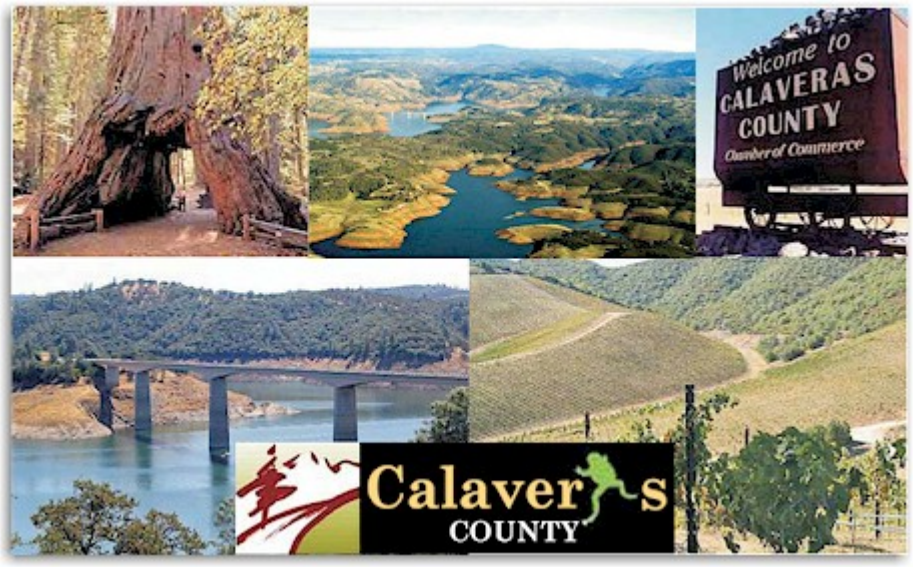
Project:
Calaveras County Council of Governments
Background Noise Measurements

Calaveras County, CA
November 27, 2013

Job # 2013-184



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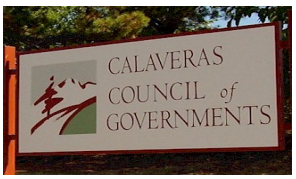

Attn: Ms. Melissa Eads, Executive Director
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November 27, 2013

Melissa Eads, Executive Director
Calaveras Council of Governments
PO Box 280
San Andreas, CA 95249

Dear Ms. Eads:

j.c. brennan & associates, Inc. has concluded our noise measurements and analysis of the noise measurement data collected for the Calaveras Council of Governments (CCOG). This is consistent with the Agreement of Professional Services between the CCOG and j.c. brennan & associates, Inc., dated September 26, 2013.

A summary of the noise measurements is provided in this letter. The data will be included in the Calaveras County General Plan Update. We expect that the majority of the noise measurement data and calculations of noise levels will be plotted on GIS (shape file) maps. We will be working closely with the County staff to obtain the GIS mapping to assist us in plotting the noise contours. Although we will require authorization from the County, we expect to share the GIS mapping with the COG in the future.

If you have questions, please contact me at 530-823-0960.

Respectfully submitted,

j.c. brennan & associates, Inc.

Jim Brennan
President

file: Noise Element - Calaveras County - 2013 - Calaveras County Council of Governments - Calaveras Background Noise Measurements

INTRODUCTION

j.c. brennan & associates, Inc., has concluded our background noise measurements and analysis of the data for the Calaveras County Council of Governments. The data will be used to develop the Setting Section for the Noise Element of the Calaveras County General Plan Update. Much of this data and resulting analysis of the data will be used to generate noise contour graphics which will be plotted on GIS (shape file) maps.

Noise measurement equipment included Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters equipped with a LDL ½" microphone. The measurement systems were calibrated using an LDL Model CAL200 acoustical calibrator before and after testing. The measurement equipment meets all of the pertinent requirements of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters.

ENVIRONMENTAL SETTING

Noise Background

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective. Often, someone's music is described as noise by another.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dBA. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dBA, and changes in levels (dBA) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels.

There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but may be expressed as dBA, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dBA apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptor, Ldn, and shows very good correlation with community response to noise.

The day/night average level (Ldn) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because Ldn represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of maximum noise levels associated with common noise sources.

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

Table 1 Typical Noise Levels		
Common Outdoor Activities	**Noise Level (dBA)**	**Common Indoor Activities**
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source:Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. November 2009.		

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dBA per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

A complete listing of acoustical terminology is provided in Appendix A.

EXISTING REGULATORY FRAMEWORK

The existing Calaveras County General Plan Noise Element is based upon recommendations by the California Office of Planning & Research (OPR), as contained in the Guidelines for the Preparation and Content of Noise Elements of the General Plan. Figure 1 shows the noise compatibility criteria recommended by the California OPR.

The criteria in the Noise Element are established for determining potential noise conflicts between various land uses, and noise sources. The standards for all noise sources are based upon the CNEL/Ldn descriptor. The Goals and Policies of the existing Calaveras County General Plan Noise Element are described below:

Goal VI-1: Improve noise compatibility between new and existing land uses.

Policy VI-1A: Protect existing noise sensitive uses from new non-residential sources of excessive noise.

Implementation Measure VI-1A-1: Consider the potential noise impacts of nonresidential land use proposals on adjacent residential and other noise sensitive land uses to the following noise levels as measured at the property line of the noise sensitive land use:

Noise Sensitive Land Use	Maximum Noise Level
Single Family Residential	60 Ldn
Multifamily Residential	65 Ldn
Schools, Hospitals	70 Ldn

Implementation Measure VI-1A-2: Site specific noise analyses should be performed where major noise sources are proposed to be located near noise sensitive land uses.

Implementation Measure VI-1A-3: Use setbacks, landscaping, earth berms and other effective measures to provide buffers and barriers between noise generators and surrounding areas.

Policy VI-1B: Restrict the development of noise sensitive land uses near identified major noise sources.

Implementation Measure VI-1B-1: Site specific noise analyses should be performed where noise sensitive land uses are proposed in proximity to major noise sources.

Implementation Measure VI-1B-2: Utilize Noise Contours in reviewing land use proposals.

Implementation Measure VI-1B-3: Require developers to use setbacks, landscaping, earth berms and other effective measures to provide buffers and barriers between the noise sensitive land uses and the existing major noise sources.

Goal VI-2: Minimize noise disturbance from ground transportation facilities

Policy VI-2A: Consider potential noise impacts in locating new residential subdivisions near highways, major county roads and rail lines.

Implementation Measure VI-2A-1: Utilize Noise Contours and noise generation projections in evaluating new residential subdivisions.

Implementation Measure VI-2A-2: Impose the provisions of the California Noise Insulation Standards and the Uniform Building Code when locating future single family residential subdivisions within the 60 dB Ldn contour.

Goal VI-3: Minimize noise disturbance from all public and private air facilities in the county.

Implementation Measure VI-3A-1: Use the County Airport Land Use Plan to guide land use decisions within the ALUP boundary.

Implementation Measure VI-3A-2 : Condition airfield use permits so as to reduce noise impacts to acceptable levels.

Figure 1
Land Use Compatibility

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE L_{DN} OR CNEL, dB 55 60 65 70 75 80
RESIDENTIAL	
TRANSIENT LODGING MOTELS, HOTELS	
SCHOOLS, LIBRARIES, CHURCHES, HOSPITALS, NURSING HOMES	
AUDITORIUMS, CONCERT HALLS, AMTHITHEATERS	
SPORTS AREA, OUTDOOR SPECTATOR SPORTS	
PLAYGROUNDS, NEIGHBORHOOD PARKS	
GOLF COURSES, RIDING STABLES, WATER RECREATION, CEMETARIES	
OFFICE BUILDINGS, BUSINESS COMMERCIAL AND PROFESSIONAL	
INDUSTRIAL, MANUFACTURING, UTILITIES, AGRICULTURE	

NORMALLY ACCEPTABLE

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise requirements

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

NORMALLY UNACCEPTABLE

New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development clearly should not be undertaken.

NOISE MEASUREMENT SURVEY RESULTS

Stationary Noise Sources:

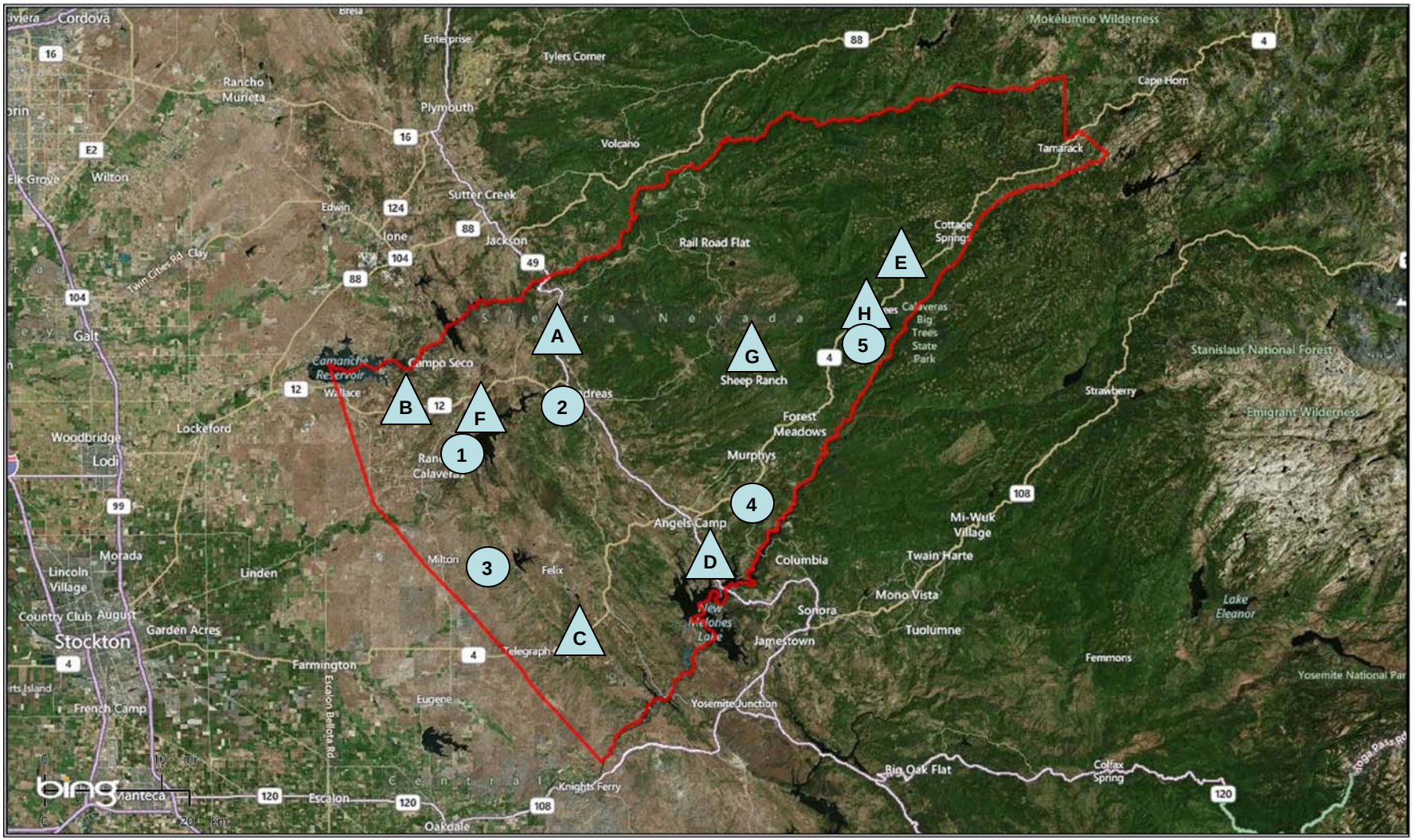
Calaveras County has numerous industrial noise sources which exist, and contribute to the overall noise environment. The following descriptions are intended to be representative of the relative noise impacts of such uses and to identify individual noise sources needing consideration during the environmental review process of developments in their vicinity. These uses include: Foothills Materials, Calaveras Materials, Rock Creek Solid Waste Facility, Red Hill Transfer Station and Avery Transfer Station. Figure 1 shows the noise measurement locations.

