Chapter IV

NOISE SUPPORT DOCUMENTATION

Prepared by
Illingworth & Rodkin, Inc.
Acoustics – Air Quality

Stanislaus County General Plan Update
Technical Reference Document for Noise Analysis

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Prepared for:

Planning and Community Development Department
1010 Tenth Street, Suite 3400
Modesto, CA 95354

Prepared by:

Dana M. Lodico
Richard B. Rodkin, P. E.

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality
505 Petaluma Boulevard South
Petaluma, CA 94952
(707) 766-7700

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A. *Introduction*

This Technical Reference Document is a supplement to the Noise Element of the General Plan, which provides background information concerning the methods and data used in preparation of the Noise Element. It is intended that this document be used by Stanislaus County as a resource when evaluating noise related implications of specific development proposals or long-range planning efforts. A brief discussion of acoustical fundamentals is presented to assist the reader in understanding the subsequent discussion. The discussion of the existing noise environment is based upon the results of a noise monitoring survey conducted in July and August 2004 and supplemented by the noise study report prepared by Illingworth & Rodkin, Inc. for the Ceres Southern Gateway Study. This study focuses on transportation noise sources such as vehicular traffic, railroad noise, and aircraft activities. Major industrial facilities in the County are also discussed.

B. *Fundamentals of Acoustics*

1. Measuring Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its pitch or its loudness. Pitch is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A decibel (dB) is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called Leq. The most common averaging period is hourly, but Leq can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

TABLE 1: DEFINITIONS OF ACOUSTICAL TERMS

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L01, L10, L50, L90	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Day/Night Noise Level, Ldn	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Lmax, Lmin	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

TABLE 2 TYPICAL SOUND LEVELS

Noise Generators (At a Given Distance from Noise Source)	A-Weighted Sound Level in Decibel	Noise Environments	Subjective Impression
	140		
Civil defense siren (100 feet)	130		
Jet take-off (200 feet)	120		Pain threshold
	110	Rock music concert	
Diesel pile drive (100 feet)	100		Very loud
Freight cars (50 feet)	90	Boiler room Printing press plant	
Pneumatic drill (50 feet) Freeway (100 feet) Vacuum cleaner (10 feet)	80 70	In kitchen with garbage disposal running	Moderately loud
	60	Data processing center	
Light traffic (100 feet) Large transformer (200 feet)	50	Department store	
	40	Private business office	Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Threshold of hearing
	0		

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. - 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The Day/Night Average Sound Level, Ldn, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

2. Effects of Noise

This section discusses several effects of noise including hearing loss, sleep and speech interference and annoyance.

a. Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard, which is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

b. Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}.

The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference are therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

c. Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed.

There continues to be disagreement about the relative annoyance of noise from aircraft and roadways. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 55 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately two percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. There is, therefore, an increase of about one percent per dBA between an L_{dn} of 60 to 70 dBA. Between an L_{dn} of 70 to 80 dBA, each decibel increase results in about a two percent increase in population that is highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately ten percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about two percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a three percent increase in the percentage of the population highly annoyed.

C. *Existing Noise Environment*

1. **Existing Noise Sources in Stanislaus County**

The major noise sources in Stanislaus County are vehicular traffic on state highways and major county roadways, railroad operations, airport operations, and industrial activities. This document focuses on transportation noise sources. Roadway traffic generates noise throughout the county. Railroad trains intermittently generate noise levels that are significant along the railroad tracks. General aviation aircraft contribute to intermittent noise levels in the county. Noise is also generated on individual parcels whether industrial, commercial or residential. These noise sources do not affect the overall noise environment throughout the community. CNEL contours for operations at the Oakdale Municipal Airport, Patterson Airport, Turlock Airport, Modesto City / County Airport, and the Crows Landing Naval Auxiliary Landing Field were derived from the existing Airport Master Plan reports as available and are shown in Appendix A. Figure A-1 in Appendix A shows the generalized locations of long and short-term noise measurement sites for major ground transportation noise sources throughout Stanislaus County.

2. **Long-term Noise Measurements**

Daily noise levels were monitored at 11 locations in unincorporated Stanislaus County from July 20th to 22nd, 2004, at 4 locations in Ceres from May 18th to 21st, 2004, and at 4 additional locations in unincorporated areas and within the city of Hughson on August 31st-September 2nd, 2004. The noise measurement locations are shown on Figure A-1. The measured data are summarized in Table A-1 in Appendix A. The daily trends in noise levels measured at the 19 long-term sites are summarized in Figures A-2 through A-21 of Appendix A. The following discussion summarizes the long-term noise measurements.

a. Location LT-1 – Highway 219

Location LT-1 was selected to represent the noise exposure along Hwy 219. The measurement location was about 60 feet from the centerline of the roadway at the setback of the residence at 907 Kiernan Road, west of Highway 108. The data, shown in Figure A-2 of Appendix A, shows that the hourly daytime noise levels ranged from 66 to 68 dBA Leq and the hourly nighttime noise levels ranged from 56 to 66 dBA. The measured overall day/night noise level was 68 dBA L_{dn}.

b. Location LT-2 – Highway 108

This location was selected to measure the noise level along Highway 108, just north of Highway 219. The noise level approximately 50 feet from the centerline of Highway 108 was 76 dBA L_{dn}. Hourly daytime noise levels ranged from 71 to 74 dBA Leq and the hourly nighttime noise levels ranged from 64 to 71 dBA L_{eq}. The data are shown in Figure A-3 of Appendix A.

c. Location LT-3 – SR 99, Northern Stanislaus County

This noise measurement location was approximately 200 feet from the centerline of SR 99 near the northern county line and was selected to measure vehicular traffic noise along SR 99 in the northern portion of the county. The measured noise level was 78 dBA Ldn and also included some railroad noise from the Union Pacific Railroad. The hourly average noise levels typically ranged from 69 dBA during the nighttime with no train movements to 75 dBA during the peak hour. Maximum noise levels generated by train movements were typically 81 to 82 dBA. The data are shown in Figure A-4 of Appendix A.

d. Location LT-4 – Highway 132

Noise levels were measured approximately 30 feet from the centerline of Highway 132, near the eastern county line. The measured day/night noise level was 68 dBA Ldn. Hourly average noise levels typically range from 63 to 67 dBA during daytime hours and drop to 51 dBA during nighttime hours. One loud event took place between 2:00 and 3:00 am, raising the $L_{eq(hr)}$ by 6-9 dB above typical nighttime levels. This loud event is likely to have been a siren or loud vehicle along Highway 132. The measured data are shown on Figure A-5 of Appendix A.

e. Location LT-5 – Highway 120, Eastern Stanislaus County

Location LT-5 was selected to measure noise exposure along Highway 120 and was located approximately 50 feet from the centerline of the roadway near the eastern county line. The measured noise level was 75 dBA Ldn. The noise measurement data are shown in Figure A-6 of Appendix A. Hourly average noise levels typically ranged from 70 to 74 dBA during daytime hours and 62 to 72 dBA during nighttime hours.

f. Location LT-6 – Highway 4

Measurement Location LT-6 was located along Highway 4, east of Farmington. The noise environment at Location LT-6 was dominated by vehicular traffic along Highway 4. The measured noise level was 69 dBA Ldn. The noise measurement data are shown in Figure A-7 of Appendix A. Hourly average noise levels typically ranged from 63 to 67 dBA during daytime hours and dropped to 55 dBA during nighttime hours.

g. Location LT-7 – Central Avenue near Grayson Road

Location LT-7 was approximately 30 feet from the centerline of Central Avenue, south of Grayson Road. The measured noise level was 72 dBA Ldn. The noise measurement data are shown in Figure A-8 of Appendix A. Hourly average noise levels typically ranged from 65 to 70 dBA during daytime hours and dropped to 59 dBA during nighttime hours.

h. Location LT-8 – Interstate 5

Measurement Location LT-8 was approximately 65 feet from the near lane of Interstate 5 and was selected to characterize noise levels along Interstate 5. The measured noise level was 80 dBA Ldn. The data show a tight range of noise levels from the minimum sound level to the maximum sound level, which is typical of freeway traffic noise. To ensure the noise exposure in this location was dominated by Interstate 5 traffic noise, an additional measurement was made nearby (LT-16) in August/September 2004 and compared to the results of this measurement. Hourly average noise levels do not vary much day or night due to heavy truck traffic at night and heavy total traffic during the daytime. Hourly average noise levels typically ranged from about 73 to 75 dBA Leq. The day/night noise level at this location was 80 dBA Ldn. The noise measurement data are shown in Figure A-9 of Appendix A.

i. Location LT-9 – Highway 33

The measurement at Location LT-9 was approximately 50 feet from the centerline of Highway 33, just north of Crows Landing, and was selected to characterize the noise exposure along Highway 33. The measured noise level was 72 dBA Ldn. Hourly average noise levels ranged from about 65 to 70 dBA Leq during the daytime and drop to about 57 dBA Leq at night. The noise measurement data are shown in Figure A-10 of Appendix A.

j. Location LT-10 –BNSF Railroad, Santa Fe Avenue, North of Hughson

Two noise measurements were made at location LT-10, just north of Hughson at the intersection of Leedom Road and Santa Fe Avenue. The measurement location was used to characterize the noise environment along Santa Fe Avenue and the BNSF Railroad without interference from outside noise sources. The measurement location was about 150 feet east of the railroad tracks and about 50 feet east of the near lane of Santa Fe Avenue. Vehicular traffic along Santa Fe Avenue is a major contributing noise source at this location, with intermittent very loud noise events produced by train passbys. The measured day-night average noise level during the first measurement period, on July 21-22, 2004, was 78 dBA Ldn. Hourly average noise levels ranged from about 70 to 74 dBA Leq during the daytime and drop to about 62 dBA Leq at night.

The second measurement period took place on August 31 to September 2, 2004 and included exceedence data, which was correlated with exceedence data from LT-17 to estimate the number of train movements that took place during the measurement period. Review of exceedence data shows that 65 train movements took place during the two-day period with approximately 54% daytime operations (7:00 am to 7:00 pm), 11% evening operations (7:00 pm to 10:00 pm), and 35% nighttime operations (10:00 pm to 7:00 am). Train movements ranged from a few seconds up to more than two minutes in duration. The L_{dn} at this location was measured to be approximately 76 dBA, which includes both Railroad and Santa Fe Avenue traffic noise. Typical hourly average noise levels during the daytime ranged from 60 to 73 dBA Leq and with noise levels ranging from about 68 to 75 dBA Leq in the nighttime. The noise measurement data are shown in Figures A-11 and A-12 of Appendix A.

k. Location LT-11 –Hatch Road

Location LT-11 was 65 feet from the centerline of Hatch Road, north of Faith Home Road, and was selected to characterize existing noise levels along Hatch Road. The measured noise level was

74 dBA Ldn. The noise measurement data are shown in Figure A-13 of Appendix A. Hourly average noise levels ranged from about 66 to 71 dBA Leq during the daytime and drop to about 62 dBA Leq at night.

l. Location LT-12 – UPRR Railroad, State Route 99

Noise levels were monitored at this location to determine the noise levels and train frequency for the Union Pacific Railroad line. The measurement location was about 20 feet west of the railroad tracks in Ceres and about 105 feet east of the near lane of State Route 99. Vehicular traffic along SR 99 is a major contributing noise sources at this location, with intermittent very loud noise events produced by train passbys. The measured noise level over a three day measurement period ranged from 83 to 85 dBA Ldn. The range of noise levels was again narrow with typical hourly average noise levels during the daytime in the range of 76 to 80 dBA Leq and with noise levels dropping to about 71 dBA Leq in the middle of the night with no train passbys. Review of exceedence data shows that 48 train movements took place during the three-day period, with an average of about 16 trains per day with approximately 54% daytime operations (7:00 am to 7:00 pm), 13% evening operations (7:00 pm to 10:00 pm), and 33% nighttime operations (10:00 pm to 7:00 am). The L_{dn} at this location was measured to be approximately 83 to 85 dBA, which includes both Railroad and Highway noise. Based on additional measurements, it is estimated that SR 99 traffic noise generates an L_{dn} of approximately 82 dBA at this location and the rail operations generate an L_{dn} of approximately 80 to 83 dBA. The noise measurement data are shown in Figure A-14 of Appendix A.

m. Location LT-13 – Service Road, Ceres

Measurement location LT-13 was approximately 40 feet from the centerline of Service Road at the intersection of Service Road and Moffet Road in Ceres. This measurement location was selected to characterize the noise environment along Service Road and vehicular traffic along Service Road is the major contributing noise source at this location, with some local traffic noise generated along Moffet Road. The measured noise level was about 72 dBA Ldn. Train passbys along the western side of SR 99 were audible at times during passbys, but did not substantially contribute to the overall noise levels. Hourly average noise levels ranged from about 68 to 73 dBA Leq during the daytime and drop to about 61 dBA Leq at night. The noise measurement data are shown in Figure A-15 of Appendix A.

n. Location LT-14 –State Route 99

Noise levels were monitored at this location to determine the noise levels at residential areas along SR 99. The measurement location was about 270 feet east of the near lane of State Route 99 in Ceres, in the backyard of 2805 Evalee Lane. Vehicular traffic along SR 99 is a major contributing noise source at this location, with occasional local traffic noise produced along El Camino Avenue. The measurement was located behind a six-foot fence. The measured noise level was about 72 dBA Ldn. Train passbys along the western side of SR 99 were audible at times during passbys, but did not substantially contribute to the overall noise levels. Hourly average noise levels ranged from about 65 to 68 dBA Leq during the daytime and drop to about 60 dBA Leq at night. The noise measurement data are shown in Figure A-16 of Appendix A.

o. Location LT-15 –State Route 99

The noise environment at Location LT-15, located approximately 130 feet east of the near lane of State Route 99, was dominated by noise generated by State Route 99 traffic. Occasional local traffic noise produced along El Camino Avenue and local residential noise also contributed to the noise environment. The measured noise level was about 78 dBA Ldn. Train passbys along the western side of SR 99 were audible at times during passbys, but did not substantially contribute to the overall noise levels. Hourly average noise levels ranged from about 70 to 74 dBA Leq during the daytime and drop to about 64 dBA Leq at night. The noise measurement data are shown in Figure A-17 of Appendix A.

p. Location LT-16 – Interstate 5

Measurement Location LT-16 was approximately 60 feet east of the near lane of Interstate 5 (Northbound) in Westley and was selected to characterize noise levels along Interstate 5. The measured noise level was 80 dBA Ldn. The data show a tight range of noise levels from the minimum sound level to the maximum sound level, which is typical of freeway traffic noise and consistent with measurement LT-8. Hourly average noise levels do not vary much day or night due to heavy truck traffic at night and heavy total traffic during the daytime. Hourly average noise levels typically ranged from about 73 to 75 dBA Leq. The noise measurement data are shown in Figure A-18 of Appendix A.

q. Location LT-17 – BNSF Railroad, Santa Fe Avenue

Noise levels were monitored at this location to determine the noise levels and train frequency for the Burlington Northern and Santa Fe (BNSF) Railroad line. The measurement location was about 150 feet east of the railroad tracks in Hughson and about 25 feet east of the near lane of Santa Fe Avenue. Vehicular traffic along Santa Fe Avenue is a major contributing noise source at this location, with intermittent very loud noise events produced by train passbys. The Builders Choice Truss Company in Hughson is located near this location and industrial noise is audible when traffic along Santa Fe Avenue is light and there are no train movements. Typical hourly average noise levels during the daytime ranged from 68 to 78 dBA Leq and with noise levels ranging from about 59 to 80 dBA Leq in the nighttime. Review of exceedence data shows that 65 train movements took place during the two-day period with approximately 54% daytime operations (7:00 am to 7:00 pm), 11% evening operations (7:00 pm to 10:00 pm), and 35% nighttime operations (10:00 pm to 7:00 am). Train movements ranged from a few seconds up to more than two minutes in duration. The L_{dn} at this location was measured to be approximately 80 to 82 dBA, which includes both Railroad and Santa Fe Avenue traffic noise. The noise measurement data are shown in Figure A-19 of Appendix A.

r. Location LT-18 – Sierra Railroad

Noise levels were monitored at this location to determine the noise levels and train frequency for the Sierra Railroad line just east of Oakdale. The measurement location was about 50 feet north of the railroad tracks and about 25 feet north of the centerline of Sierra Road. Vehicular traffic along Sierra Road is light, but includes a high percentage of trucks. The measured noise level over a two-day measurement period was 72 dBA Ldn. Typical hourly average noise levels during the peak daytime hours ranged from 70 to 72 dBA Leq and with noise levels dropping to about 58 dBA Leq in the middle of the night with no train passbys. Review of exceedence data shows that 4 train movements took place during the two-day period, with 75% daytime operations (7:00 am to 7:00 pm) and 25% nighttime operations (10:00 pm to 7:00 am). The L_{dn} at this location was measured to be approximately 72 dBA, which includes both Railroad and Sierra Road traffic noise. The noise measurement data are shown in Figure A-20 of Appendix A.

s. Location LT-19 – Tidewater Railroad

Noise levels were monitored at this location to determine the noise levels and train frequency for the Tidewater Southern branch line of the Union Pacific Railroad line. Noise levels were measured along Saint John's Road, just south of Del Rio. The measurement location was about 35 feet from the railroad tracks and about 25 feet from the centerline of St. John's Road. Vehicular traffic along St. John's Road is the major contributing noise source at this location, with intermittent very loud noise events produced by train passbys. The measured noise level over the measurement period ranged from was 69 to 70 dBA Ldn. Typical hourly average noise levels during the peak daytime hours ranged from 64 to 70 dBA Leq and with noise levels dropping to about 43 dBA Leq in the middle of the night with no train passbys. Review of exceedence data shows that 1 train movement took place during the two-day period, during daytime hours. The L_{dn} at this location was measured to be approximately 69 to 70 dBA, which includes both Railroad and traffic noise. The noise measurement data are shown in Figure A-21 of Appendix A.

