
 PROJECT: LEHIGH QUARRY
 DATE: 11/18-20/2009
 SOURCE: QUARRY OPERATIONS

LOCATION 4		DeAnza Oaks		80 ft.	
Dist. To Source		Day 1		10 ⁿ Leq/10	
TIME	Leq	Leq	10 ⁿ Leq/10		
7:00 AM	53.5		223872.1		
8:00 AM	52.7		186208.7		
9:00 AM	53.6		229086.8		
10:00 AM	53.6		229086.8		
11:00 AM	55.0		316227.8		
12:00 PM	53.8		239883.3		
1:00 PM	51.6		144544.0		
2:00 PM	50.8		120226.4		
3:00 PM	51.1		128825.0		
4:00 PM	56.1		407380.3		
5:00 PM	45.6		36307.8		
6:00 PM	44.5		28183.8		
7:00 PM	43.3		21379.6		
8:00 PM	42.4		17378.0		
9:00 PM	41.6		14454.4	SUM=	2343045
10:00 PM	43.8		23988.3	Ld=	51.9
11:00 PM	44.4		27542.3		
12:00 AM	41.4		13803.8		
1:00 AM	40.5		11220.2		
2:00 AM	41.7		14791.1		
3:00 AM	44.1		25704.0		
4:00 AM	43.8		23988.3		
5:00 AM	47.4		54954.1		
6:00 AM	51.7		147910.8	SUM=	343903
				Ld=	45.8
				Daytime Level=	63.7
				Nighttime Level=	65.3
				DNL=	54
				24-Hour Leq=	50.5

LOCATION 4		DeAnza Oaks		80 ft.	
Dist. To Source		Day 2		10 ⁿ Leq/10	
TIME	Leq	Leq	10 ⁿ Leq/10		
7:00 AM	51.1		128825.0		
8:00 AM	50.4		109647.8		
9:00 AM	50.8		120226.4		
10:00 AM	53.5		223872.1		
11:00 AM	56.1		407380.3		
12:00 PM	58.3		676083.0		
1:00 PM	54.1		257039.6		
2:00 PM	52.2		165958.7		
3:00 PM	50.6		114815.4		
4:00 PM	45.5		35481.3		
5:00 PM	44.3		26915.3		
6:00 PM	44.5		28183.8		
7:00 PM	43.5		22387.2		
8:00 PM	43.4		21877.6		
9:00 PM	42.8		19054.6	SUM=	2357748
10:00 PM	45.8		38018.9	Ld=	52.0
11:00 PM	45.1		32359.4		
12:00 AM	41.5		14125.4		
1:00 AM	42.8		19054.6		
2:00 AM	41.8		15135.6		
3:00 AM	44.4		27542.3		
4:00 AM	44.7		29512.1		
5:00 AM	47.9		61659.5		
6:00 AM	50.8		120226.4	SUM=	357634
				Ld=	46.0
				Daytime Level=	63.8
				Nighttime Level=	65.5
				DNL=	54
				24-Hour Leq=	50.5