Site 1 - Foothill Materials: Foothill Materials is an aggregate productions facility located at 3650 Hogan Dam Road, Valley Springs CA, 95252. The primary noise sources are the production of aggregate, i.e. loader, excavator, rock crusher, impact rock hammer, conveyors, diesel generator and trucks entering the plant. Noise level measurements were conducted at the east boundary of Foothill Materials, and approximately 585 feet from the center of the noise source. The noise level measurements were conduct on October 18, 2013. Measured noise levels were 51 dBA Leq and 70 dBA Lmax. The distances to the 45 dBA and 55 dBA Leq noise contours are 1,167 feet and 369 feet respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 2.

Site 2 - Calaveras Materials: Calaveras Materials is an aggregate production facility located at 2288 Pool Station Road, San Andreas CA, 95242. The primary noise sources are the production of aggregate, i.e. loader, excavator, rock crusher, water truck, conveyors, diesel generator, trucks entering the plant. Noise level measurements were conducted at the northeast boundary of Calaveras Materials, and approximately 900 feet from the center of the noise source. The noise level measurements were conduct on October 18, 2013. Measured noise levels were 53 dBA Leq due to the plant operations. The distances to the 45 dBA Leq and 55 dBA Leq noise contours are 2,260 feet and 715 feet respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 2.

Site 3 - Rock Creek Solid Waste Facility: Rock Creek Solid Waste Facility is located at 12021 Hunt Road, Farmington CA, 95230. The primary noise sources are the ingress and egress of trucks entering the facility from Hunt Road, tractor and backup alarms from equipment operations in the land fill, with distant roadway noise on Milton Road. The noise level Measurements were conducted at the northwest boundary of Rock Creek Solid Waste facility, and approximately 114 feet from the center of the noise source. The noise level measurements were conduct on October 18, 2013. Measured noise levels are 45 dBA Leq and 63 dBA Lmax. The distances to the 45 dBA Leq and 55 dBA Leq noise contours are 114 feet and 36 feet respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 2.

Figure 1
Project Location – Site Plan & Noise Monitoring Sites



Site 4 - Red Hill Transfer Station: Red Hill Transfer Station is solid waste collection facility located at 5314 Red Hill Road, Vallecito, CA 95251. The primary noise sources are the loading, unloading of refuse at the facility. The noise level measurements were conducted near the northeast gate, and approximately 225 feet from the center of the noise source. The noise level measurements were conducted on October 18, 2013. Measured noise levels are 54 dBA Leq and 75 dBA Lmax. The distances to the 45 dBA Leq and 55 dBA Leq noise contours are 634 feet and 252 feet respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 2.

Site 5 - Avery Transfer Station: Avery Transfer Station is solid waste collection facility located at 4541 Segale Road, Avery, CA 95224. The primary noise sources are the loading and unloading of refuse at the facility. The noise level measurements were conducted near the loading dock, and approximately 135 feet from the center of the noise source. The noise level measurements were conduct on October 18, 2013. Measured noise levels are 60 dBA Leq and 78 dBA Lmax, the distance to the 45 dBA Leq and 55 dBA Leq noise contours are 759 feet and 240 respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 2.

Table 2
Stationary Noise Monitoring Results

Site	Location	Date	Distance From Noise Source (in feet)	Measured Hourly Sound Level, dBA			
				Leq	Lmax	L50	L90
1	Hogan Quary, 3650 Hogan Dam Road	10/18/2013	585 feet	51	70	43	40
2	Calaveras Materials, 2288 Pool Station Road	10/18/2013	900 feet	53	--	--	--
3	Rock Creek Solid Waste Facility, 12021 Hunt Road	10/18/2013	114 feet	45	63	37	30
4	Red Hill Transfer Station, 5314 Red Hill Road	10/18/2013	225 feet	54	75	42	35
5	Avery Transfer Station, 4541 Segale Road	10/18/2013	135 feet	60	78	55	51

1 - All Community Noise Measurement Sites have test duration of 20:00 minutes.
Source - j.c. brennan & associates, Inc. - 2013

Community Noise Survey:

A community noise survey was conducted to document noise exposure in the County where noise sensitive land uses may be located near major roadways and areas where noise levels are relatively quiet. Noise monitoring sites were selected to be representative of typical residential, commercial or recreational areas within the County.

Continuous 24-hour noise measurements were conducted at eight locations during the time period of October 16-17, 2013. The continuous 24-hour noise monitoring sites were recorded day-night statistical noise level trends. The data collected included the hourly average (Leq), and the maximum level (Lmax) during the measurement period. Noise monitoring sites and the measured noise levels at each site are summarized in Table 3. Figure 1 shows the locations of the noise monitoring sites. Appendix B shows the results of the noise measurement surveys.

Site A - S.R. 49: This site was selected to provide information on the existing noise levels associated with S.R. 49. This also provided a day/night split of traffic along S.R. 49 to assist in the modeling of overall traffic noise levels. Noise Measurement Site A was a continuous hourly noise measurement site which was conducted for a 24-hour period on October 16-17, 2013. This site was located approximately 65 feet from centerline of S.R. 49, and south of the Town of Mokelumne. The measured noise level at this location was 61 dBA Ldn. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3. Additional traffic noise level data, including distances to traffic noise contours are shown in Table 4.

Site B – S.R. 12: This site was selected to provide information on the existing noise levels associated with S.R. 12. This also provided a day/night split of traffic along S.R. 12 to assist in the modeling of overall traffic noise levels. Noise Measurement Site B was a continuous hourly noise measurement site which was conducted for a 24-hour period on October 16-17, 2013. This site was located approximately 54 feet from centerline of S.R. 12, and west of the Town of Burson. The measured noise level at this location was 65 dBA Ldn. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3. Additional traffic noise level data, including distances to traffic noise contours are shown in Table 4.

Site C – S.R. 4: This site was selected to provide information on the existing noise levels associated with S.R. 4. This also provided a day/night split of traffic along S.R. 4 to assist in the modeling of overall traffic noise levels. Noise Measurement Site C was a continuous hourly noise measurement site which was conducted for a 24-hour period on October 16-17, 2013. This site was located approximately 84 feet from centerline of S.R. 4, and west of the Town of Copperopolis. The measured noise level at this location was 66 dBA Ldn. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3. Additional traffic noise level data, including distances to traffic noise contours are shown in Table 4.

Site D – S.R. 49: This site was selected to provide information on the existing noise levels associated with S.R. 49. This also provided a day/night split of traffic along S.R. 49 to assist in the modeling of overall traffic noise levels. Noise Measurement Site D was a continuous hourly noise measurement site which was conducted for a 24-hour period on October 16-17, 2013. This site was located approximately 81 feet from centerline of S.R. 49, and south of the Town of Angels Camp. The measured noise level at this location was 65 dBA Ldn. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3.

Site E – S.R. 4: This site was selected to provide information on the existing noise levels associated with S.R. 4. This also provided a day/night split of traffic along S.R. 4 to assist in the modeling of overall traffic noise levels. Noise measurement Site E was a continuous hourly noise measurement site which was conducted for a 24-hour period on October 16-17, 2013. This site was located approximately 48 feet from centerline of S.R. 49, and north of the Town of Arnold. The measured noise level at this location was 64 dBA Ldn. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3.

Site F – New Hogan Lake Recreation Area: This site was selected to provide information on the existing noise levels associated with a community recreation area. Noise measurement Site F was located northeast of the New Hogan Lake Headquarters. This was a continuous hourly noise measurement site which was conducted for a period of 24-hours on November 12-13, 2013. The primary noise source at this measurement site was roadway traffic on the access road. The measured noise levels were 37 dBA Leq and 62 dBA Lmax. The distances to the 45 dBA, and 55 dBA Leq noise contours is 44 feet and 10 feet, respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3.

Site G – Rural Area of the Sheep Ranch Community: This site was selected to provide information on the existing noise levels associated with a rural community. Noise measurement Site G was located south of the community of Sheep Ranch. This was a continuous hourly noise measurement site which conducted for a period of 24-hours on November 12-13, 2013. This site was located approximately 180 feet north of Sheep Ranch Road between Armstrong Road and Lookout Point Road. The primary noise source at this measurement site was roadway traffic on Sheep Ranch Road. The measured noise levels were 39 dBA Leq and 75 dBA Lmax. The distances to the 45 dBA, and 55 dBA Leq noise contours are 72 feet and 15 feet, respectively. The noise measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3.

Site H – White Pines Lake Recreation Area: This site was selected to provide information on the existing noise levels associated with a community recreation area. Noise measurement Site H was located north of the White Pines Lake Recreation Area. This was a continuous hourly noise measurement site which conducted for a period of 24-hours on November 12-13, 2013. This site was located approximately 60 feet east of Forest Road 7N08. The primary noise source at this measurement site was roadway traffic with background noise from people recreating. The measured noise levels were 33 dBA Leq and 72 dBA Lmax. The noise

measurement location is shown in Figure 1, and the results of the noise level measurements are shown in Table 3.