3. Short-Term Spot Measurements

Short-term spot measurements were made at ten locations throughout Stanislaus County in July of 2004 to characterize typical daytime noise levels and to collect traffic and noise data to be used subsequently in the computation of traffic noise contours for the General Plan. The noise measurement locations are shown in Figure A-1 in Appendix A. The measured data is summarized in Table A-2 in Appendix A. Vehicular traffic on the street network was the dominant noise source during measurements. There were small contributions from intermittent local noise such as distant dog barking or residential noise at a few of the locations. General aviation aircraft at Location ST-5 generated a maximum level of 54 dBA but automobiles and motorcycles were typically 10 to 20 dBA louder.

4. Roadways

The California Department of Transportation (Caltrans) Noise Prediction Model LeqV2 was used to develop L_{dn} contours for the state highways and major county roadways within the unincorporated areas of Stanislaus County. Annual average daily traffic volumes (AADT) and truck mixes for existing (2000) conditions were obtained from Caltrans and the Stanislaus County Department of Public Works. These data were input into the traffic noise model for calibration with noise measurements conducted during the noise monitoring survey. Existing noise levels along county streets and highways were then calculated with the calibrated traffic noise model. Noise levels were estimated at 75 feet from the centerline of major roadways throughout the county and 150 feet from the center of highways. A summary of calculated distances to L_{dn} contours for existing and future conditions along major community roadways are shown in Table B-1 in Appendix B. The distances reported in Table B-1 can be considered to be worst-case estimates of noise exposure throughout the county because calculations do not take acoustical shielding from buildings or topography into account. Existing roadway noise contours were not mapped because small changes in noise levels over time would not be distinguishable on a map of the scale represented in this document. For planning purposes, noise contour maps of the future noise levels can be found in Appendix B.

5. Railroads

Railroad operations in Stanislaus County include high speed mainline operations on the Burlington Northern and Santa Fe (BNSF) Railway and Union Pacific Railroad and low speed mainline and switching operations on the AT&SF Railway, UPRR, Sierra Railroad, Modesto and Empire Traction Company Railroad, and Tidewater Southern Railroad. Existing noise contours for these rail lines can be found in Table A-3 of Appendix A.

a. Union Pacific Railroad (UPRR)

The UPRR in Stanislaus County includes operations on the main line which passes through Salida, Modesto, Ceres, Keyes, and Turlock and operations on the branch line on the west side of the county, which passes through Wesley, Patterson, Crows Landing, and Newman. Based on noise measurements in Ceres and near the northern county line, there are approximately 16 freight train movements per day on the main line. Trains are evenly distributed throughout the day and night, with approximately 54% daytime operations (7:00 am to 7:00 pm), 13% evening operations (7:00 pm to 10:00 pm), and 33% nighttime operations (10:00 pm to 7:00 am). The UPRR main line runs adjacent to SR 99 for the majority of its route through Stanislaus County. Based on measured noise levels along the tracks, the calculated distance from the center of the mainline to the 60 dBA Ldn railroad contour is approximately 680 feet for existing (2004) operations.

b. Burlington Northern and Santa Fe (BN & SF) Railway

Operations on the BNSF Railway in Stanislaus County occur on the mainline which runs through Riverbank, Hughson, Empire, and Denair, and on a branch line which connects the mainline at Riverbank with the with the Sierra Railroad in Oakdale. According to noise measurements made in and just north of Hughson, approximately 33 train movements take place each day with approximately 54% daytime operations (7:00 am to 7:00 pm), 11% evening operations (7:00 pm to 10:00 pm), and 35% nighttime operations (10:00 pm to 7:00 am). Train movements ranged from a few seconds up to more than two minutes in duration. Based on measured noise levels along the tracks, the calculated distance from the center of the mainline to the 60 dBA L_{dn} railroad contour is approximately 950 feet for existing (2004) operations.

c. Sierra Railroad

The Sierra Railroad operates between Oakdale and Standard and includes both freight and passenger trains. Freight trains are operated by Union Pacific and Burlington Northern Santa Fe and usually operate roughly three times per week. Passenger trips travel between Oakdale and the eastern Stanislaus County Line and include entertainment style railroad travel approximately 3 to 5 times per week with most trips occurring Thursday through Sunday. Additional trips are scheduled during holidays. Based on the noise measurement survey made east of Oakdale, 1 to 3 freight train movements take place each day with approximately 75% daytime operations (7:00 am to 7:00 pm) and 25% nighttime operations (10:00 pm to 7:00 am). Railroad and horn noise levels are clearly audible in areas of the county adjacent to the tracks, but they occur infrequently. The 60 dBA L_{dn} contour for this operation is approximately 80 feet from the centerline of the railroad for existing (2004) conditions located away from grade crossings.

d. Modesto and Empire Traction Company Railroad

The Modesto and Empire Traction Company is a short-line railroad which connects switching operations between the UPRR Railroad in Modesto and the AT&SF Railway in Empire. A typical train can vary from lone locomotives to 4-5 car trains, up to 60 car trains. Train speed is limited to a maximum of 20 mph, with an average speed of 1 mph. Train operations typically occur 24 hours per day from 11 pm on Sunday through 8 am on Saturday, with occasional train movements over the weekend. Operations are split into three shifts, with one crew working the 7 am to 3 pm shift, two crews working the 3 pm to 11 pm shift, and two crews working the 11 pm to 7 am shift. Train trips per day vary greatly, with lighter operations occurring during the daytime 7 am to 3 pm shift.

Source: Ken Beard, Modesto and Empire Traction Company, telephone interview, September 7, 2004.

e. Tidewater Southern Railroad

The Tidewater Southern Railroad is a branch line operation of the Union Pacific Railroad. The line runs in a general north-south route through Stanislaus County passing through Del Rio, Modesto, and Turlock. The portion of the line from just south of Bangs Avenue through Modesto to Bonniefair was abandoned in 2000 and sections were removed or paved over in 2003. North of Bangs Road, operations typically occur 3 days per week on Tuesday, Thursday and Saturday. However, service may be operated more or less frequently depending on demand. According to noise measurements made south of Del Rio, approximately 6 train movements take place each day, with occasional evening and nighttime movements. The southern end of the line is served out of Rogers Holding Yard in Ceres and by unit grain trains directly off the former Southern Pacific rail line from Fresno. The 60 dBA L_{dn} contour for this operation is approximately 140 feet from the centerline of the railroad for existing (2004) conditions located away from grade crossings.

Source: Jim Smith, Union Pacific Railroad, telephone interview, October 8, 2004.

6. Airports

Aircraft noise in California is described in terms of the community noise equivalent level (CNEL). As mentioned previously, CNEL is approximately equivalent to the day/night average noise level (Ldn) but includes a 5 dB weighting factor for the evening hours (7:00 PM to 10:00 PM). CNEL contours for operations at the Oakdale Municipal Airport, Patterson Airport, Turlock Airport, and Modesto City / County Airport were derived from the existing Airport Master Plan reports as available. Noise contours for the Crows Landing Naval Auxiliary Landing Field are not included in this report because, at the present time, the airfield is not in use and future plans for the airfield were unavailable.

a. Modesto City/ County Airport (Harry Sham Field)

The information for this portion of the report was compiled from the 2003 Airport Master Plan. The Modesto City/ County Airport serves as the primary commercial service airport for Stanislaus County and includes two runways in a 28L and R – 10L and R configuration. In 2001, the airport included 89,832 total operations, with 43,574 passengers, 591,518 lbs. total freight, and 177 based aircraft. Operations are predicted to increase to 141,180 by the year 2022. Approximately 84 percent of Modesto Airport operations in 2001 occurred during daytime hours (7:00 am to 7:00 pm), 15 percent occurred during evening hours (7:00 pm to 10:00 pm), and one (1) percent occurred during nighttime hours (10:00 pm to 7:00 am). The Modesto City/ County Airport includes air carriers, general aviation, and military operations. Itinerant general aviation accounts for approximately 62 percent of total general aviation operations, with 74 percent single engine aircraft, 9 percent multi-engine aircraft, 12 percent turboprops and jets, and 4 percent helicopters. The fleet mix transition over the past decade has been a move to high performance aircraft such as propjets and turbo fan aircraft and this is expected to continue into the future years. The 2001 Master Plan contours are shown in Figure A-22 in Appendix A.

Source: Modesto City-County Airport (Harry Sham Field) 2002 Airport Master Plan, prepared by Coffman Associates.

b. Oakdale Municipal Airport

The information for this portion of the report was compiled from the 2003 Airport Master Plan. The Oakdale Airport is composed of 117 acres of land with one paved runway. The east-west runway 10-28 is 3,020 feet long and can handle only small general aviation aircraft. The airport is located approximately two miles east of Oakdale City boundaries and the site is owned by the City of Oakdale. Land uses surrounding the airport are generally agricultural, with some rural residential uses. A few of these residences are located along Laughlin Road, the access road to the airport. The land surrounding the airport is currently zoned for agricultural uses and no residential uses fall within the 65 CNEL contour.

The airport is not considered particularly busy, except on summer weekends, and aircraft operations have not been counted on any continuing basis. The vast majority of operations are by single-engine aircraft, with approximately 60% local operations and 40% itinerant operations in 1995. Of these, approximately 4% of all operations were estimated to be by twin-engine aircraft and 0.5% by business jets. It was forecasted in 1995 that by the year 2015, there would be 80 based aircraft and 51,380 total operations, with a peak hourly runway demand of 39 under the runway-use configuration actually utilized and 5 under a single runway use configuration. It is assumed the single runway condition will occur for approximately 10% of the year and will not continue over a long period of time. A runway extension has been proposed to increase the existing runway to 4,400 feet, but has not been completed (as of August 2004). Future contours were calculated with and without the runway extension and it was found that there was an improvement in the CNEL contours with the extension, since the most active runway 28 will shift east away from developed areas. The 1996 Master Plan contours are shown in Figure A-23 in Appendix A with the runway extension.

Source: Oakdale Municipal Airport 1996 Airport Master Plan, prepared by Wadell Engineering Corporation.

c. Patterson Airport

The Patterson Airport is a small airport; built on approximately 30 acres with a runway (34/16) that is less than 2000 feet long. Small turbine-powered or reciprocal engine agricultural planes are the typical users, and planes of about 8,000 to 10,000 lbs gross weight are the largest that are able to operate on this small runway. The majority of land use in the vicinity of the airport is agricultural, with the nearest noise sensitive areas located within the City of Patterson and more than a quarter mile from the airport. The 2001 Draft EIR for the City of Patterson does not include the airport as a significant noise source. Additionally, it is likely that the airport will be annexed to the City of Patterson by January 2005. Noise contours were not prepared for this airport. Based upon the airport size and operations, it is expected that the 60 dB CNEL contour for this airport is located very close to the airport so no noise sensitive land would be affected.

Sources: Patrick Bodin, City of Patterson, August 2004.

West Patterson Master Development Plan Draft EIR, prepared by Crawford Multari & Clark Associates.

d. Turlock Airpark

Turlock Airpark is a small, public use airport with a few based aircraft. The airport is located just south of State Route 99, with portions of the airport located in both the City of Turlock and unincorporated Stanislaus County. Within county lands, the land use is primarily agricultural. The limited runway length prevents large aircraft and jets from using the airport, so that the majority of airport use is by single engine aircraft and ultralight aircraft. Twenty single engine aircraft and twelve ultralight aircraft are based at the Turlock Airpark. Noise contours were not prepared for this airport. Based on the limited capacity of the airport, it is estimated that the 60 dB CNEL contour for this airport lies within the airport boundaries so that noise sensitive uses are not significantly impacted.

Source: Michael Cooke, Planning Department, City of Turlock, August 2004.

e. Former Crows Landing Naval Auxiliary Landing Field (NALF)

The former Crows Landing Naval Auxiliary Landing Field is completely surrounded by Stanislaus County land. The site contains approximately 1,500 acres of land between Patterson and Crows Landing. Much of the facility property and most of the surrounding area is used for agriculture. The former NALF Crows Landing was commissioned in May 1943 and served primarily as an auxiliary airfield for operations from Naval Air Station, Moffet Field. The Navy closed the facility in 1994 it was transferred to NASA on July 1, 1994. In October 1999, NASA was authorized by to transfer the facility to Stanislaus County. At this time, NASA is no longer using the airfield and the property should be transferred to the County by the end of 2004. Noise contours were not prepared for this airport. There no current plan for the air field at this time, but a new Master Plan may eventually be prepared if the county decides to operate a General Aviation airport at this location.

Source: Proposed Plan NASA Crows Landing, June 1999, prepared by the Navy, Engineering Field Activity West.

Debra Whitmore, Senior Planner, Planning and Community Development, Stanislaus County, August 2004.

7. Industrial and Other Stationary Noise Sources

Noise is inherent to many industrial processes, even with the best available noise control technology. Updated noise exposure information for major industries in the unincorporated areas of Stanislaus County was developed from operational information obtained from plant operators. The industrial areas represented in this document are intended to identify noise sources that are located near noise sensitive land uses. The industrial areas are grouped into three categories; (1) those which are outside of any sphere of influence, but near County development, (2) those located within a sphere of influence, and (3) those located in the County agricultural zone, away from development. The main focus of this section of the document is on industry located outside of any sphere of influence, but near County development. Facilities located within a sphere of influence and near noise sensitive uses would be included in the applicable City Noise Element document.

Outside City Spheres of Influence, Near County Development

a. Berry Feed and Seed Company, Keyes

The Berry Feed and Seed facility receives and processes grain products for seed and animal feeds. Products are received by truck and rail. Major on-site noise sources include material and air handling fans, hammermills, roller mills, and heavy truck movements. The majority of the equipment is located inside a steel structure. Operations are conducted 24-hours per day year round. Residences located south of the facility have been purchased by Berry Feed and Seed and are used as company offices, storage, and liquid feed containers. The 60 dBA L_{dn} noise contour for this facility is estimated to be approximately 1550 feet from the center of the plant as specified in the 1987 documentation.