Table 3
Existing Continuous 24-Hour Ambient Noise Monitoring Results
October 16th through November 13, 2013

Site	Location	Average Measured Hourly Noise Levels, dBA								
		Ldn	Daytime (7:00 am - 10:00 pm)				Nighttime (10:00 pm – 7:00 am)			
		(dBA)	Leq	Lmax	L50	L90	Leq	Lmax	L50	L90
A	Hwy 49 South of Mokelumne near Sport Hill Road	61	60	82	49	36	52	72	34	29
B	Hwy 12 between Wallace and Burson near Megan Lane	65	62	81	48	35	58	78	34	26
C	Hwy 4 near Copperopolis south of Telegraph Road	66	61	77	51	37	60	75	34	24
D	Hwy 49 South of Angels Camp South of Rainbow Way	65	62	78	55	41	58	74	35	27
E	Hwy 4 North of Arnold North of Moran Rd	64	63	81	45	33	55	72	26	23
F	New Hogan Lake Headquarters along Fire Trail	43	39	56	33	28	37	48	31	27
G	Sheep Hill Road between Armstrong Road and Lookout Point Road	46	41	75	29	24	39	75	22	20
H	White Pines Lake along Forest Road 7N08 north of 4th Street	44	45	65	34	30	33	47	28	26

Source – j.c. brennan & associates, Inc. – 2013

CALCULATED MAJOR ROADWAY NOISE LEVELS

Roadway noise levels were calculated for the State highways and County roadways. The noise measurement data collected near the State Highways were used to assess the day/night traffic splits for those roadways, and to assist in verifying the calculated roadway noise levels.

The Federal Highway Administration's (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD 77-108) was used to develop Ldn (24-hour average) noise contours for all highways and major roadways in the General Plan study area. The model is based upon the CALVENO noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver and the acoustical characteristics of the site. The FHWA Model predicts hourly Leq values for free-flowing traffic conditions, and is generally considered to be accurate within 1.5 dB. To predict Ldn values, it is necessary to determine the hourly distribution of traffic for a typical 24-hour period.

Traffic data representing annual average traffic volumes for existing conditions were obtained from Caltrans and the Calaveras County General Plan traffic consultant. Day/night traffic distribution for Highway 49, Highway 12, and Highway 4 were based upon continuous hourly noise measurement data collected for those roadways. Truck mix data were also based upon Caltrans and j.c. brennan & associates, Inc. file data. Using these data sources and the FHWA traffic noise prediction methodology, traffic noise levels were calculated for existing traffic volumes in terms of the Ldn metric. Distances from the centerlines of selected roadways to the 60, 65 and 70 dB Ldn contours are summarized in Table 4.

In many cases, the actual distances to noise level contours may vary from the distances predicted by the FHWA model. Factors such as roadway curvature, roadway grade, shielding from local topography or structures, elevated roadways, or elevated receivers may affect actual sound propagation. The distances reported in Table 4 are generally considered to be conservative estimates of noise exposure along roadways in the Calaveras County.

The effects of factors such as roadway curvature, and grade, can be determined from site-specific traffic noise measurements. The noise measurement results can be compared to the FHWA model results by entering the observed traffic volumes, speed and distance as inputs to the FHWA model. The differences between the measured and predicted noise levels can be used to adjust the FHWA model and more precisely determine the locations of the traffic noise contours.

The results of the roadway noise calculations are shown in Appendix C.

Table 4
Predicted Existing Traffic Noise Levels

Roadway	Segment	Ldn at 100 feet	Distances to Ldn Contours (feet)		
			60 dB	65 dB	70 dB
SR 4	Stanislaus Co Line to Obrynes Ferry Rd	63	161	75	35
SR 4	Pool Station Rd to Angel Oaks Dr	64	183	85	39
SR 4	Angel Oakses Dr to Foundry Ln	62	128	59	28
SR 4	SR 49 to Allen Ln	62	130	60	28
SR 4	Allen Ln to Broadview Ln	65	216	100	47
SR 4	Allen Ln to Broadview Ln	64	180	84	39
SR 4	Lakemont Dr to Henry Dr	63	159	74	34
SR 4	Henry Dr to Sierra Pkway	63	159	74	34
SR 4	Skyline Dr to Alpine Co Line	59	91	42	20
SR 12	San Joaquin Co Line to Burson Rd	62	128	60	28
SR 12	Burson Rd to SR 26	64	176	82	38
SR 12	SR 26 to SR 49	64	189	88	41
SR 26	San Joaquin Co Line to Silver Rapids Rd	62	143	67	31
SR 26	Silver Rapids Rd to SR 12	64	197	91	42
SR 26	SR 12 to SR 49	56	53	24	11
SR 26	SR 49 tp Ridge Rd	53	34	16	7
SR 26	Ridge Rd to Winton Rd	55	47	22	10
SR 26	Winton Rd to Amador Co Line	54	41	19	9
SR 49	Amador Co Line to SR 12	60	98	46	21
SR 49	SR 12 to Mountain Ranch Rd	62	147	68	32

Table 4
Predicted Existing Traffic Noise Levels

Roadway	Segment	Ldn at 100 feet	Distances to Ldn Contours (feet)		
			60 dB	65 dB	70 dB
SR 49	Mountain Ranch Rd to 4th Crossing	62	129	60	28
SR 49	4th Crossing Rd to Brunner Hill Rd	62	141	65	30
SR 49	Copello Dr to Dogtown Rd	62	135	62	29
SR 49	Dogtown Rd to SR 4 (W)	64	184	85	40
SR 49	SR 4 (W) to Murphys Grade Rd	63	156	72	34
SR 49	Murphys Grad Rd to Stanislaus Av	62	127	59	27
SR 49	Murphys Grad Rd to Stanislaus Av	65	200	93	43
SR 49	Mark Twain Rd to Bret Harte Rd	64	179	83	39
SR 49	Bret Harte Rd to Vallecito Rd	63	170	79	37
SR 49	Vallecito Rd to Tuolomne Co Line	61	110	51	24
Gold Strike Rd	Neilsen Rd to SR 49	54	39	18	8
Mountain Ranch Rd	SR 49 to Gold Hunter	57	65	30	14
Mountain Ranch Rd	Gold Hunter to Sheep Ranch Rd	55	48	22	10
Murphys Grade Rd	Ranch Rd to SR 4	58	75	35	16
Parrots Ferry Rd	SR 4 to Tuiolumne Co. Line	54	40	19	9
Jenny Lind Rd	SR 4 to Tuiolumne Co. Line	54	37	17	8
Paloma Rd	SR 12 to SR 26	53	32	15	7
Avery Sheep Ranch Rd	SR 4 to Sheep Ranch Rd	53	36	17	8
Big Trees Rd	SR 4 to Main St Murphys	55	50	23	11

Table 4
Predicted Existing Traffic Noise Levels

Roadway	Segment	Ldn at 100 feet	Distances to Ldn Contours (feet)		
			60 dB	65 dB	70 dB
Main St - Copperopolis	SR 4 to Reeds Turnpike	55	46	22	10
Moran Rd	SR 4 to SR 4	55	49	23	11
O'Byrnes Ferry Rd	Reeds Turnpike to Tuolumne Co	55	46	22	10
Sheep Ranch RD	Mountain Ranch Rd to Murphys	54	40	19	9
Olive Orchard Rd	SR 26 to Burson Rd	53	33	15	7
Baldwin St	SR 26 to Milton Rd	54	42	20	9
Fricot City Rd	Fourth Crossing Rd to Sheep Ranch	55	46	21	10
Garner Place	SR 26 to Baldwin St	54	40	18	9
Hogan Dam Rd	SR 26 to Hunt Rd	54	39	18	8
Vista Del Lago	SR 26 to Hogan Dam Rd	55	48	22	10
Vallecito Rd	Vallecito Rd to Kurt Dr	58	71	33	15

Notes: Distances to traffic noise contours are measured in feet from the centerlines of the roadways.
Source: Fehr & Peers and j.c. brennan & associates, Inc., 2013

Appendix A
Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
$L_{(n)}$	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the “Maximum” level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is s rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site A Hwy 49 Mokelumne
10/17/2013 - 10/18/2013

Hour	Leq	Lmax	L50	L90
11:00	60	80	46	29
12:00	61	82	49	32
13:00	60	84	45	31
14:00	62	85	49	35
15:00	61	77	50	33
16:00	60	84	50	34
17:00	60	80	51	35
18:00	61	91	53	36
19:00	57	78	52	50
20:00	57	85	48	46
21:00	62	93	46	42
22:00	51	70	47	43
23:00	49	67	45	41
0:00	47	72	35	29
1:00	42	68	25	23
2:00	48	75	23	21
3:00	51	73	23	21
4:00	52	75	26	22
5:00	53	74	34	24
6:00	59	78	48	33
7:00	59	77	52	37
8:00	60	76	52	37
9:00	60	77	48	31
10:00	58	76	46	31

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62.1	56.8	60.1	58.8	42.0	52.4
Lmax (Maximum)	93.1	75.8	81.5	78.2	66.7	72.4
L50 (Median)	53.1	44.7	49.1	48.0	22.9	33.9
L90 (Background)	49.6	29.2	35.9	43.3	21.4	28.6

Computed Ldn, dB	61.1
% Daytime Energy	91%
% Nighttime Energy	9%

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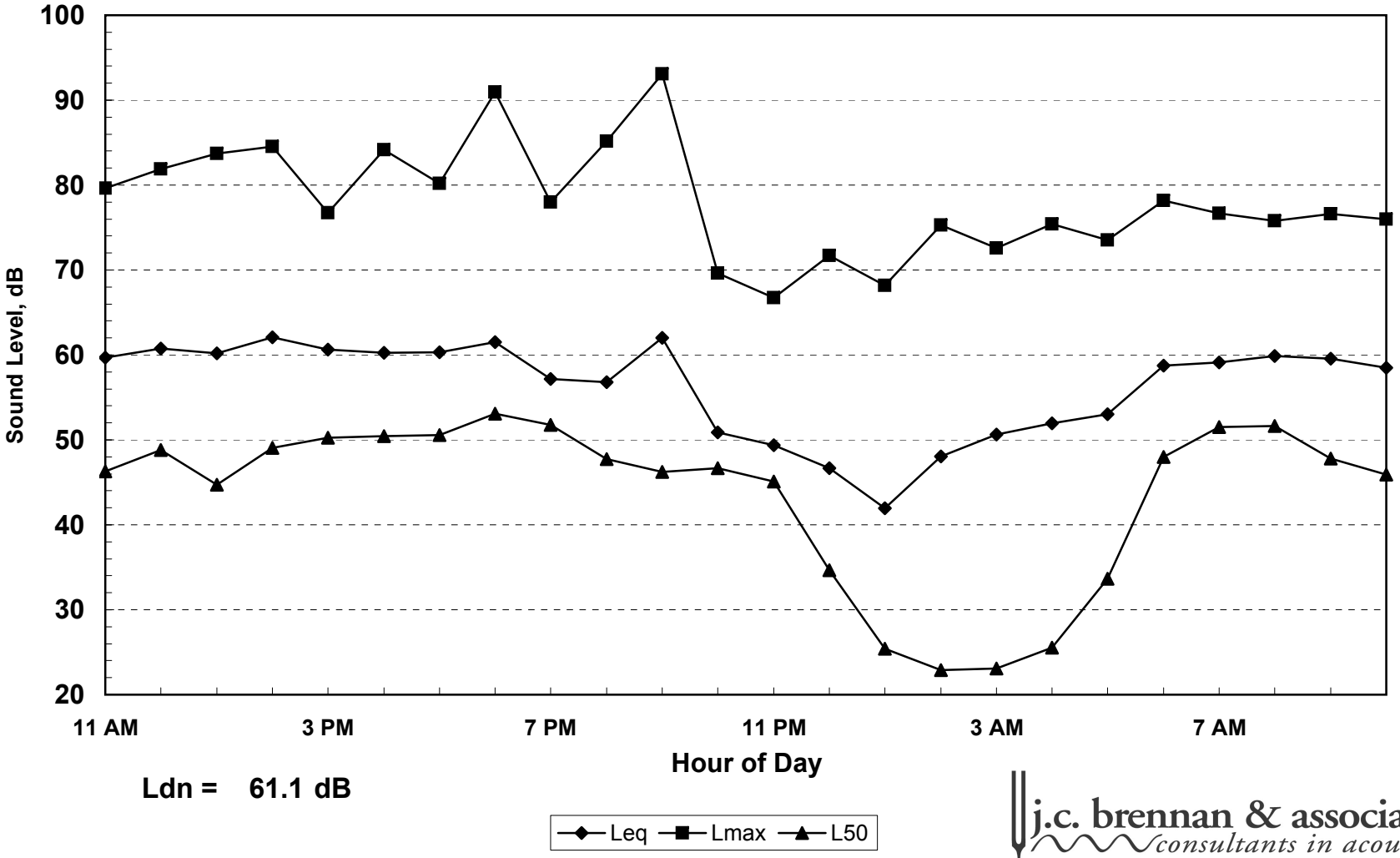
Appendix B

2013-184 Calaveras Background Noise Measurement

24hr Continuous Noise Monitoring - Site A Hwy 49 Mokelumne

10/17/2013 - 10/18/2013



Ldn = 61.1 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site B Hwy 12 Burson
10/17/2013 - 10/18/2013

Hour	Leq	Lmax	L50	L90
12:00	63	87	46	31
13:00	62	79	45	31
14:00	62	79	47	33
15:00	63	81	49	33
16:00	64	84	52	35
17:00	63	80	51	36
18:00	62	84	50	39
19:00	61	81	47	39
20:00	60	79	46	35
21:00	59	78	44	30
22:00	56	77	38	25
23:00	55	80	33	24
0:00	51	75	25	21
1:00	46	69	22	19
2:00	50	77	22	20
3:00	52	77	27	22
4:00	58	80	36	24
5:00	62	84	50	36
6:00	64	80	53	42
7:00	63	79	53	43
8:00	63	79	52	41
9:00	63	80	50	33
10:00	62	84	46	31
11:00	62	80	45	31

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63.7	58.6	62.2	63.7	46.0	57.9
Lmax (Maximum)	86.8	77.5	80.9	84.1	69.4	77.6
L50 (Median)	53.0	43.9	48.1	53.0	21.9	34.1
L90 (Background)	42.8	30.3	34.7	42.0	19.5	25.8

Computed Ldn, dB	65.3
% Daytime Energy	82%
% Nighttime Energy	18%

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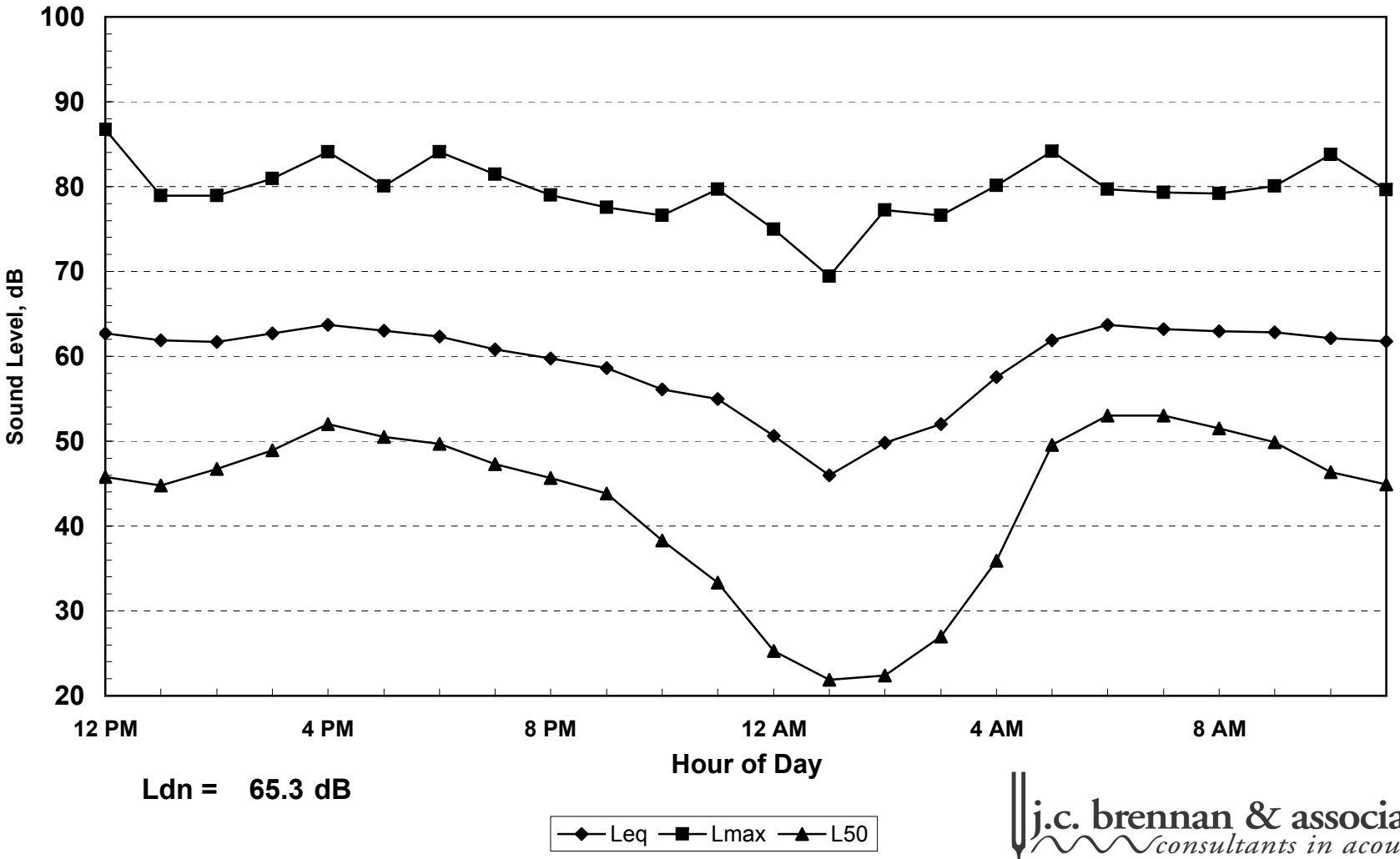
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site B Hwy 12 Burson
10/17/2013 - 10/18/2013



Ldn = 65.3 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site C Hwy 4 Copperoplis
10/17/2013 - 10/18/2013

Hour	Leq	Lmax	L50	L90
13:00	61	80	50	35
14:00	61	78	50	34
15:00	60	78	51	36
16:00	61	76	54	38
17:00	62	78	56	42
18:00	61	74	52	39
19:00	61	73	54	33
20:00	58	72	41	25
21:00	59	74	43	28
22:00	58	74	39	20
23:00	55	72	25	20
0:00	55	73	23	19
1:00	53	74	22	19
2:00	54	75	21	19
3:00	58	76	33	20
4:00	58	77	36	19
5:00	62	74	55	34
6:00	65	82	60	43
7:00	64	77	59	43
8:00	62	79	54	39
9:00	62	81	53	36
10:00	62	85	50	35
11:00	61	77	49	34
12:00	61	79	50	36

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64.0	57.8	61.3	64.8	53.5	59.3
Lmax (Maximum)	85.4	71.9	77.3	82.0	72.1	75.2
L50 (Median)	59.1	41.1	51.2	60.4	20.6	34.7
L90 (Background)	42.6	25.3	35.6	42.8	19.0	23.7