Source: Bruce Pace, Director of Safety and Environmental Affairs, Berry Feed and Seed, Telephone Interview, February 16, 2005.

b. California Almond Growers Exchange, Salida

The California Almond Growers Exchange is an almond receiving, processing, and storage facility. Noise generating operations include an almond shelling process, heavy truck movements, elevators, dust collectors, and conveyers. The plant typically operates 5 to 6 days per week during the hours of 6:00 am and midnight during almond harvesting season (September through November). Based on noise measurements conducted in 1986 during the off-season (BBA, 1987) an elevator generates noise levels of approximately 65 to 66 dBA at a distance of 900 feet from the operations and the processing equipment generates noise levels of approximately 66 dBA at a distance of 200 feet from the receiving area of the plant. The almond shelling process (an addition since 1986) is not expected to be distinguishable above noise levels already generated on the site by the other equipment. Noise levels would be higher during peak season, when there are large numbers of trucks and all stationary equipment is in full operation.

Source: Bill Weaver, Plant Manager, California Almond Growers Exchange, February 2005.

c. Dompe Company Warehouse, Crows Landing

The Dompe Warehouse is located adjacent to the Grisez Warehouse and used mostly as a storage facility. There are no major noise sources at the facility. Bean cleaning and treatment is performed at this facility during harvest season. The 60 dBA L_{dn} noise contour for this facility is expected to be located entirely within the property boundaries. Nearby noise sensitive uses are not significantly impacted by this facility, but may be impacted by the adjourning Grisez facility.

Source: Barbara Troesch, Accounts Payable, Dompe Company Warehouse, Telephone Interview, January 20, 2005.

d. Flory Industries, Salida

Flory Industries is a manufacturing and fabrication plant located west of Salida. The facility manufactures equipment including nut harvesters and sweepers, sprayers, blowers, and agricultural implements. The shop operates in three shifts 5 to 6 days per week; a daytime shift from 7:00 am to 3:30 pm, a swing shift from 4:00 pm to 12:30 am, and a smaller graveyard shift from 11:30 pm to 8:00 am. Most manufacturing operations are located within buildings, but steam cleaning and heavy duty riveting are performed outdoors. Noise sources which were audible at the property line during the 1987 survey included forklifts, trucks, welding and grinding operations, steam cleaning, and the compressor and pump operations. The airstrip previously located on the property and used for operations has been removed. Based on the removal of the airstrip and the previous 1987 technical noise document findings, the 60 dBA L_{dn} noise contour for this facility is expected to be located entirely within the property boundaries.

Source: Rodney Flory, Senior Partner and Treasurer, Flory Industries, January 2005.

e. Grisez Warehouse, Crows Landing

The Grisez warehouse complex includes three mills enclosed in separate buildings. Only one of the three mills is currently in use, with the additional two buildings being used as storage. The facility stores, cleans, and treats lima, baby lima, and baby green beans, as well as black eyed peas. Major noise sources include the one operating mill, ventilation fans, deliveries, and forklift operation. Approximately two heavy truck deliveries take place each week. The facility is typically operated from 7:00 am to 5:00 pm during the off-season and from 7:00 am to 7:00 pm during harvest season. Operations have decreased from the 1987 (when all three mills were running), but could conceivable return to previous operations. The 60 L_{dn} contour during peak season mill operations is estimated to be approximately 830 feet from the center of the milling equipment as specified in the 1987 documentation.

Source: Barbara Troesch, Accounts Payable, Dompe Company Warehouse, Telephone Interview, January 20, 2005.

f. Modesto Sand and Gravel, Modesto

Modesto Sand and Gravel is a demolition and excavation company which operates noisy equipment off-site. Heavy trucks, excavators, and loaders are sent out during daytime hours to the location of the demolition or excavation site. Equipment is stored on site when not in use and the only on-site noise sources would be vehicle movements moving to and from the facility. The 60 dBA L_{dn} noise contour for this facility is expected to be located entirely within the property boundaries.

Source: Grace Azevedo, Administrative Assistant, Modesto Sand and Gravel, Telephone Interview, February 15, 2005.

Inside City Spheres of Influence

g. Beard Industrial Tract, Modesto

The Beard Industrial Tract includes a variety of industrial uses, including food processing plants and transportation sources. Primary noise sources include the Modesto and Empire Traction Company Railroad movements, Burlington Northern and Santa Fe (BN & SF) Railway movements, traffic along Yosemite Boulevard, and aircraft operations at the Modesto City/ County Airport (all discussed previously). South of the tract, the noise environment is generated primarily by industrial noise sources. It is likely that the 60 dBA L_{dn} noise contour for Beard Industrial Tract would be located within the tract boundaries. However, due to seasonal variations in operations and the many variables associated with the tract, it is recommended that detailed studies of current source operations be conducted whenever potentially noise sensitive land uses are proposed nearby.

h. Bonzi Landfill

The Bonzi Landfill operates from 6:00 am to 6:00 pm on 5-days per week with occasional Saturday operations and is not open to the public. Operations include the storage, recycling, and disposal of industrial wastes. Heavy trucks are used for waste handling and transportation to and from the site, with a limited number of nighttime truck activities (1-2). Nearby residences are approximately 150 yards from the working area and are acoustically shielded by berms and a block wall. The major noise source at these residences is heavy truck movements on Hatch Road.

Source: Steve Bonzi, General Manager, Bonzi Landfill, Telephone Interview, February 16, 2005.

i. Gallo Winery, Modesto

The Gallo Winery and Gallo Glass Company is a large industrial complex located east of Dry Creek, between Yosemite Boulevard and the Tuolumne River, and within the Modesto sphere of influence. No major changes in operations have occurred in the complex since 1986. Operations occur on a 24-hour per day basis, 365 days per year and include cooling towers, refrigeration equipment, and various types of small and large fans. In addition, heavy truck movements occur in some areas. Bottling operations are enclosed within the buildings. Based on noise measurements conducted in 1987 (BBA, 1987), noise levels at or near the plant boundaries typically range from approximately 55 to 70 dBA during periods of normal operations.

Source: Derrick Jarvis, Operations Manager, Gallo Winery, January 2005.

Agricultural Zone, Away From County Development

j. Santa Fe Aggregates, Inc, Waterford Plant

The Santa Fe Aggregates Waterford Plant is a sand and gravel extraction and processing plant, located approximately 5 miles east of Waterford. Extraction, crushing, and screening operations typically occur weekdays between the hours of 6:00 am and 11:00 pm during peak season (June through October), and 7:00 am to 5:00 pm during off season, with occasional Saturday operations during peak season. The asphalt plant typically operates 4 days per week in peak season with a start up time of 6:00 am and 2 days per week during off-season with a start up time of 7:00 to 8:00 am. The concrete batch plant is no longer in use and has not been used for many years. Extraction operations utilize a backhoe and a belt conveyer line to transport material between facilities. Crushing operations include two cone crushers and a vertical impact crusher. The plant is now on electric power and no longer uses a diesel generator. Based on the 1987 technical noise document findings and updated operations information and without taking acoustical shielding into account, the 'worst-case' 60 dBA L_{dn} noise contour for this facility is expected to be located approximately 600 feet from excavation and hauling activities and approximately 4500 feet from the center of the processing plant during asphalt plant operations. Shielding from the bluff along the river would be expected to reduce noise levels significantly in areas north of SR 132.

Source: Michelle Cunningham, Division Manager, Santa Fe Aggregates, Inc, Telephone Interview, February 15, 2005.

8. Key Findings

a. Roadways, freeways, and railroads are the primary source of noise in Stanislaus County, with SR-99 and Interstate 5, the Union Pacific Railroad (UPRR), and the Burlington Northern and Santa Fe (BN & SF) Railway having the highest noise levels.

b. Localized and intermittent noise impacts occur as a result of aircraft over flights and industrial noise sources.

D. Future Noise Environment

1. Roadways

Future (2030) L_{dn} noise levels were estimated based on traffic volume data provided by the Stanislaus County Department of Public Works. A tabulated summary of calculated distances to L_{dn} contours for existing and future conditions are shown in Tables B-1 and B-2 in Appendix B. The predicted future (2030) L_{dn} noise levels along state highways and major county roadways throughout Stanislaus County at a distance of 75 feet from the centerline of the roadway are mapped in Figure B-1 in Appendix B. Predicted L_{dn} values are "worst-case" estimates because they do not take acoustical shielding from buildings or terrain into account.

2. Railroads

Information on the future operations of the railroads was unavailable and future noise contours were not prepared. Existing noise contour distances can be found in Appendix A. These data are the best available to describe the existing and future noise environments along the rail corridors.

3. Airports

Predicted future CNEL contours for operations at the Oakdale Municipal Airport and Modesto City / County Airport were derived from the existing Airport Master Plan reports as available and can be found in Figure B-3 in Appendix B. The noise contour maps show the extent of airport noise for planning purposes in the vicinity of the airport.

4. Industrial and Other Stationary Noise Sources

Future operations at industrial facilities are dependant on many variables and information was unavailable to allow meaningful projections of noise. It is recommended that detailed studies of current source operations be conducted whenever potentially noise sensitive land uses are proposed for areas near existing industrial, commercial, or other stationary facilities which could generate significant noise levels.

References

The references listed here are in addition to those documented throughout the report.

Brown Buntin Associates, Inc., Technical Reference Document, Chapter 4: Noise, 1987.

Stanislaus County Year 2000 General Plan, Chapter 2: Circulation Element, 1987.

Stanislaus County Year 2000 General Plan, Chapter 4: Noise Element, 1987.

StanCOG, Program Environmental Impact Report, Regional Transportation Plan for Stanislaus County, Chapter 12 Noise, October 2001.

E. *List of Preparers*

Illingworth & Rodkin, Inc., an acoustics and air quality consulting firm, was contracted by Stanislaus County to conduct this noise study. The following individuals had substantial roles in conducting the noise study and in the preparation of this report:

- Richard Rodkin (Principal) developed study approach, provided oversight in field measurement locations, traffic noise modeling and report preparation tasks, and reviewed this document.
- Dana Lodico (Staff Consultant) directed field measurements, analyzed noise and traffic data, conducted traffic noise modeling, and was the author of the report.
- Clayton Anderson (Staff Consultant) conducted noise measurements.

Appendix A: Existing Noise Sources

Figure A-1: Noise Measurement Locations

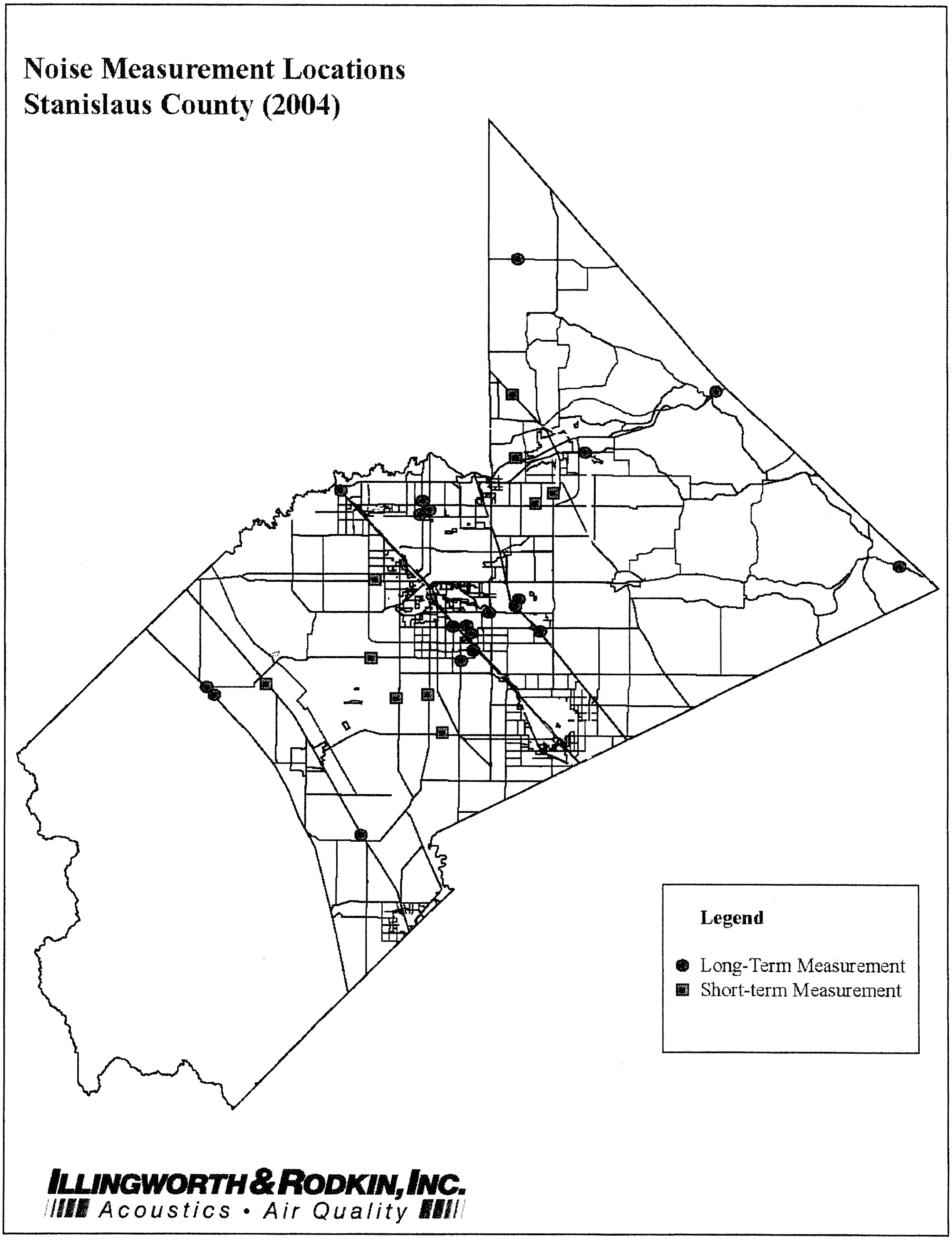


Table A-1: Summary of Long-Term Noise Measurements

Site	Location	Date	Time	Daytime Noise Levels	Nighttime Noise Levels	L_{dn}
Long-Term Measurements				**dBA**	**dBA**	**dBA**
LT-1	Residential Land Use, 907 Kiernan Road ~ 60 ft from the centerline of Hwy 219 /Kiernan Road	7/20/04 to 7/21/04	11:00 am to 1:00 pm	65-68	56-65	**68**
LT-2	~50 feet from the centerline of Hwy 108, near intersection with Hwy 219	7/20/04 to 7/21/04	11:30 am to 12:30 pm	71-74	64-73	**76**
LT-3	~200 feet to center of SR 99 near lane, ~350 feet toUPRR Rail line	7/20/04 to 7/22/04	12:20 pm to 2:30 pm	72-75	69-75	**78**
LT-4	~30 feet from centerline of 132, near county line	7/20/04 to 7/21/04	12:00 pm to 4:00 pm	62-66	51-66	**68**
LT-5	~50 feet from centerline of 120, near County line	7/20/04 to 7/21/04	1:00 pm to 5:00 pm	70-73	62-72	**75**
LT-6	~45 feet from centerline of Hwy. 4	7/20/04 to 7/21/04	2:00 pm to 7:00 pm	64-67	54-67	**69**
LT-7	~30 feet from centerline of Central Ave, south of Ceres near Grayson Road	7/20/04 to 7/22/04	6:00 pm to 2:00 pm	67-70	59-69	**72**
LT-8	~65 feet from near lane of I-5	7/21/04 to 7/22/04	11:00 am to 12:00 pm	73-75	73-75	**80**
LT-9	~50 feet from centerline of SR 33, north of Crows Landing	7/21/04 to 7/22/04	11:30 am to 1:00 pm	66-70	57-69	**72**
LT-10a	~50 feet from the centerline of Santa Fe Ave., near Leedom	7/21/04 to 7/22/04	3:30 pm to 4:00 pm	68-75	62-76	**78**
LT-10b	~50 feet from the centerline of Santa Fe Avenue at Leedom	8/31/04 to 9/2/04	2:00 pm to 2:00 pm	69-75	60-74	**76**
LT-11	3831 Hatch Road, ~65 feet from centerline of Hatch Road	7/21/04 to 7/22/04	3:30 pm to 4:00 pm	68-71	62-71	**74**
LT-12	~20 feet west of SPTCo Railroad and ~105 feet west of SR 99, in Ceres	5/18/04 to 5/21/04	12:30 pm to 2:00 pm	77-81	71-79	**83**
LT-13	~30 feet from the edge of Service Road, at Service and Moffet in Ceres	5/18/04 to 5/21/04	1:00 pm to 2:00 pm	69-73	62-73	**75**
LT-14	2805 Evalee Lane ~270 feet east of SR 99, in Ceres	5/18/04 to 5/20/04	1:30 pm to 3:00 pm	66-69	60-69	**72**
LT-15	Little Orchard Mobile Home Park ~130 feet east of SR 99, in Ceres	5/18/04 to 5/20/04	2:30 pm to 3:00 pm	72-74	64-73	**78**
LT-16	~60 feet from near lane of I-5 in Westley	8/31/04 to 9/2/04	10:30 am to 10:30 am	72-74	71-75	**80**
LT-17	~150 feet from AT&SF Railroad in Hughson	8/31/04 to 9/2/04	1:00 pm to 2:00 pm	69-80	59-80	**81**
LT-18	~50 feet from the Sierra Railroad tracks east of Oakdale	8/31/04 to 9/2/04	3:00 pm to 3:00 pm	66-71	58-70	**72**
LT-19	~35 feet from the Tidewater Railroad, south of Del Rio	8/31/04 to 9/2/04	4:00 pm to 4:00 pm	63-70	43-63	**70**