Computed Ldn, dB	66.0
% Daytime Energy	73%
% Nighttime Energy	27%

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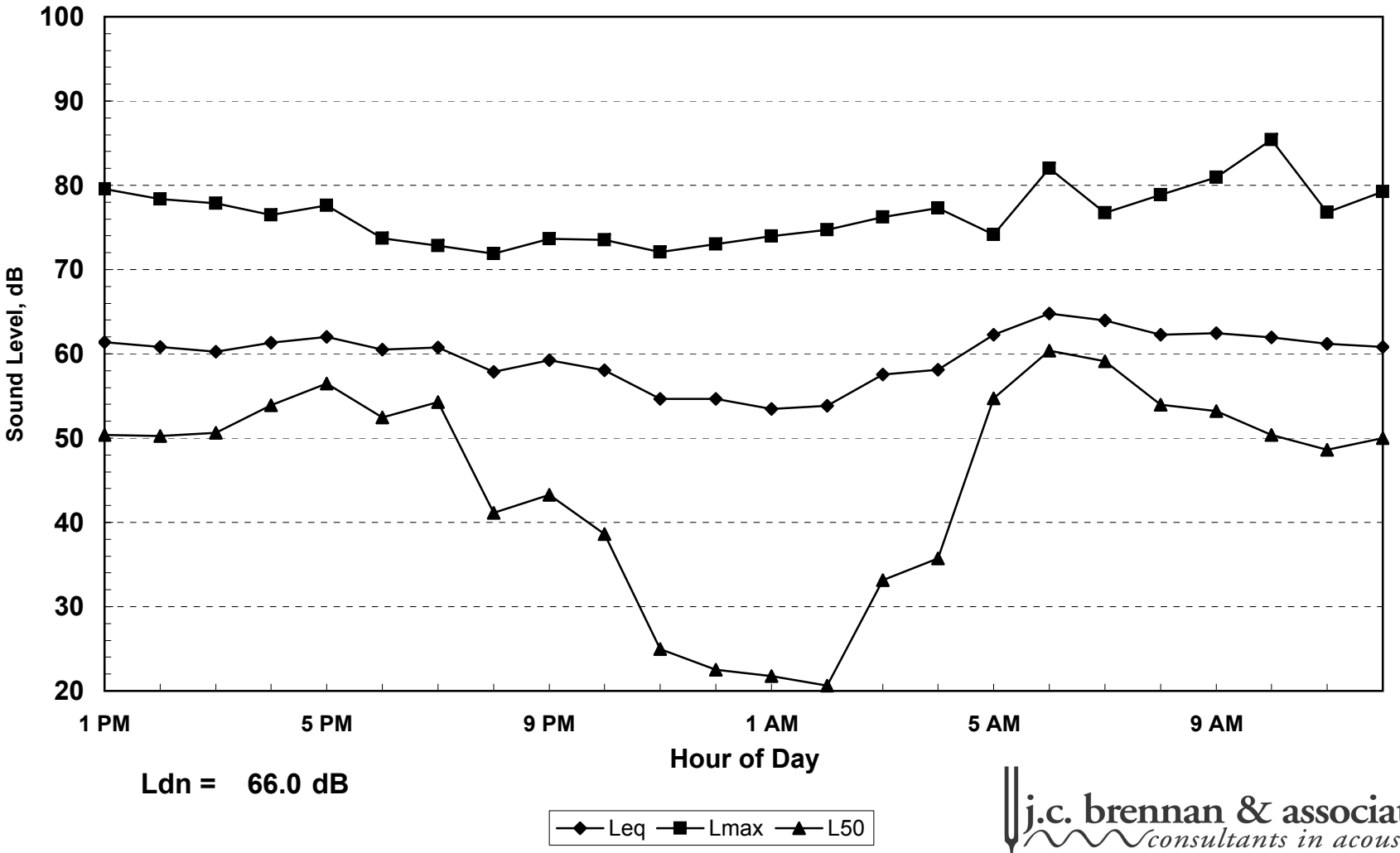
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site C Hwy 4 Copperoplis
10/17/2013 - 10/18/2013



Ldn = 66.0 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site D Hwy 49 Angels Camp
10/17/2013 - 10/18/2013

Hour	Leq	Lmax	L50	L90
14:00	61	77	53	37
15:00	62	81	55	37
16:00	62	79	55	36
17:00	64	84	58	45
18:00	63	77	59	44
19:00	62	82	56	44
20:00	59	76	48	41
21:00	58	78	48	36
22:00	57	72	39	32
23:00	52	73	33	30
0:00	51	72	31	29
1:00	51	75	28	22
2:00	48	70	21	20
3:00	54	75	22	21
4:00	57	76	31	22
5:00	60	76	50	29
6:00	64	80	58	36
7:00	66	78	63	52
8:00	65	76	61	47
9:00	61	80	53	33
10:00	61	74	54	36
11:00	61	78	52	36
12:00	62	79	55	40
13:00	62	77	56	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	66.1	58.4	62.3	63.5	47.8	57.5
Lmax (Maximum)	84.0	74.0	78.3	79.6	70.4	74.3
L50 (Median)	63.4	47.7	55.1	58.0	21.4	34.9
L90 (Background)	52.3	33.3	40.5	35.7	20.2	26.7

Computed Ldn, dB	65.0
% Daytime Energy	84%
% Nighttime Energy	16%

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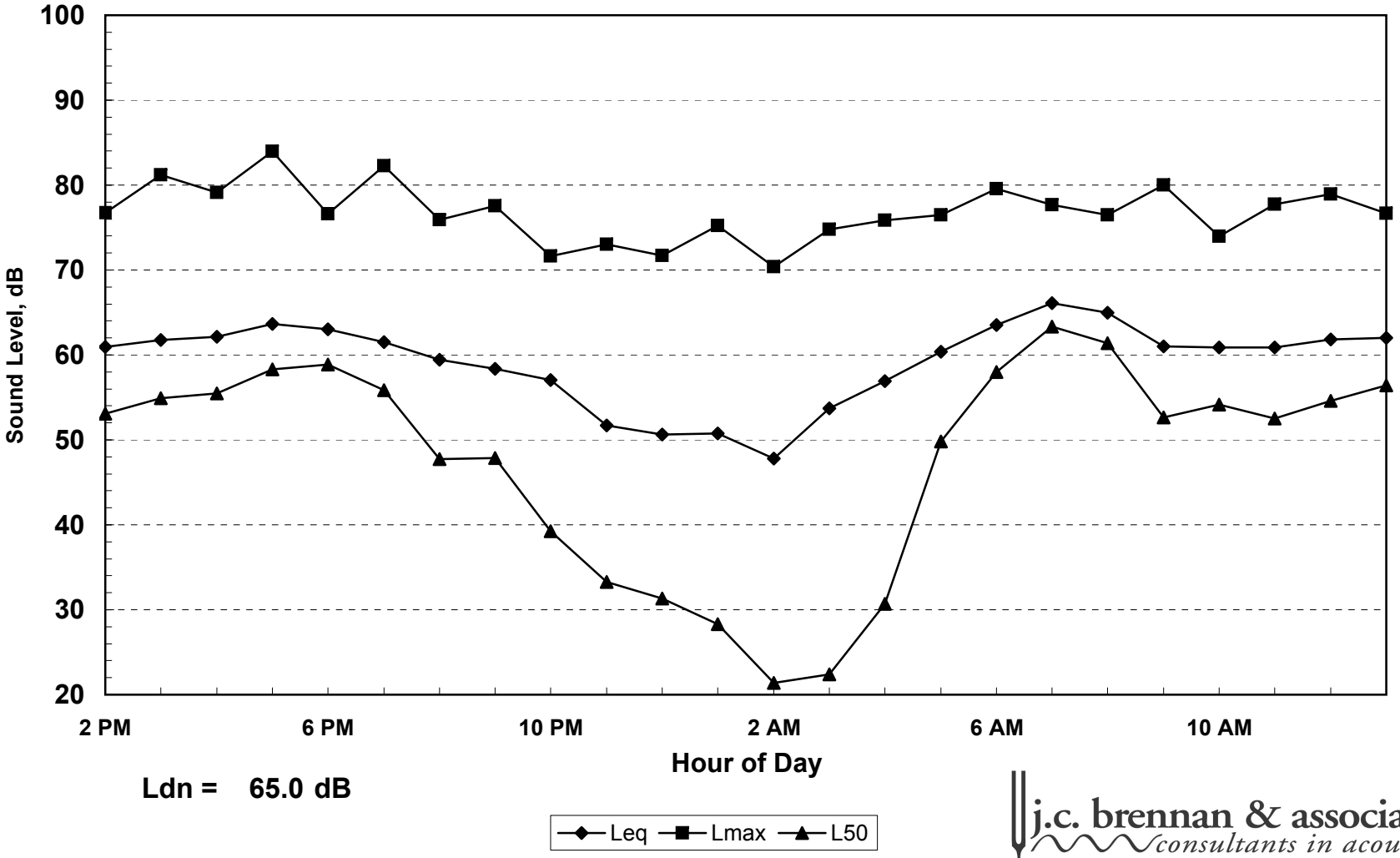
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site D Hwy 49 Angels Camp
10/17/2013 - 10/18/2013



Ldn = 65.0 dB

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Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site E Hwy 4 Arnold
10/17/2013 - 10/18/2013

Hour	Leq	Lmax	L50	L90
15:00	65	83	56	35
16:00	64	80	53	34
17:00	63	78	44	35
18:00	61	77	42	36
19:00	59	76	36	32
20:00	59	79	31	26
21:00	52	76	25	23
22:00	51	77	25	24
23:00	50	73	26	23
0:00	51	77	24	23
1:00	46	75	23	22
2:00	25	44	23	22
3:00	41	70	23	22
4:00	46	76	23	22
5:00	57	78	29	23
6:00	62	81	39	29
7:00	64	85	42	32
8:00	64	81	47	34
9:00	64	80	50	33
10:00	64	86	52	32
11:00	64	84	52	34
12:00	64	85	53	36
13:00	65	81	55	36
14:00	64	81	51	37

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	65.1	51.9	63.3	62.2	25.3	54.6
Lmax (Maximum)	85.7	75.9	80.7	81.3	43.7	72.2
L50 (Median)	55.8	25.1	45.8	39.3	22.6	26.1
L90 (Background)	36.8	23.2	33.0	29.3	22.1	23.4

Computed Ldn, dB	63.8
% Daytime Energy	92%
% Nighttime Energy	8%

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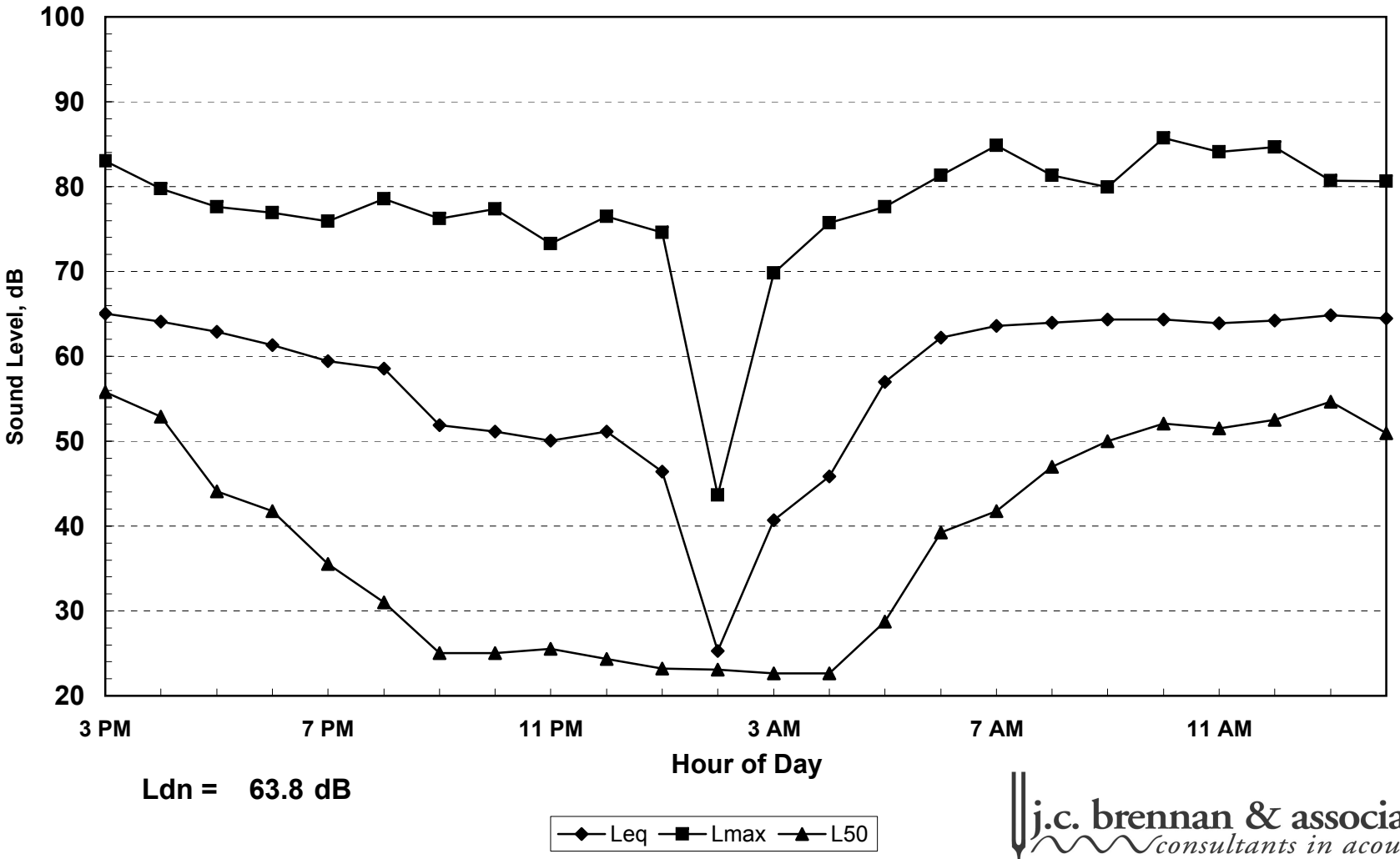
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site E Hwy 4 Arnold
10/17/2013 - 10/18/2013



Ldn = 63.8 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site F New Hogan Lake
11/12/2013 - 11/13/2013

Hour	Leq	Lmax	L50	L90
10:00	39	59	35	29
11:00	39	57	32	26
12:00	41	62	32	24
13:00	38	56	33	25
14:00	41	59	34	29
15:00	38	53	34	30
16:00	37	52	34	28
17:00	37	54	33	29
18:00	34	51	31	25
19:00	38	54	30	26
20:00	39	56	26	21
21:00	34	58	25	20
22:00	33	49	27	23
23:00	34	47	26	23
0:00	32	45	26	23
1:00	30	45	26	24
2:00	27	37	26	22
3:00	36	48	34	30
4:00	39	50	35	28
5:00	40	55	38	33
6:00	40	52	39	35
7:00	42	53	41	38
8:00	40	59	38	35
9:00	37	49	32	28

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	42.4	33.7	38.8	40.2	26.7	36.5
Lmax (Maximum)	61.7	48.9	55.6	54.9	36.8	47.7
L50 (Median)	40.9	25.0	32.7	38.7	26.2	30.8
L90 (Background)	38.2	20.4	27.6	34.6	21.8	26.6

Computed Ldn, dB	43.4
% Daytime Energy	74%
% Nighttime Energy	26%

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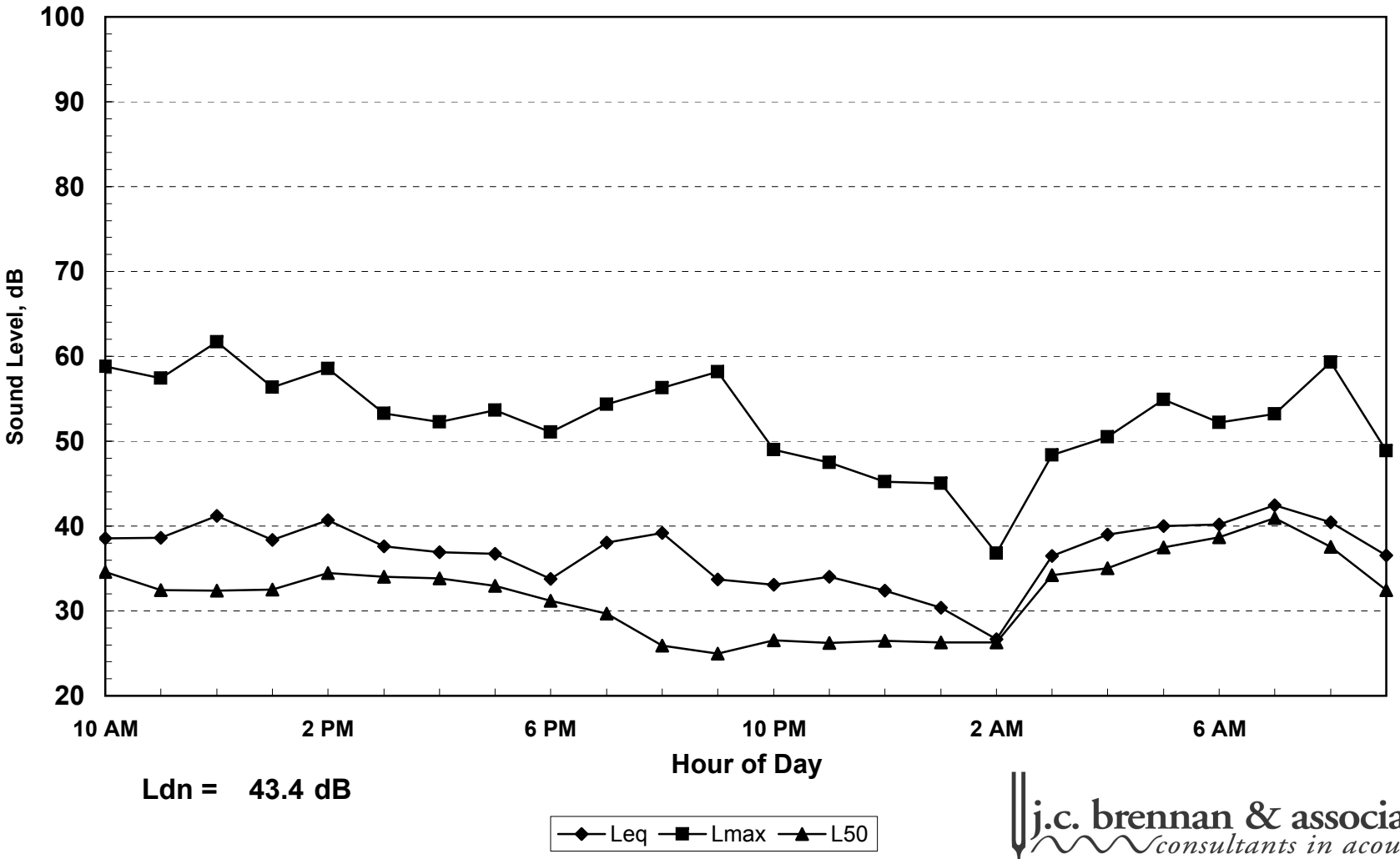
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site F New Hogan Lake
11/12/2013 - 11/13/2013



Ldn = 43.4 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site G Sheep Ranch Road
11/12/2013 - 11/13/2013

Hour	Leq	Lmax	L50	L90
12:00	39	62	32	25
13:00	41	59	31	23
14:00	43	58	32	24
15:00	46	75	33	22
16:00	44	70	33	24
17:00	40	61	28	25
18:00	40	68	25	24
19:00	38	57	25	24
20:00	34	55	23	22
21:00	34	52	22	21
22:00	34	52	21	20
23:00	36	56	21	20
0:00	34	50	21	20
1:00	33	54	20	20
2:00	23	48	20	20
3:00	24	45	21	20
4:00	33	57	20	20
5:00	31	56	20	19
6:00	48	75	32	21
7:00	42	61	32	24
8:00	43	71	30	24
9:00	37	60	28	24
10:00	36	56	28	24
11:00	41	59	32	26

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	45.5	33.6	41.1	48.1	23.3	39.4
Lmax (Maximum)	74.9	51.9	61.5	74.7	45.3	54.8
L50 (Median)	32.7	21.8	29.0	32.5	19.8	21.8
L90 (Background)	25.8	20.9	23.7	21.2	19.4	19.9

Computed Ldn, dB	46.1
% Daytime Energy	71%
% Nighttime Energy	29%

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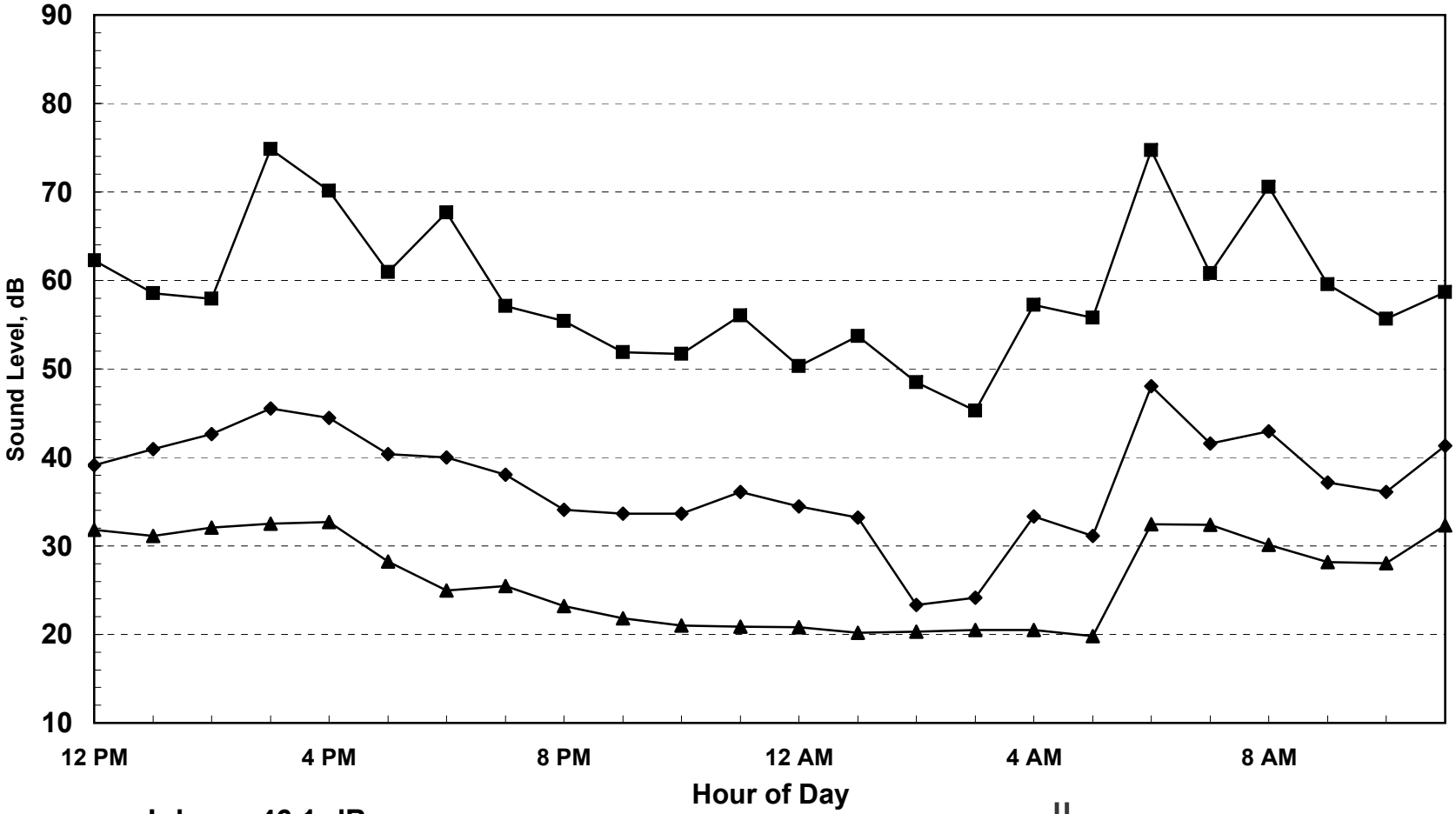
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site G Sheep Ranch Road
11/12/2013 - 11/13/2013