Table A-2: Summary of Short-Term Noise Measurements

Site	Location	Date	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
Short-Term Measurements				**dBA**	**dBA**	**dBA**	**dBA**	**dBA**
ST-1	~75 feet from the centerline of Maze Blvd/ Hwy. 132 at Garrison	7/20/04	12:55 pm to 1:00 pm	71	81	76	66	50
ST-2	~75 feet from the centerline of Grayson Road, east of Jennings Road	7/20/04	1:48 pm to 1:58 pm	61	75	63	45	37
ST-3	~80 feet from the centerline of Carpenter Road, at Monte Vista Avenue	7/20/04	2:22 pm to 2:32 pm	64	74	68	54	44
ST-4	~60 feet from the centerline of West Main Street, west of Blaker Road	7/20/04	3:00 pm to 3:10 pm	68	77	72	62	49
ST-5	~60 feet from the centerline of Crows Landing Road, at Zeering	7/20/04	3:33 pm to 3:43 pm	67	78	70	60	48
ST-6	~40 feet from the centerline of SR 33, south of Westley	7/21/04	10:50 am to 11:00 am	71	81	75	60	47
ST-7	~50 feet from the centerline of Albers, between Patterson and Claribel	7/21/04	5:50 pm to 6:00 pm	72	82	76	67	54
ST-8	~50 feet from the centerline of Claribel, between Albers and Hwy. 108	7/21/04	6:15 pm to 6:25 pm	69	78	74	62	50
ST-9	~60 feet from the centerline of Hwy. 108, at Orchard Ave.	7/21/04	6:40 pm to 6:50 pm	70	77	74	69	56
ST-10	~60 feet from the centerline of Valley Home Rd, at 12542 Valley Home Road	7/21/04	7:10 pm to 7:20 pm	65	76	71	52	42

Figure A-2: Daily Trend in Noise Levels at LT-1

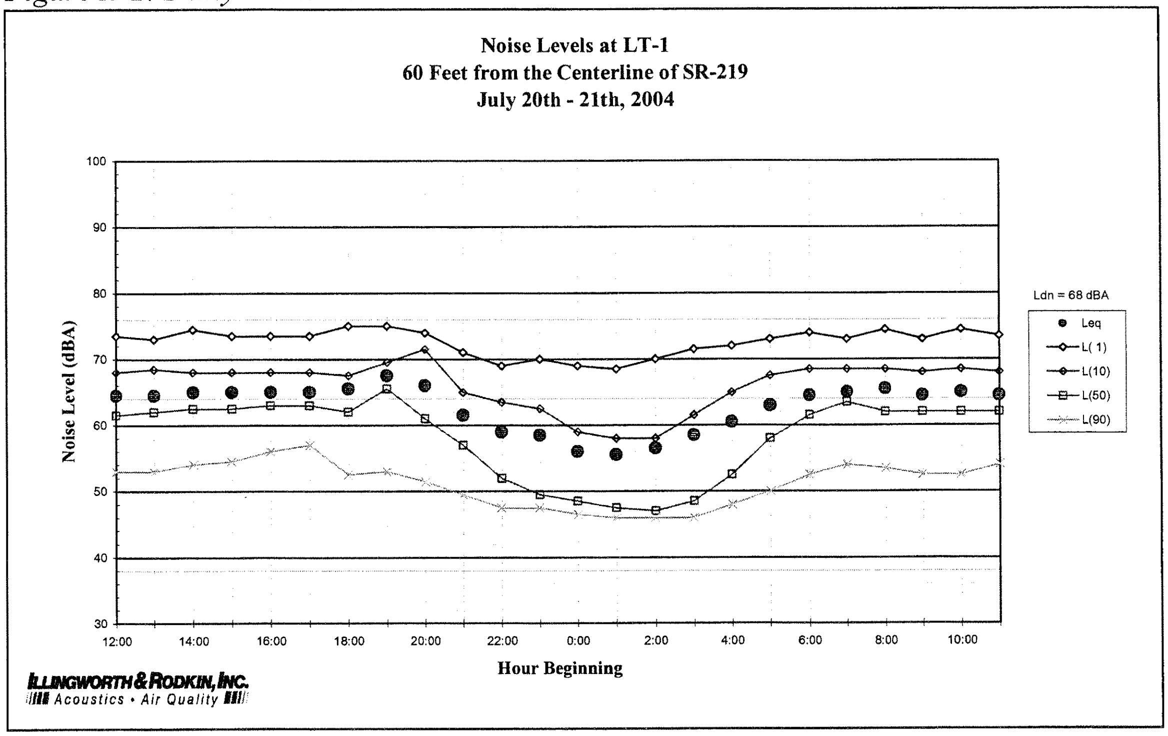


Figure A-3: Daily Trend in Noise Levels at LT-2

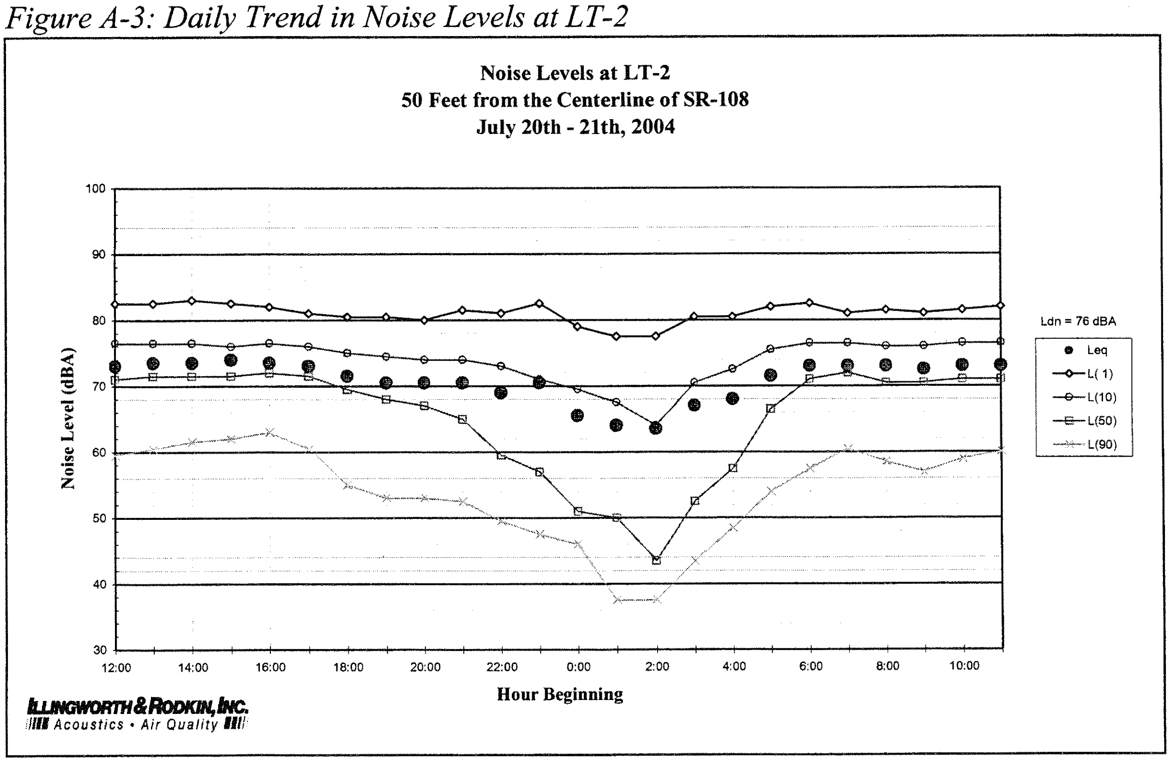


Figure A-4: Daily Trend in Noise Levels at LT-3

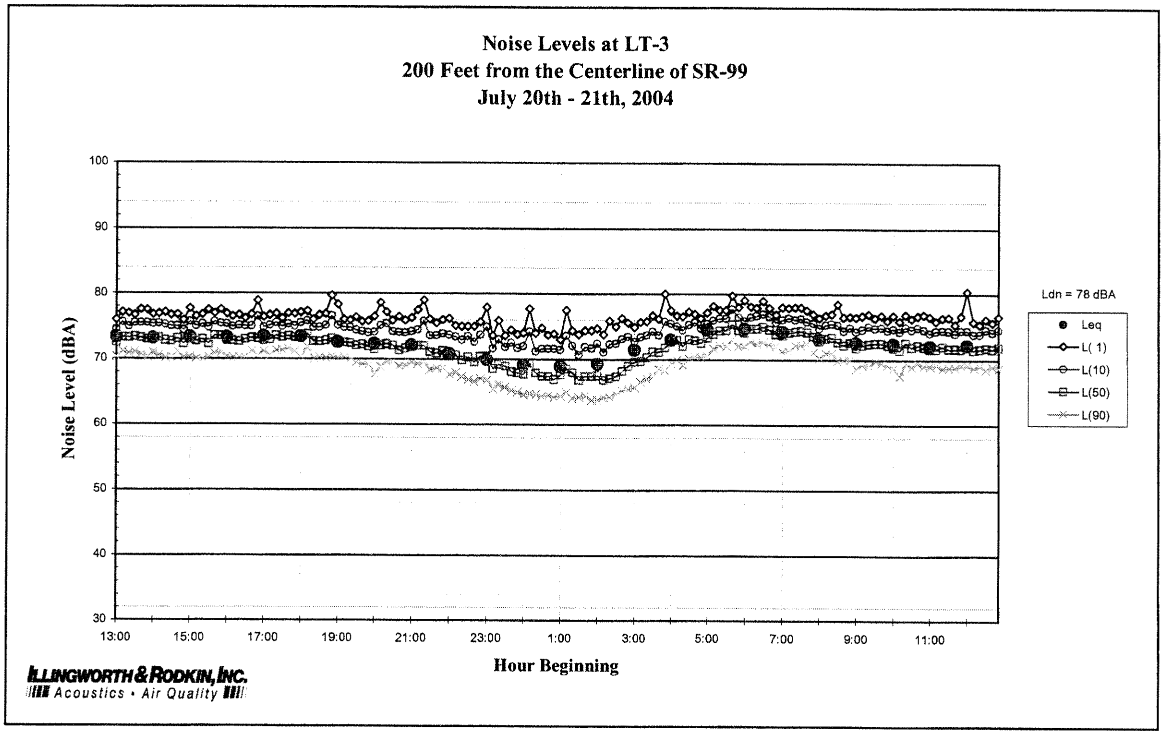


Figure A-5: Daily Trend in Noise Levels at LT-4

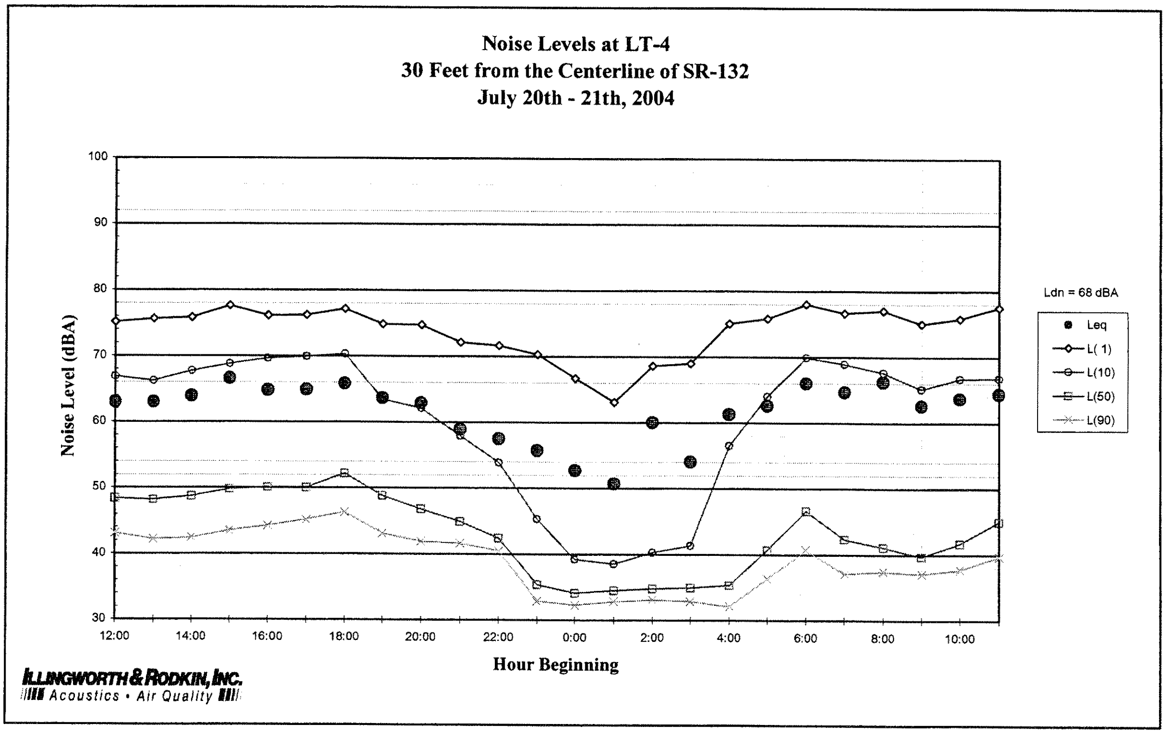


Figure A-6: Daily Trend in Noise Levels at LT-5

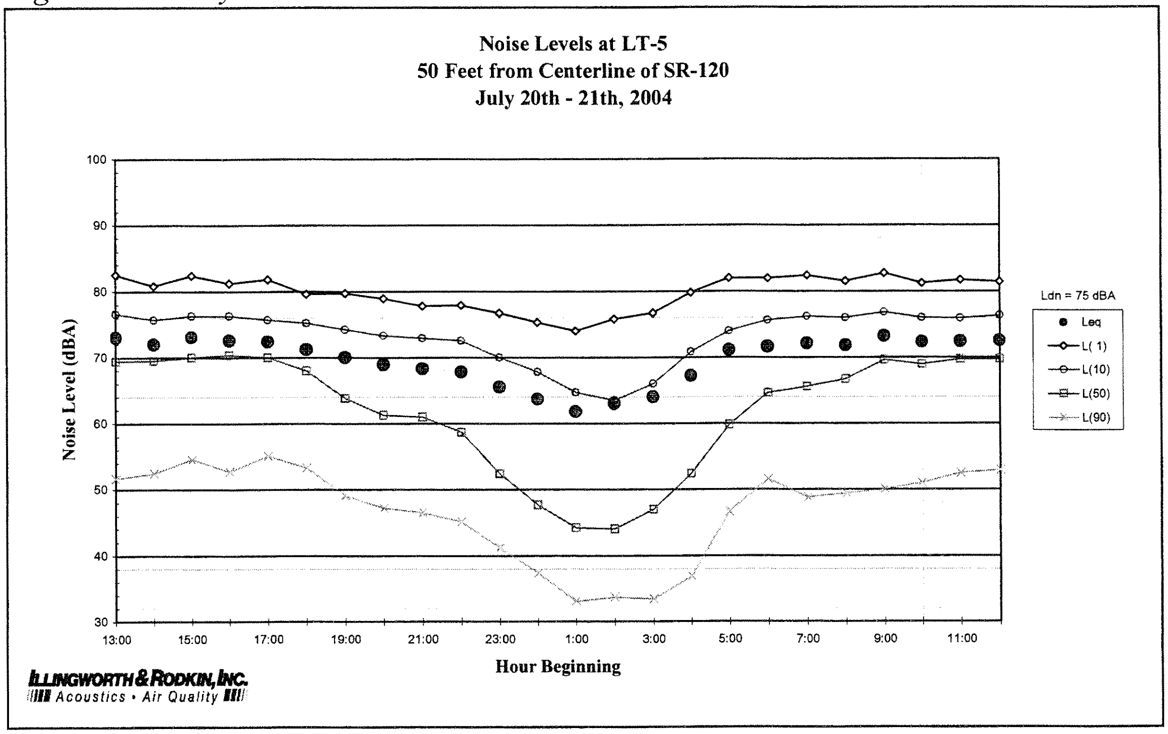


Figure A-7: Daily Trend in Noise Levels at LT-6

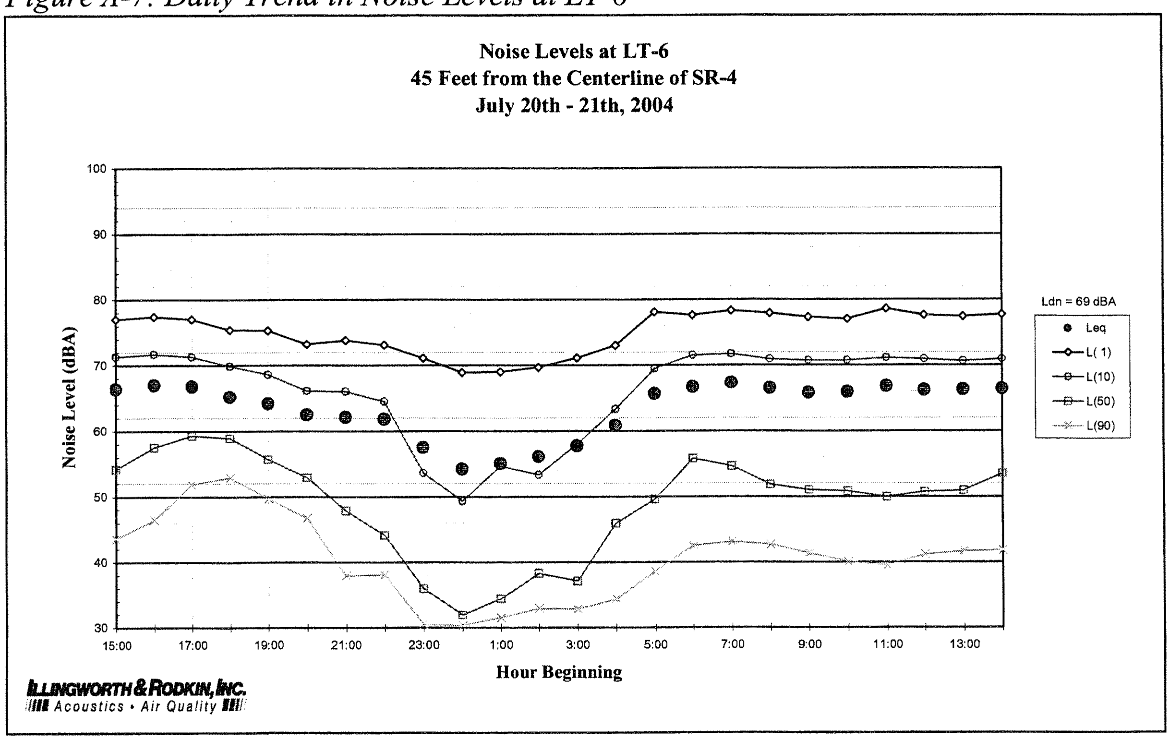


Figure A-8: Daily Trend in Noise Levels at LT-7

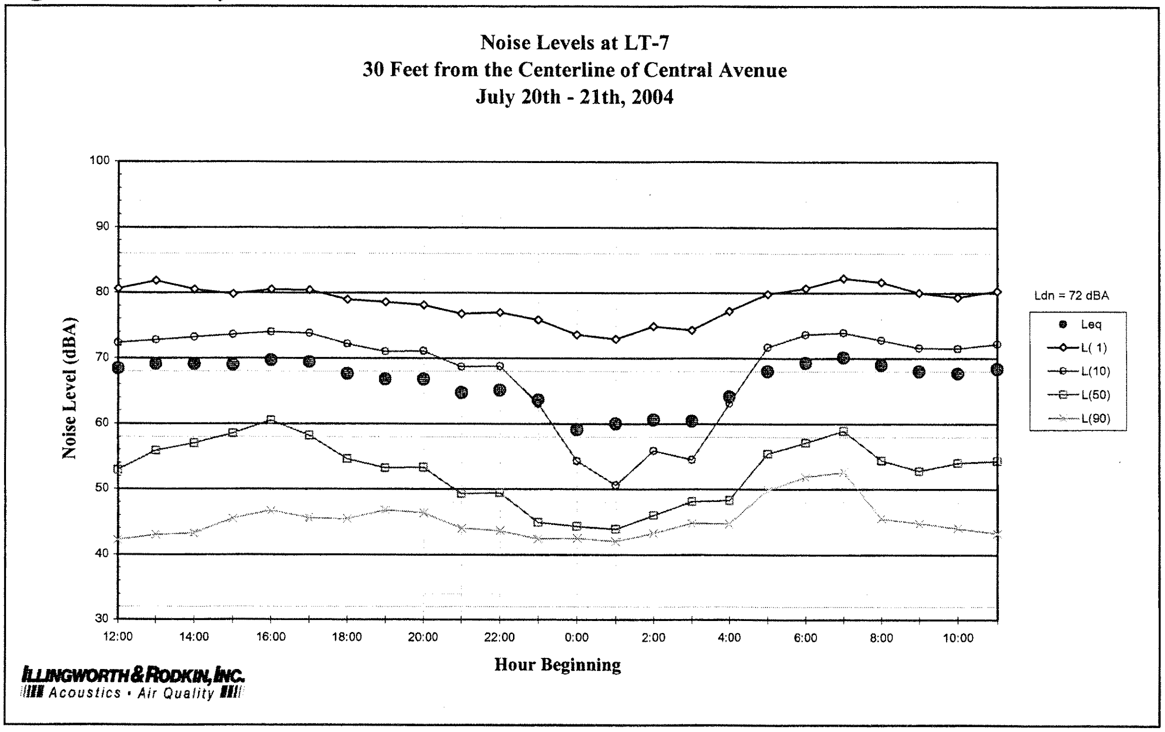