Ldn = 46.1 dB

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Appendix B
2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site H White Pines Lake
11/12/2013 - 11/13/2013

Hour	Leq	Lmax	L50	L90
14:00	48	68	37	32
15:00	50	67	41	30
16:00	46	68	35	29
17:00	42	64	35	30
18:00	44	66	32	29
19:00	40	68	31	28
20:00	35	54	30	27
21:00	31	50	28	26
22:00	31	52	28	26
23:00	32	46	28	27
0:00	38	57	28	26
1:00	32	48	28	26
2:00	35	54	27	26
3:00	27	35	27	26
4:00	27	31	27	26
5:00	30	46	27	26
6:00	35	53	29	27
7:00	44	70	34	30
8:00	42	60	36	33
9:00	48	72	37	33
10:00	43	64	35	31
11:00	47	68	34	30
12:00	43	66	35	32
13:00	41	65	35	32

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	50.5	31.1	45.0	37.6	27.4	33.0
Lmax (Maximum)	71.9	49.7	64.8	56.8	31.1	46.9
L50 (Median)	40.7	28.0	34.3	29.3	26.9	27.6
L90 (Background)	32.6	26.3	30.2	26.7	25.6	26.2

Computed Ldn, dB	44.4
% Daytime Energy	96%
% Nighttime Energy	4%

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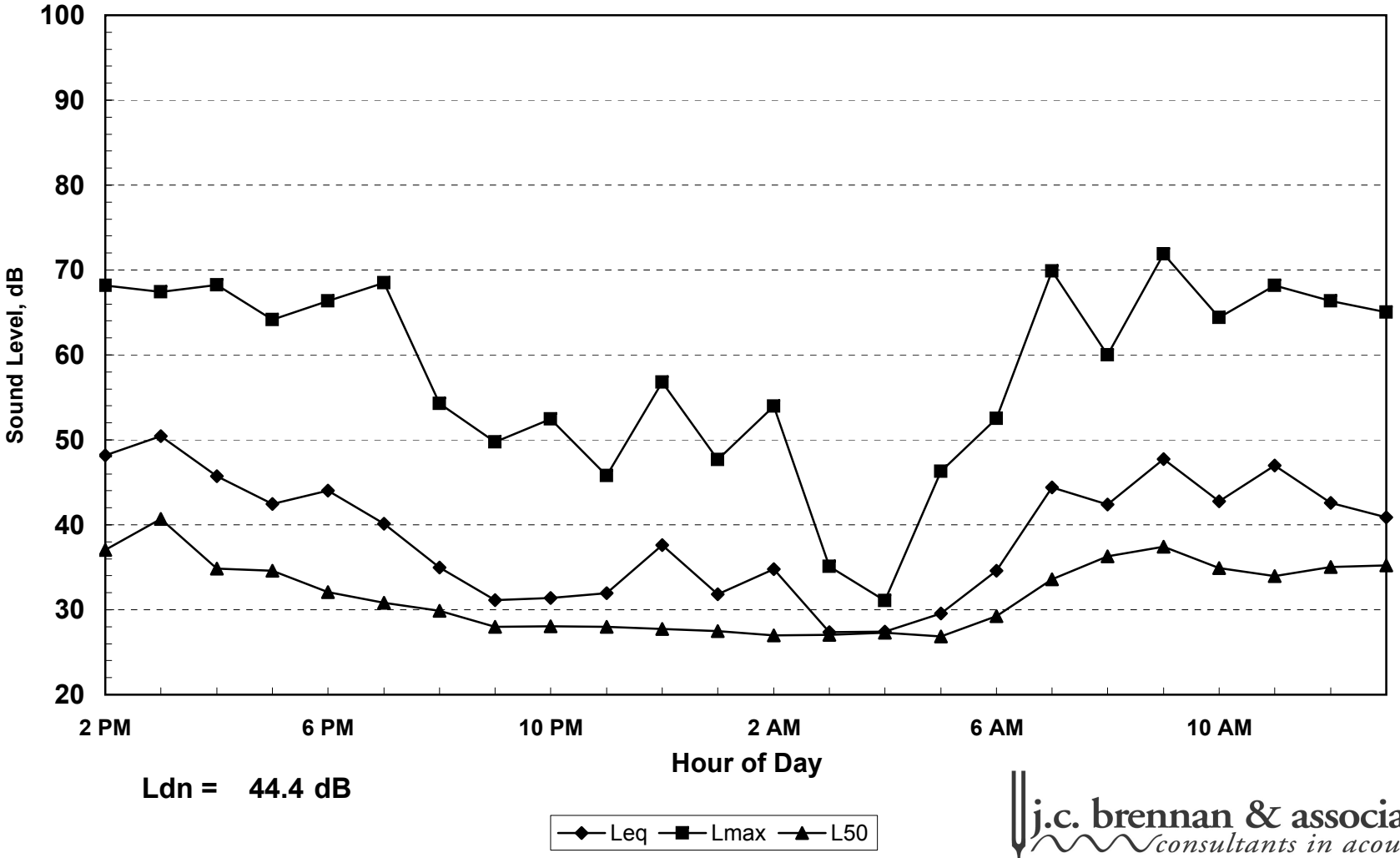
Appendix B

2013-184 Calaveras Background Noise Measurement
24hr Continuous Noise Monitoring - Site H White Pines Lake
11/12/2013 - 11/13/2013



Ldn = 44.4 dB

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Appendix C

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 4	Stanislaus Co Line to Obrynes Ferry Rd	3,490	73		27	2	4	55	100	
2	SR 4	Pool Station Rd to Angel Oaks Dr	5,160	73		27	2	4	50	100	
3	SR 4	Angel Oakses Dr to Foundry Ln	3,030	73		27	2	4	50	100	
4	SR 4	SR 49 to Allen Ln	3,850	73		27	2	4	45	100	
5	SR 4	Allen Ln to Broadview Ln	8,220	73		27	2	4	45	100	
6	SR 4	Broadview Ln to Lakemont Dr	5,050	73		27	2	4	50	100	
7	SR 4	Lakemont Dr to Henry Dr	5,200	73		27	2	4	45	100	
8	SR 4	Henry Dr to Sierra Pkway	4,210	73		27	2	4	50	100	
9	SR 4	Skyline Dr to Alpine Co Line	1,810	73		27	2	4	50	100	
10	SR 12	San Joaquin Co Line to Burson Rd	3,260	82		18	2	4	55	100	
11	SR 12	Burson Rd to SR 26	5,240	82		18	2	4	55	100	
12	SR 12	SR 26 to SR 49	5,840	82		18	2	4	55	100	
13	SR 26	San Joaquin Co Line to Silver Rapids Rd	4,090	85		15	1	5	55	100	
14	SR 26	Silver Rapids Rd to SR 12	6,570	85		15	1	5	55	100	
15	SR 26	SR 12 to SR 49	910	85		15	1	5	55	100	
16	SR 26	SR 49 tp Ridge Rd	740	85		15	2	2	50	100	
17	SR 26	Ridge Rd to Winton Rd	1,510	85		15	2	2	45	100	
18	SR 26	Winton Rd to Amador Co Line	1,250	85		15	2	2	45	100	
19	SR 49	Amador Co Line to SR 12	2,430	85		15	2	4	55	100	
20	SR 49	SR 12 to Mountain Ranch Rd	5,220	84		16	2	4	50	100	
21	SR 49	Mountain Ranch Rd to 4th Crossing	3,540	84		16	2	4	55	100	
22	SR 49	4th Crossing Rd to Brunner Hill Rd	3,820	84		16	1	5	55	100	
23	SR 49	Copello Dr to Dogtown Rd	3,580	84		16	1	5	55	100	
24	SR 49	Dogtown Rd to SR 4 (W)	5,700	84		16	1	5	55	100	
25	SR 49	SR 4 (W) to Murphys Grade Rd	6,640	84		16	1	5	45	100	

Appendix C

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 4	Stanislaus Co Line to Obrynes Ferry F	60.9	51.3	58.3	63
2	SR 4	Pool Station Rd to Angel Oaks Dr	61.4	52.4	59.6	64
3	SR 4	Angel Oakses Dr to Foundry Ln	59.1	50.0	57.3	62
4	SR 4	SR 49 to Allen Ln	58.8	50.4	57.9	62
5	SR 4	Allen Ln to Broadview Ln	62.1	53.7	61.2	65
6	SR 4	Broadview Ln to Lakemont Dr	61.3	52.3	59.5	64
7	SR 4	Lakemont Dr to Henry Dr	60.1	51.7	59.2	63
8	SR 4	Henry Dr to Sierra Pkway	60.5	51.5	58.7	63
9	SR 4	Skyline Dr to Alpine Co Line	56.9	47.8	55.0	59
10	SR 12	San Joaquin Co Line to Burson Rd	59.5	49.8	56.8	62
11	SR 12	Burson Rd to SR 26	61.5	51.9	58.8	64
12	SR 12	SR 26 to SR 49	62.0	52.4	59.3	64
13	SR 26	San Joaquin Co Line to Silver Rapids	60.0	47.3	58.3	62
14	SR 26	Silver Rapids Rd to SR 12	62.0	49.4	60.3	64
15	SR 26	SR 12 to SR 49	53.4	40.8	51.7	56
16	SR 26	SR 49 tp Ridge Rd	51.4	42.3	46.5	53
17	SR 26	Ridge Rd to Winton Rd	53.2	44.7	49.2	55
18	SR 26	Winton Rd to Amador Co Line	52.4	43.8	48.3	54
19	SR 49	Amador Co Line to SR 12	57.7	48.1	55.0	60
20	SR 49	SR 12 to Mountain Ranch Rd	60.0	50.9	58.1	62
21	SR 49	Mountain Ranch Rd to 4th Crossing	59.5	49.9	56.8	62
22	SR 49	4th Crossing Rd to Brunner Hill Rd	59.8	47.2	58.1	62
23	SR 49	Copello Dr to Dogtown Rd	59.6	46.9	57.9	62
24	SR 49	Dogtown Rd to SR 4 (W)	61.6	48.9	59.9	64
25	SR 49	SR 4 (W) to Murphys Grade Rd	59.7	48.2	59.7	63