Figure A-9: Daily Trend in Noise Levels at LT-8

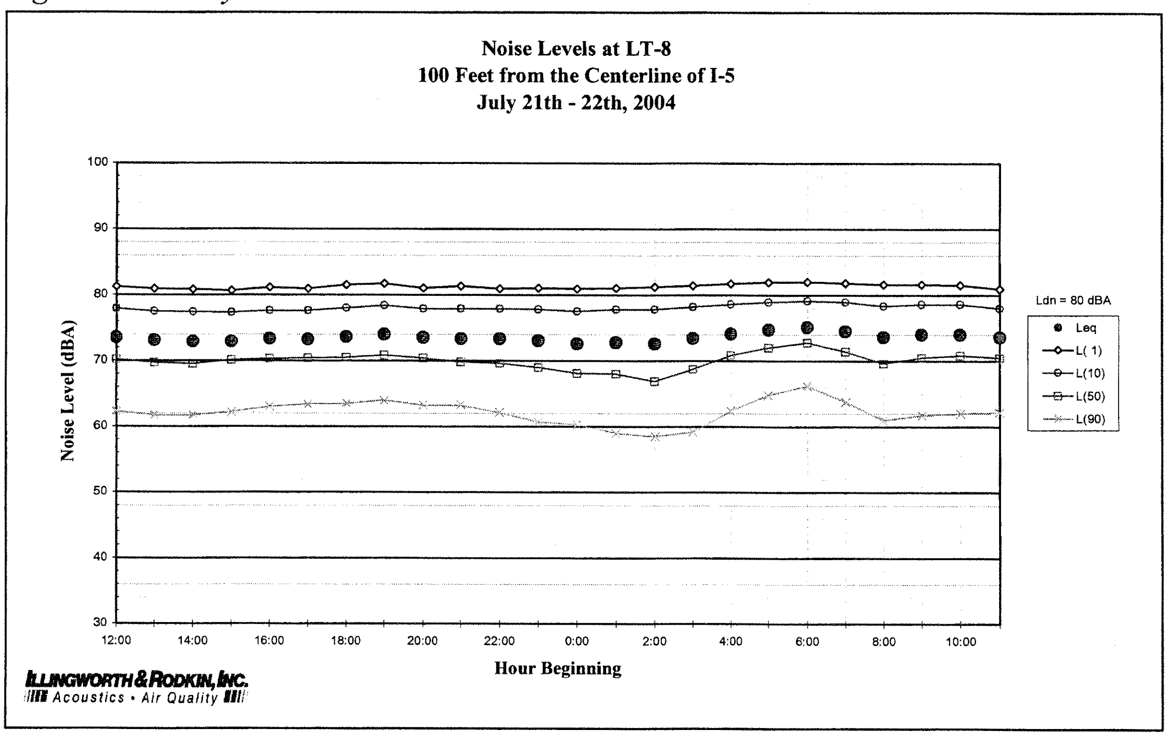


Figure A-10: Daily Trend in Noise Levels at LT-9

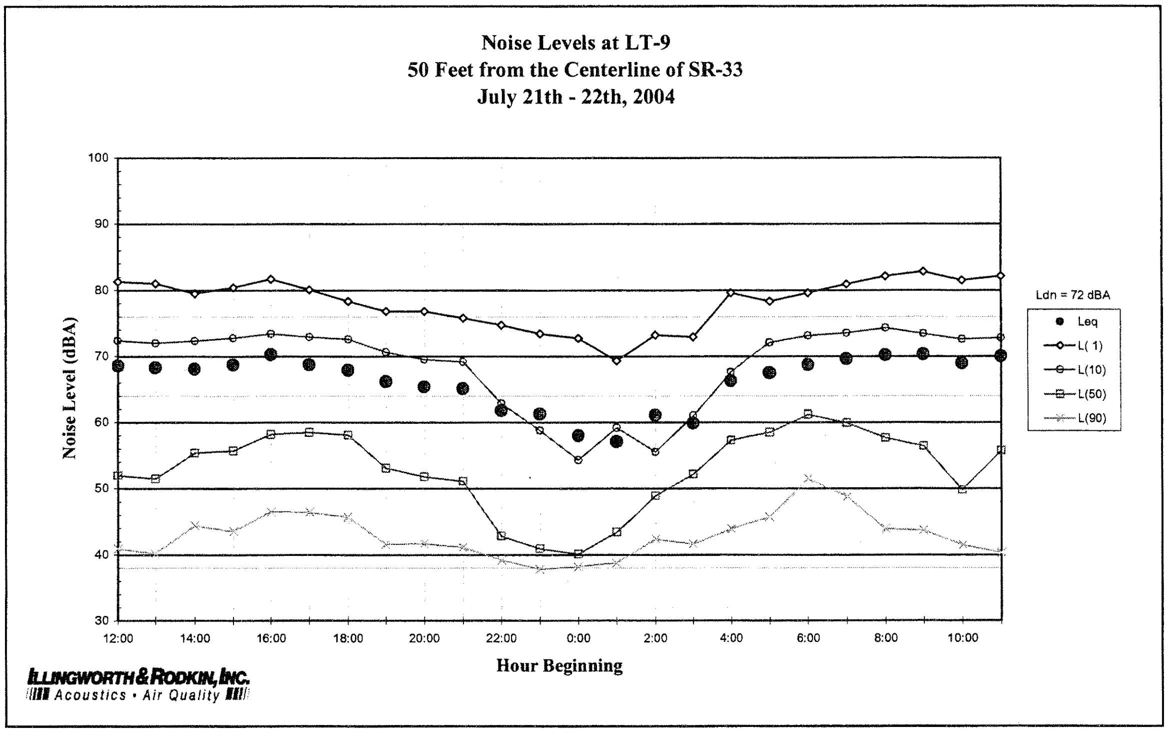


Figure A-11: Daily Trend in Noise Levels at LT-10a

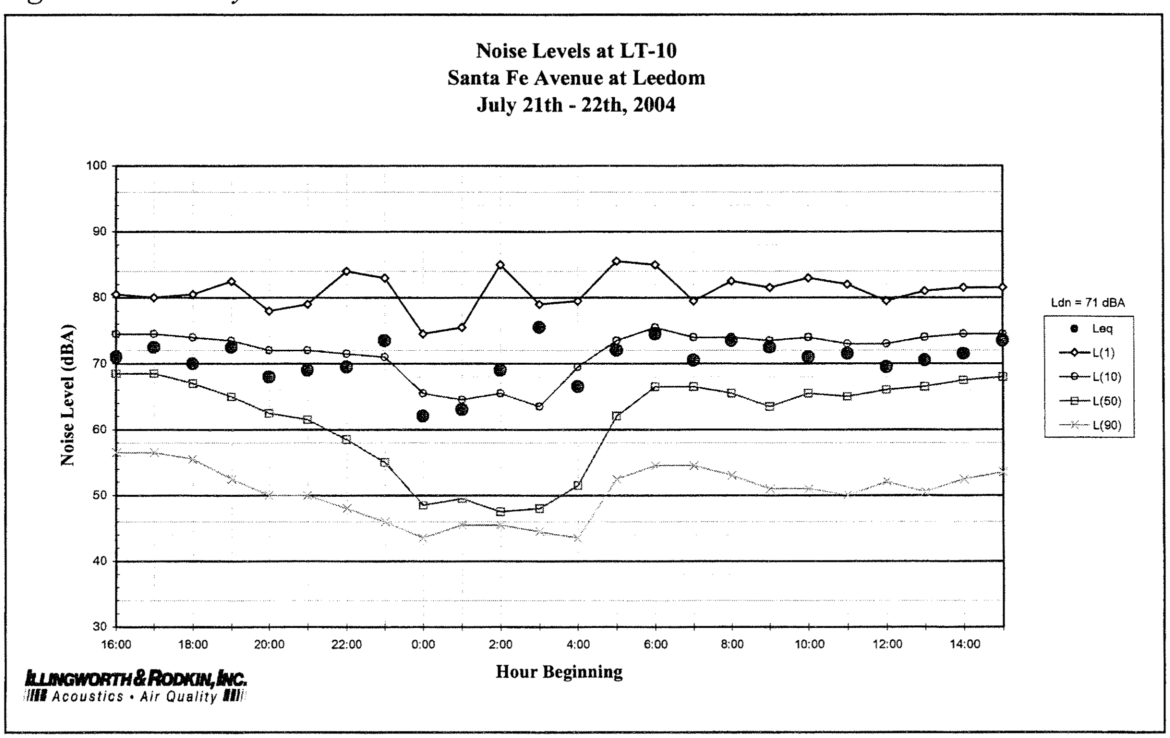


Figure A-12: Daily Trend in Noise Levels at LT-10b

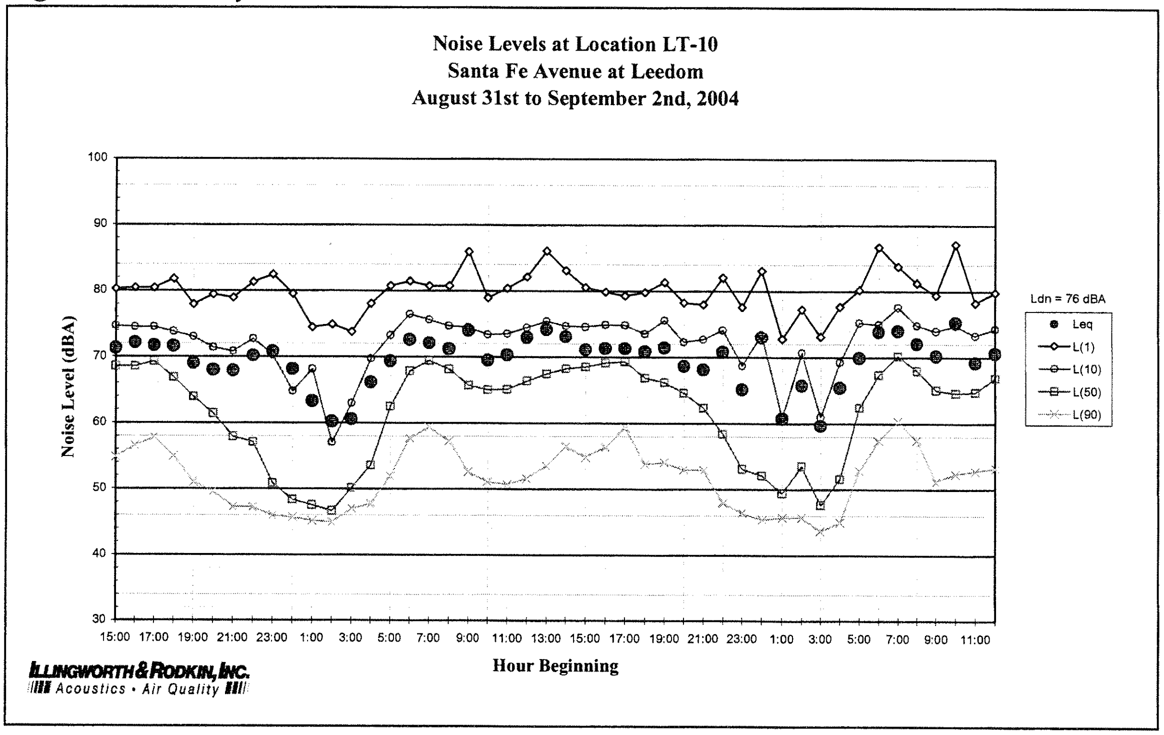


Figure A-13: Daily Trend in Noise Levels at LT-11

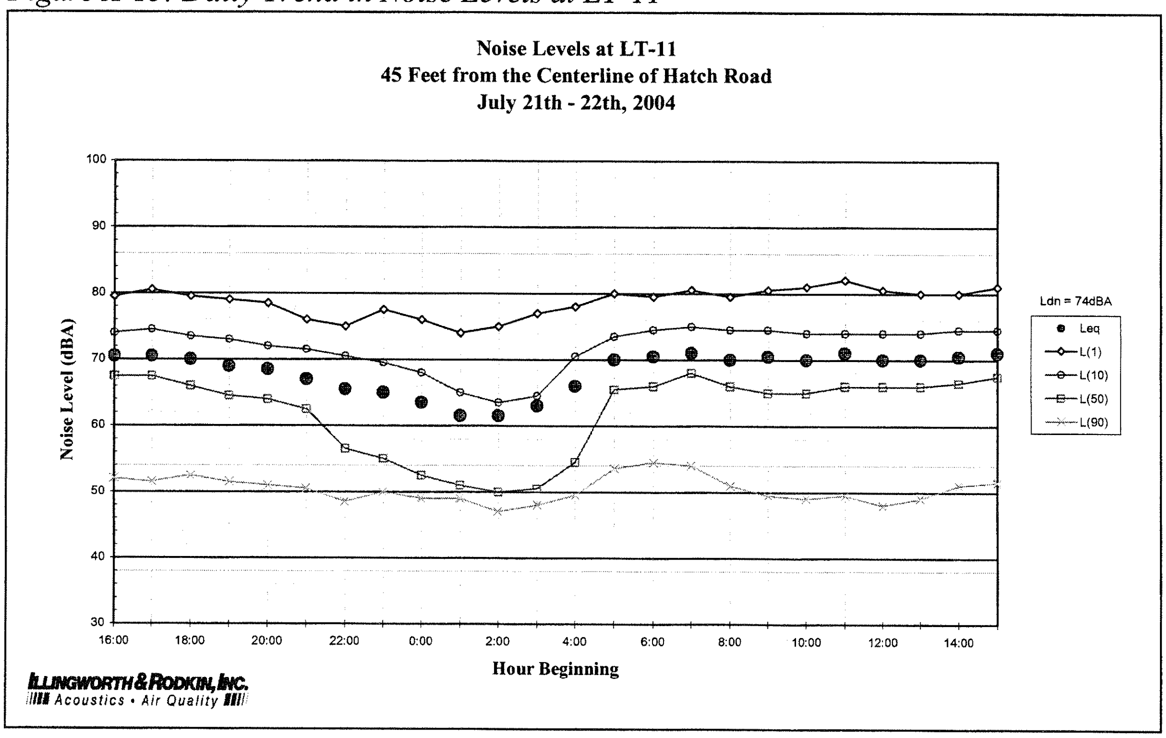


Figure A-14: Daily Trend in Noise Levels at LT-12

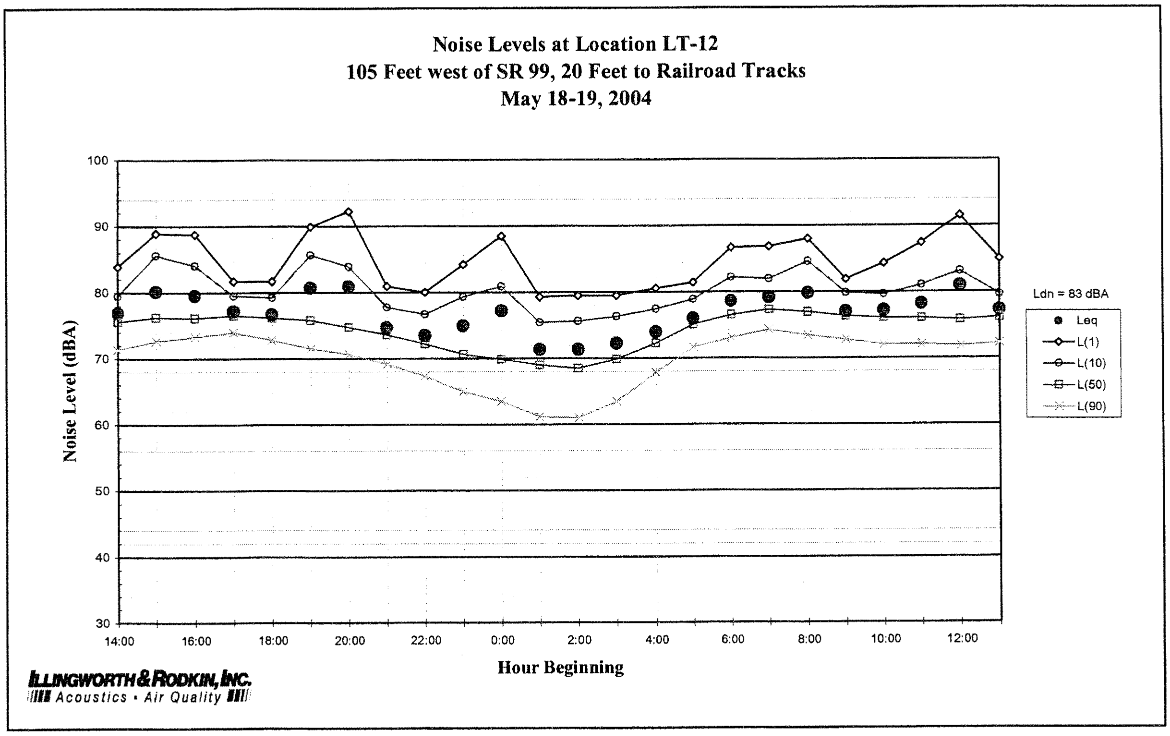


Figure A-15: Daily Trend in Noise Levels at LT-13