Appendix C

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Distances to Traffic Noise Contours (75)	(70)	(65)	(60)	(55)
1	SR 4	Stanislaus Co Line to Obrynes Ferry	16	35	75	161	347
2	SR 4	Pool Station Rd to Angel Oaks Dr	18	39	85	183	393
3	SR 4	Angel Oakses Dr to Foundry Ln	13	28	59	128	276
4	SR 4	SR 49 to Allen Ln	13	28	60	130	281
5	SR 4	Allen Ln to Broadview Ln	22	47	100	216	466
6	SR 4	Broadview Ln to Lakemont Dr	18	39	84	180	388
7	SR 4	Lakemont Dr to Henry Dr	16	34	74	159	343
8	SR 4	Henry Dr to Sierra Pkway	16	34	74	159	344
9	SR 4	Skyline Dr to Alpine Co Line	9	20	42	91	196
10	SR 12	San Joaquin Co Line to Burson Rd	13	28	60	128	277
11	SR 12	Burson Rd to SR 26	18	38	82	176	380
12	SR 12	SR 26 to SR 49	19	41	88	189	408
13	SR 26	San Joaquin Co Line to Silver Rapid	14	31	67	143	309
14	SR 26	Silver Rapids Rd to SR 12	20	42	91	197	424
15	SR 26	SR 12 to SR 49	5	11	24	53	113
16	SR 26	SR 49 tp Ridge Rd	3	7	16	34	74
17	SR 26	Ridge Rd to Winton Rd	5	10	22	47	101
18	SR 26	Winton Rd to Amador Co Line	4	9	19	41	89
19	SR 49	Amador Co Line to SR 12	10	21	46	98	212
20	SR 49	SR 12 to Mountain Ranch Rd	15	32	68	147	316
21	SR 49	Mountain Ranch Rd to 4th Crossing	13	28	60	129	279
22	SR 49	4th Crossing Rd to Brunner Hill Rd	14	30	65	141	303
23	SR 49	Copello Dr to Dogtown Rd	13	29	62	135	290
24	SR 49	Dogtown Rd to SR 4 (W)	18	40	85	184	395
25	SR 49	SR 4 (W) to Murphys Grade Rd	16	34	72	156	336

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
26	SR 49	Murphys Grad Rd to Stanislaus Av	4,870	84		16	1	5	45	100	
27	SR 49	Stanislaus Ave to Mark Twain Rd	7,870	84		16	1	5	50	100	
28	SR 49	Mark Twain Rd to Bret Harte Rd	6,660	84		16	1	5	50	100	
29	SR 49	Bret Harte Rd to Vallecito Rd	6,160	84		16	1	5	50	100	
30	SR 49	Vallecito Rd to Tuolomne Co Line	3,220	84		16	1	5	50	100	
31	Gold Strike Rd	Neilsen Rd to SR 49	1,370	85		15	1	1	45	100	
32	Mountain Ranch Rd	SR 49 to Gold Hunter	2,950	85		15	1	1	45	100	
33	Mountain Ranch Rd	Gold Hunter to Sheep Ranch Rd	1,850	85		15	1	1	45	100	
34	Murphys Grade Rd	Ranch Rd to SR 4	3,600	85		15	1	1	45	100	
35	Parrots Ferry Rd	SR 4 to Tuiolumne Co. Line	1,410	85		15	1	1	45	100	
36	Jenny Lind Rd	SR 26 to Milton	1,270	85		15	1	1	45	100	
37	Paloma Rd	SR 12 to SR 26	1,010	85		15	1	1	45	100	
38	Avery Sheep Ranch Rd	SR 4 to Sheep Ranch Rd	1,230	85		15	1	1	45	100	
39	Big Trees Rd	SR 4 to Main St Mrphy's	1,980	85		15	1	1	45	100	
40	Main St - Copperopolis	SR 4 to Reeds Turnpike	1,770	85		15	1	1	45	100	
41	Moran Rd	SR 4 to SR 4	1,910	85		15	1	1	45	100	
42	O'Byrnes Ferry Rd	Reeds Turnpike to Tuolumne Co	1,770	85		15	1	1	45	100	
43	Sheep Ranch RD	Mountain Ranch Rd to Murphys	1,410	85		15	1	1	45	100	
44	Olive Orchard Rd	SR 26 to Burson Rd	1,040	85		15	1	1	45	100	
45	Baldwin St	SR 26 to Milton Rd	1,530	85		15	1	1	45	100	
46	Fricot City Rd	Fourth Crossing Rd to Sheep Ranch	1,760	85		15	1	1	45	100	
47	Garner Place	SR 26 to Baldwin St	1,390	85		15	1	1	45	100	
48	Hogan Dam Rd	SR 26 to Hunt Rd	1,340	85		15	1	1	45	100	
49	Vista Del Lago	SR 26 to Hogan Dam Rd	1,860	85		15	1	1	45	100	
50	Vallecito Rd	Vallecito Rd to Kurt Dr	3,370	85		15	1	1	45	100	

Appendix C

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
26	SR 49	Murphys Grad Rd to Stanislaus Av	58.4	46.9	58.4	62
27	SR 49	Stanislaus Ave to Mark Twain Rd	61.8	49.7	60.9	65
28	SR 49	Mark Twain Rd to Bret Harte Rd	61.1	49.0	60.2	64
29	SR 49	Bret Harte Rd to Vallecito Rd	60.7	48.6	59.8	63
30	SR 49	Vallecito Rd to Tuolomne Co Line	57.9	45.8	57.0	61
31	Gold Strike Rd	Neilsen Rd to SR 49	52.9	41.2	45.7	54
32	Mountain Ranch Rd	SR 49 to Gold Hunter	56.2	44.6	49.1	57
33	Mountain Ranch Rd	Gold Hunter to Sheep Ranch Rd	54.2	42.5	47.0	55
34	Murphys Grade Rd	Ranch Rd to SR 4	57.1	45.4	49.9	58
35	Parrots Ferry Rd	SR 4 to Tuiolumne Co. Line	53.0	41.4	45.9	54
36	Jenny Lind Rd	SR 26 to Milton	52.6	40.9	45.4	54
37	Paloma Rd	SR 12 to SR 26	51.6	39.9	44.4	53
38	Avery Sheep Ranch Rd	SR 4 to Sheep Ranch Rd	52.4	40.8	45.3	53
39	Big Trees Rd	SR 4 to Main St Mrphy's	54.5	42.8	47.3	55
40	Main St - Copperopolis	SR 4 to Reeds Turnpike	54.0	42.3	46.8	55
41	Moran Rd	SR 4 to SR 4	54.3	42.7	47.2	55
42	O'Byrnes Ferry Rd	Reeds Turnpike to Tuolumne Co	54.0	42.3	46.8	55
43	Sheep Ranch RD	Mountain Ranch Rd to Murphys	53.0	41.4	45.9	54
44	Olive Orchard Rd	SR 26 to Burson Rd	51.7	40.0	44.5	53
45	Baldwin St	SR 26 to Milton Rd	53.4	41.7	46.2	54
46	Fricot City Rd	Fourth Crossing Rd to Sheep Ranch	54.0	42.3	46.8	55
47	Garner Place	SR 26 to Baldwin St	53.0	41.3	45.8	54
48	Hogan Dam Rd	SR 26 to Hunt Rd	52.8	41.1	45.6	54
49	Vista Del Lago	SR 26 to Hogan Dam Rd	54.2	42.6	47.1	55
50	Vallecito Rd	Vallecito Rd to Kurt Dr	56.8	45.1	49.6	58

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2011-167
Description: Calaveras County Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
26	SR 49	Murphys Grad Rd to Stanislaus Av	13	27	59	127	273
27	SR 49	Stanislaus Ave to Mark Twain Rd	20	43	93	200	431
28	SR 49	Mark Twain Rd to Bret Harte Rd	18	39	83	179	386
29	SR 49	Bret Harte Rd to Vallecito Rd	17	37	79	170	366
30	SR 49	Vallecito Rd to Tuolomne Co Line	11	24	51	110	238
31	Gold Strike Rd	Neilsen Rd to SR 49	4	8	18	39	84
32	Mountain Ranch Rd	SR 49 to Gold Hunter	7	14	30	65	141
33	Mountain Ranch Rd	Gold Hunter to Sheep Ranch Rd	5	10	22	48	103
34	Murphys Grade Rd	Ranch Rd to SR 4	7	16	35	75	161
35	Parrots Ferry Rd	SR 4 to Tuiolumne Co. Line	4	9	19	40	86
36	Jenny Lind Rd	SR 26 to Milton	4	8	17	37	80
37	Paloma Rd	SR 12 to SR 26	3	7	15	32	69
38	Avery Sheep Ranch Rd	SR 4 to Sheep Ranch Rd	4	8	17	36	79
39	Big Trees Rd	SR 4 to Main St Mrphy's	5	11	23	50	108
40	Main St - Copperopolis	SR 4 to Reeds Turnpike	5	10	22	46	100
41	Moran Rd	SR 4 to SR 4	5	11	23	49	105
42	O'Byrnes Ferry Rd	Reeds Turnpike to Tuolumne Co	5	10	22	46	100
43	Sheep Ranch RD	Mountain Ranch Rd to Murphys	4	9	19	40	86
44	Olive Orchard Rd	SR 26 to Burson Rd	3	7	15	33	70
45	Baldwin St	SR 26 to Milton Rd	4	9	20	42	91
46	Fricot City Rd	Fourth Crossing Rd to Sheep Ranch	5	10	21	46	100
47	Garner Place	SR 26 to Baldwin St	4	9	18	40	85
48	Hogan Dam Rd	SR 26 to Hunt Rd	4	8	18	39	83
49	Vista Del Lago	SR 26 to Hogan Dam Rd	5	10	22	48	104
50	Vallecito Rd	Vallecito Rd to Kurt Dr	7	15	33	71	154