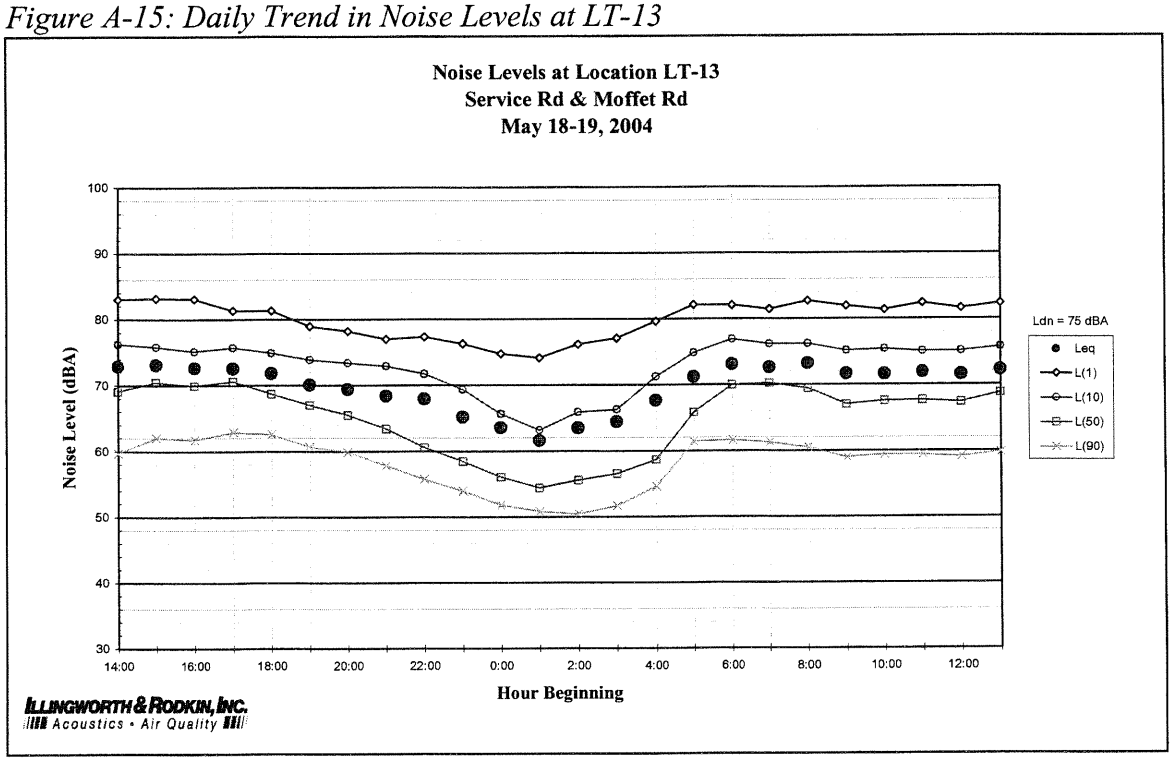


Figure A-16: Daily Trend in Noise Levels at LT-14

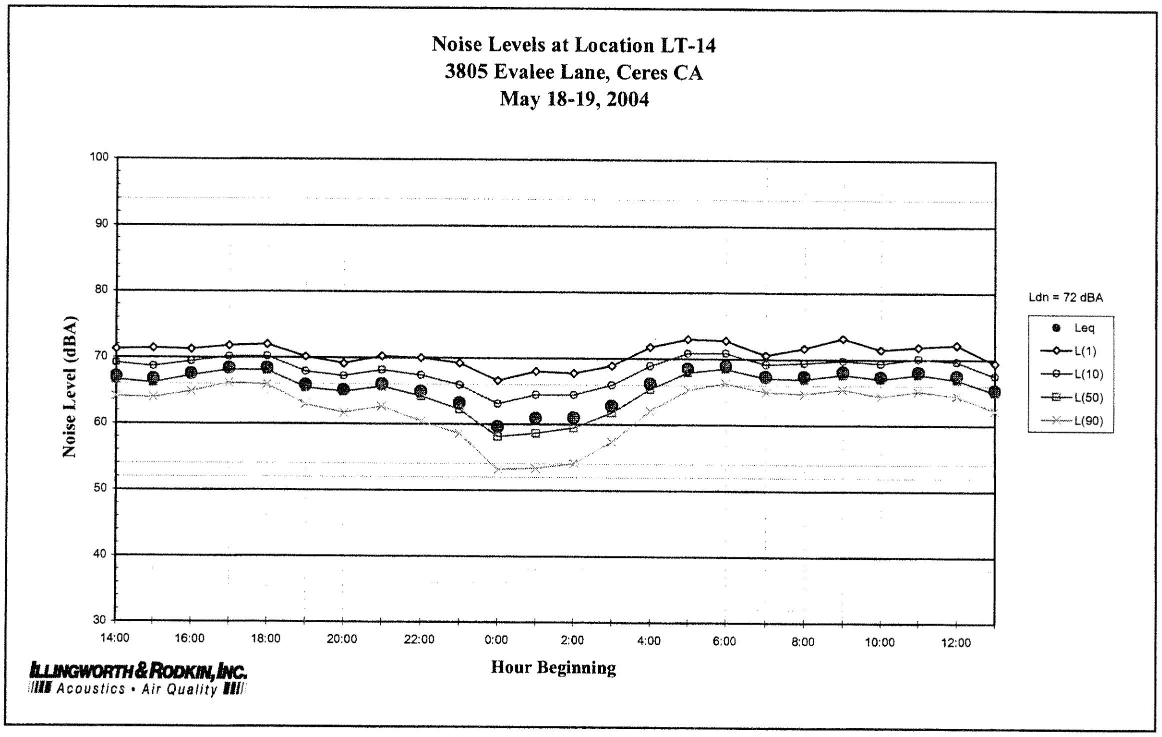


Figure A-17: Daily Trend in Noise Levels at LT-15

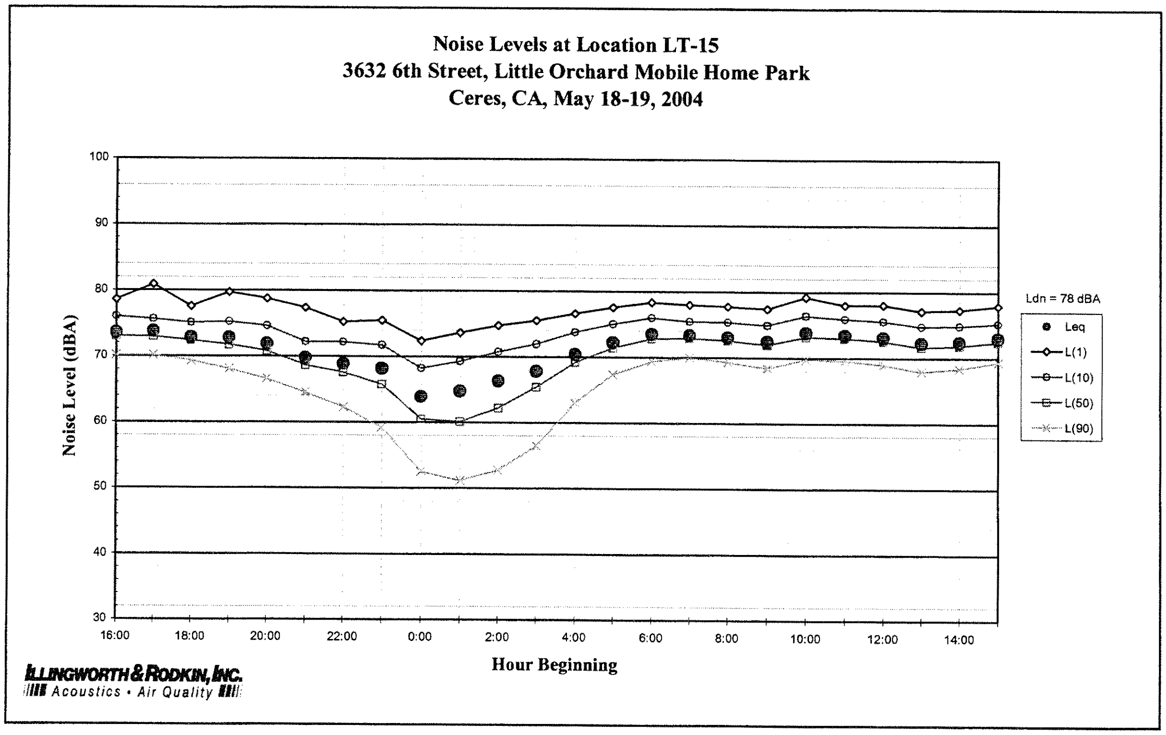


Figure A-18: Daily Trend in Noise Levels at LT-16

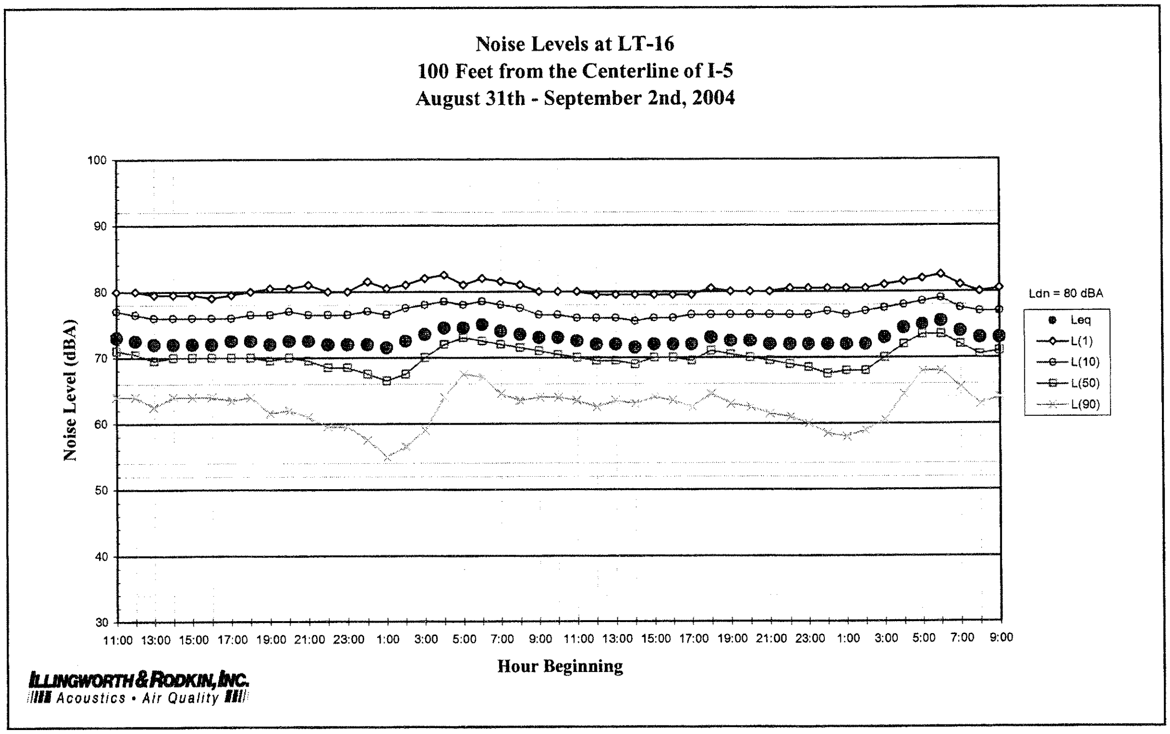


Figure A-19: Daily Trend in Noise Levels at LT-17

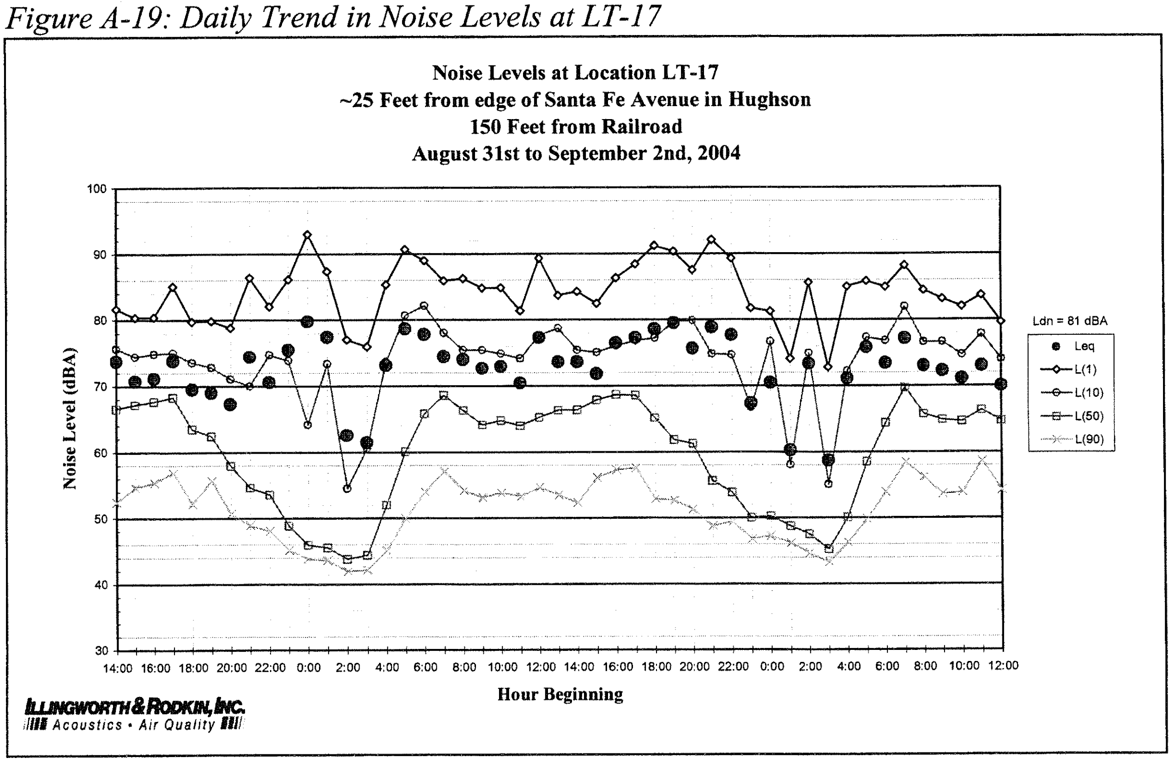


Figure A-20: Daily Trend in Noise Levels at LT-18

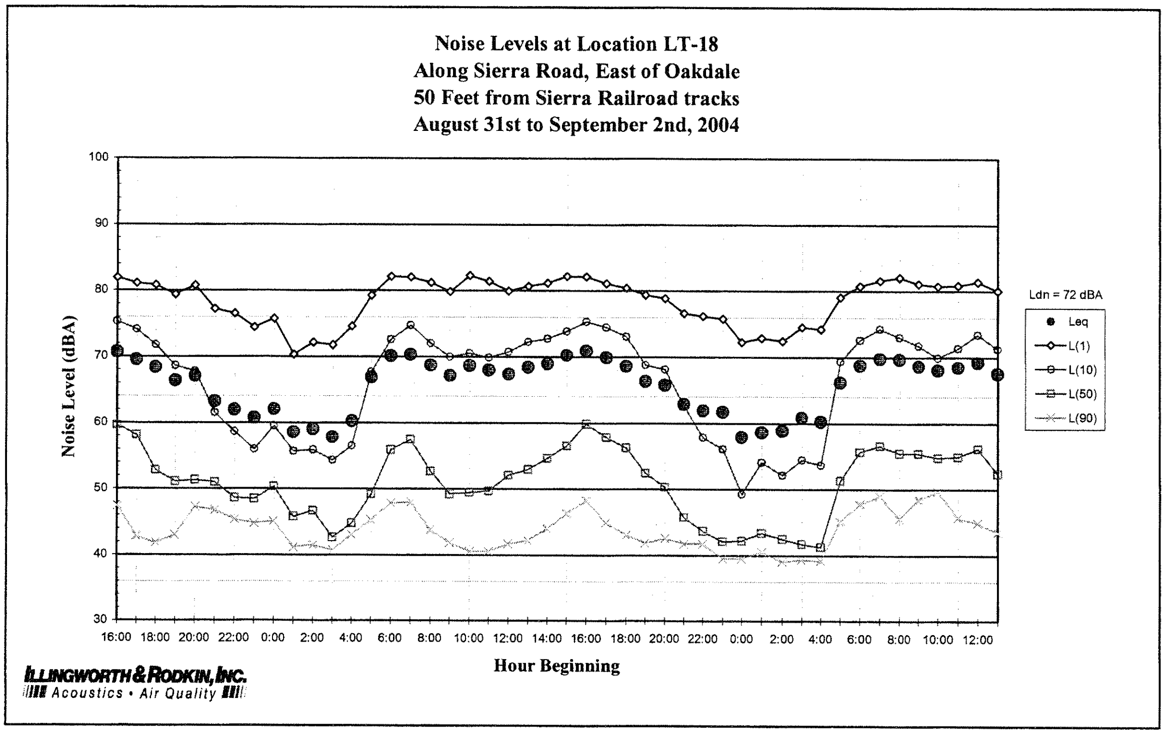


Figure A-21: Daily Trend in Noise Levels at LT-19

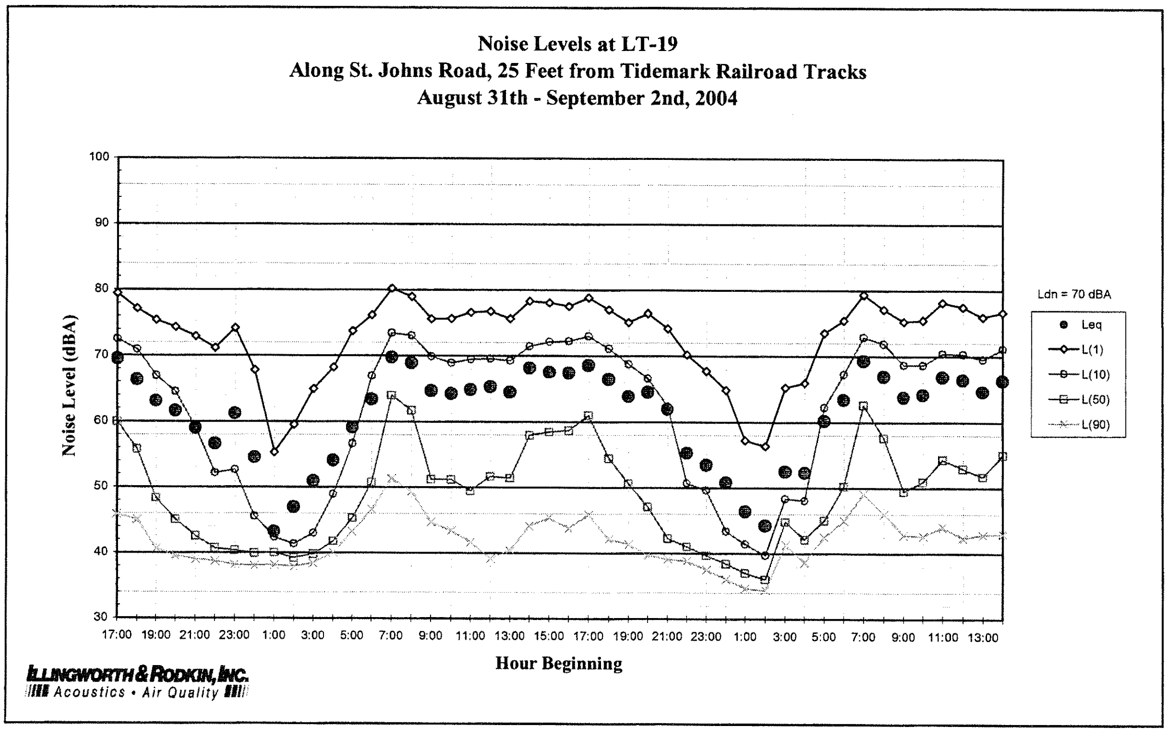
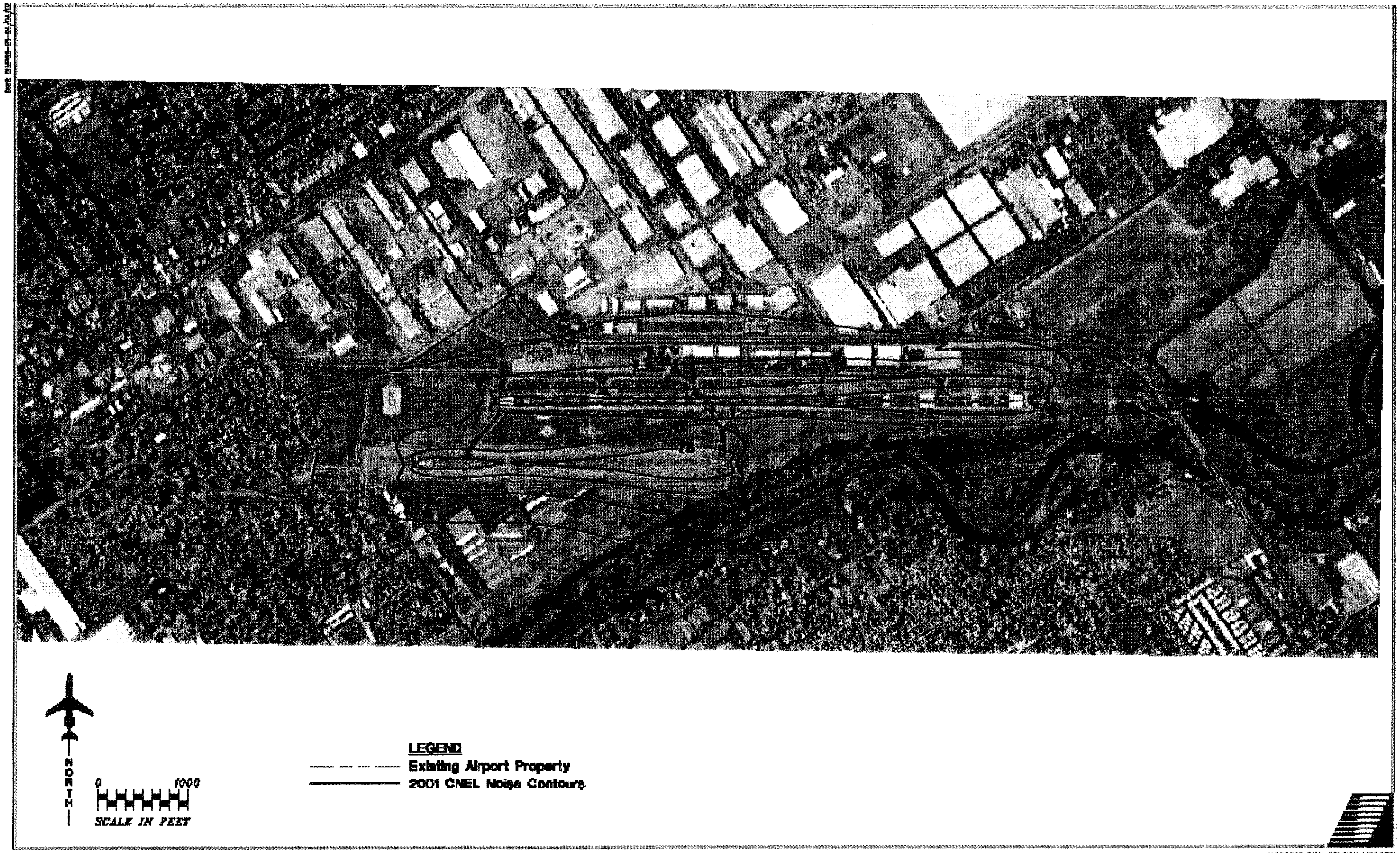


Table A-3: Noise Contour Distances for Major Railroad Lines in Stanislaus County

Railroad Description*	**Distance from Centerline of the Railroad Tracks (in feet)**			
	75-Ldn	**70-Ldn**	**65-Ldn**	**60-Ldn**
Union Pacific Railroad (UPRR)	70	150	320	680
Burlington Northern and Santa Fe (BN & SF) Railway	100	200	440	950
Sierra Railroad	**	**	**	80
Tidewater Southern Railroad	**	**	60	140

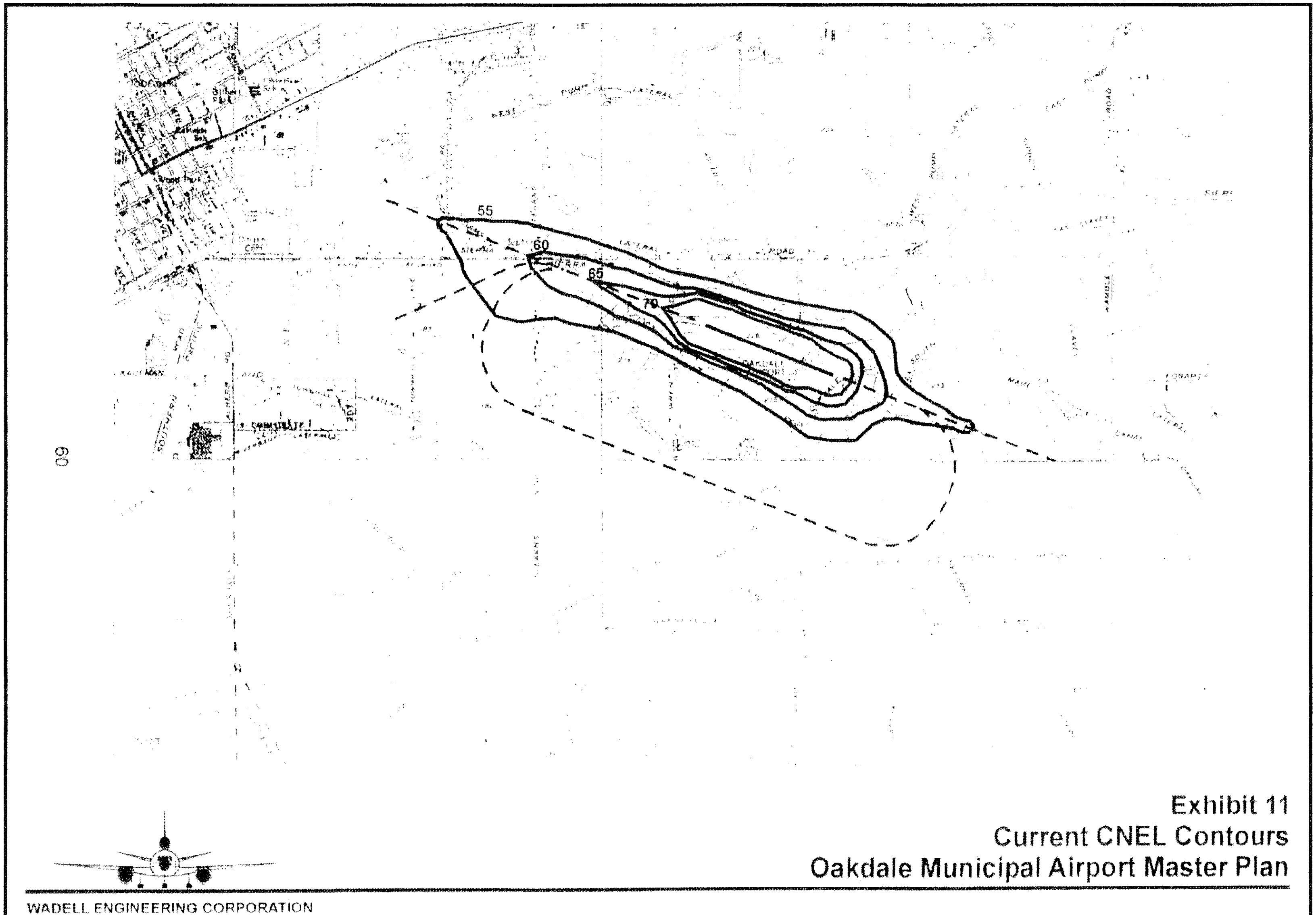
* Noise contour distances for the Modesto and Empire Traction Company Railroad were not calculated due to a lack of specific information regarding train movements along this track.
** Distances of less than 50 feet are not included in this table.

Figure A-22: Existing (2001) CNEL Noise Contours for Modesto City-County Airport



Source: Modesto City-County Airport (Harry Sham Field) 2002 Airport Master Plan, prepared by Coffman Associates.

Figure A-23: Existing (1995) CNEL Noise Contours for Oakdale Municipal Airport



Source: Oakdale Municipal Airport 1996 Airport Master Plan, prepared by Wadell Engineering Corporation

Appendix B: Future Noise Environment

Table B-1: Calculated Vehicular Traffic Noise Levels for Major Community Roadways

Community	Roadway Description	Distance from Centerline of Roadway (in feet) Based on Traffic Noise Modeling*						Maximum $L_{eq(hr)}$ at 75 feet from Centerline	
		Existing			2030 Circulation Element			Existing	2030 Circulation Element
		70-Ldn	65-Ldn	60-Ldn	70-Ldn	65-Ldn	60-Ldn	dBA	dBA
Salida	SR 99	440	950	2040	640	1370	2950	77	79
Salida	SR 219	90	190	410	200	430	930	71	76
Salida	Finney Road	*	100	230	*	*	50	67	58
Salida	Broadway	*	100	210	90	200	430	67	71
Salida	Salida Boulevard	*	70	160	60	120	270	65	68
Salida	Sisk Road	*	*	60	*	*	90	58	61
Del Rio	Mc Henry (North of 108)	80	160	350	120	260	550	70	73
Del Rio	Ladd Road	80	160	350	*	80	170	70	65
Knights Ferry	SR 108-120	60	120	260	100	220	470	68	72
La Grange	SR 132	100	220	470	160	350	750	72	75
La Grange	La Grange Boulevard	*	*	*	*	*	90	56	61
East of Oakdale	SR 108-120	50	120	250	*	100	220	68	67
Westley	SR 33	60	120	260	90	200	430	68	71
Westley	Grayson / Howard Road	*	60	140	50	110	240	64	68
Grayson	Grayson Road	*	90	190	60	130	280	66	68
Grayson	River Road	*	*	100	*	50	110	62	63
Crows Landing	SR 33	*	90	190	90	190	410	66	71
Crows Landing	Fink / Crows Landing Road	*	100	230	90	200	420	67	71
Keyes	SR 99	280	590	1280	380	810	1740	74	76
Keyes	Faith Home Road	*	*	60	*	100	220	59	67
Keyes	Keyes Road	*	90	190	120	260	550	66	73
Keyes	Keyes Road	120	260	550	190	410	870	73	76
Empire	SR 132	*	100	210	100	220	470	67	72

Community	Roadway Description	Distance from Centerline of Roadway (in feet) Based on Traffic Noise Modeling*						Maximum $L_{eq(hr)}$ at 75 feet from Centerline	
		Existing			2030 Circulation Element			Existing	2030 Circulation Element
		70-Ldn	65-Ldn	60-Ldn	70-Ldn	65-Ldn	60-Ldn	dBA	dBA
Empire	Santa Fe Avenue	90	190	400	110	240	510	71	72
Empire	Church Street	60	120	260	60	140	300	68	69
Hickman	Hickman Road	120	260	560	160	350	750	73	75
Hickman	Lake Road	*	100	220	70	150	320	67	69
Denair	Santa Fe Avenue	*	90	190	80	180	380	66	71
Denair	Monte Vista Avenue	*	*	100	*	70	150	62	64
Denair	Zeering Road	*	100	220	90	180	400	67	71
Denair	Gratton Road	50	120	250	80	180	380	68	71
Denair	Gratton Road	*	60	130	50	110	230	64	67
Rural State Highways	SR 165 (Co. Line to SR 99)	60	120	260	80	170	370	68	70
Rural State Highways	SR 219 (Salida to SR 108)	70	150	320	200	430	930	69	76
Rural State Highways	SR 33 (Co. Line to Co. Line)	60	140	300	140	300	640	69	74
Rural State Highways	I-5 (Co. Line to Co. Line)	190	410	870	320	700	1510	76	80
Rural State Highways	SR 108 (SR 219 to SR 120)	60	140	300	80	180	390	69	71
Rural State Highways	SR 120 (Co. Line to Co. Line)	80	160	350	80	160	350	70	70
Rural State Highways	SR 4 (Co. Line to Co. Line)	*	*	100	*	90	190	62	66
Rural State Highways	SR 132 (West of Modesto)	100	210	450	160	350	760	72	75
Rural State Highways	SR 132 (East of Modesto)	*	100	210	100	220	470	67	72
Rural County Roads	Claribel Road (Mc Henry to Coffee)	130	280	600	600	1290	2770	73	82
Rural County Roads	Claribel Road (Oakdale to Albers)	150	320	700	510	1100	2380	74	81
Rural County Roads	Hatch Road (Carpender to Modesto)	*	100	220	80	160	350	67	70
Rural County Roads	Hatch Road (Modesto CL to Mitchell)	80	180	390	140	310	660	71	74
Rural County Roads	Hatch Road (Mitchell to Santa Fe)	90	190	400	120	260	550	71	73
Rural County Roads	Gray son Road (I-5 to Crows Landing)	*	90	190	60	130	280	66	68

Community	Roadway Description	Distance from Centerline of Roadway (in feet) Based on Traffic Noise Modeling*						Maximum $L_{eq(hr)}$ at 75 feet from Centerline	
		Existing			2030 Circulation Element			Existing	2030 Circulation Element
		70-Ldn	65-Ldn	60-Ldn	70-Ldn	65-Ldn	60-Ldn	dBA	dBA
Rural County Roads	Keyes Road (Carpender to Hickman)	*	70	160	90	190	420	65	71
Rural County Roads	West Main (Turlock to I-5)	100	220	470	180	400	850	72	76
Rural County Roads	Carpenter Road (West Main to Grayson)	60	120	260	110	230	500	68	72
Rural County Roads	Carpenter Road (Grayson to Modesto)	50	120	250	110	230	500	68	72
Rural County Roads	Crows Landing Road (Crows Landing to Modesto)	60	140	300	110	240	520	69	73
Rural County Roads	Mc Henry Avenue (Ladd Road to Co. Line)	80	160	350	120	260	550	70	73
Rural County Roads	Claus Road (SR132 to Claribel)	*	100	220	120	260	550	67	73
Rural County Roads	Claus Road (Claribel to Patterson)	80	180	380	180	400	850	71	76
Rural County Roads	Coffee Road (Modesto to Patterson)	*	60	140	*	60	120	64	63
Rural County Roads	Oakdale Road (Patterson to Claribel)	60	120	260	90	190	410	68	71
Rural County Roads	Oakdale Road (Claribel to Modesto)	60	120	260	100	220	470	68	72
Rural County Roads	Tully Road (Ladd to Bangs)	*	60	130	90	190	410	64	71
Rural County Roads	Mitchell Road (Hatch to Modesto CL)	100	220	460	120	260	560	72	73
Rural County Roads	Santa Fe Avenue (Empire to Co. Line)	60	140	300	100	210	450	69	72
Rural County Roads	Geer Road (Turlock to SR 132)	90	190	400	140	290	630	71	74
Rural County Roads	Albers Road (SR 132 to Oakdale)	120	260	550	230	490	1050	73	77
Rural County Roads	Hickman Road (West Main to Waterford)	*	60	120	*	90	200	63	66

* Distances of less than 50 feet are not included in this table.

Figure B-1: Noise Contour Map for Major Roadway Noise Sources (Unconstrained 2030)

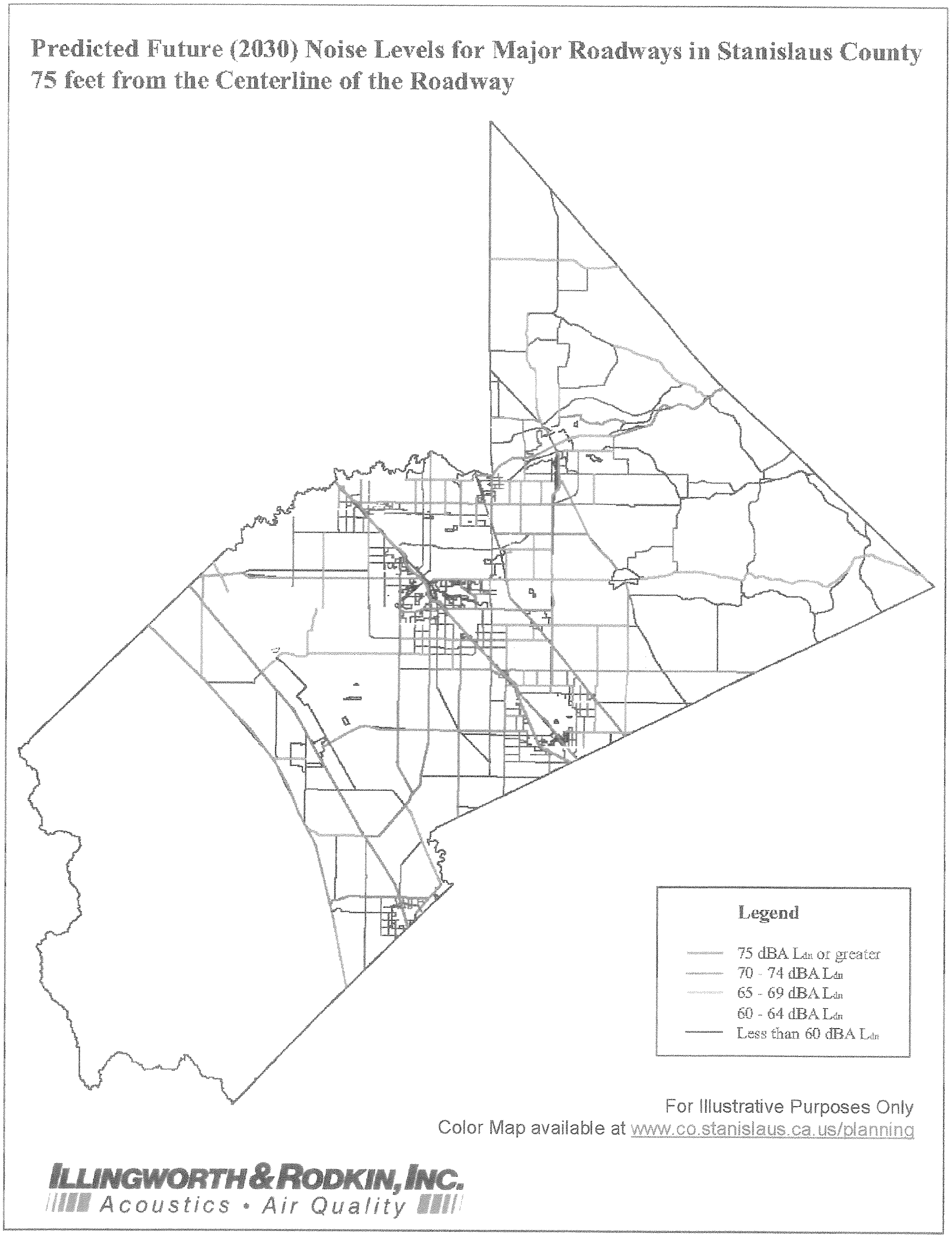
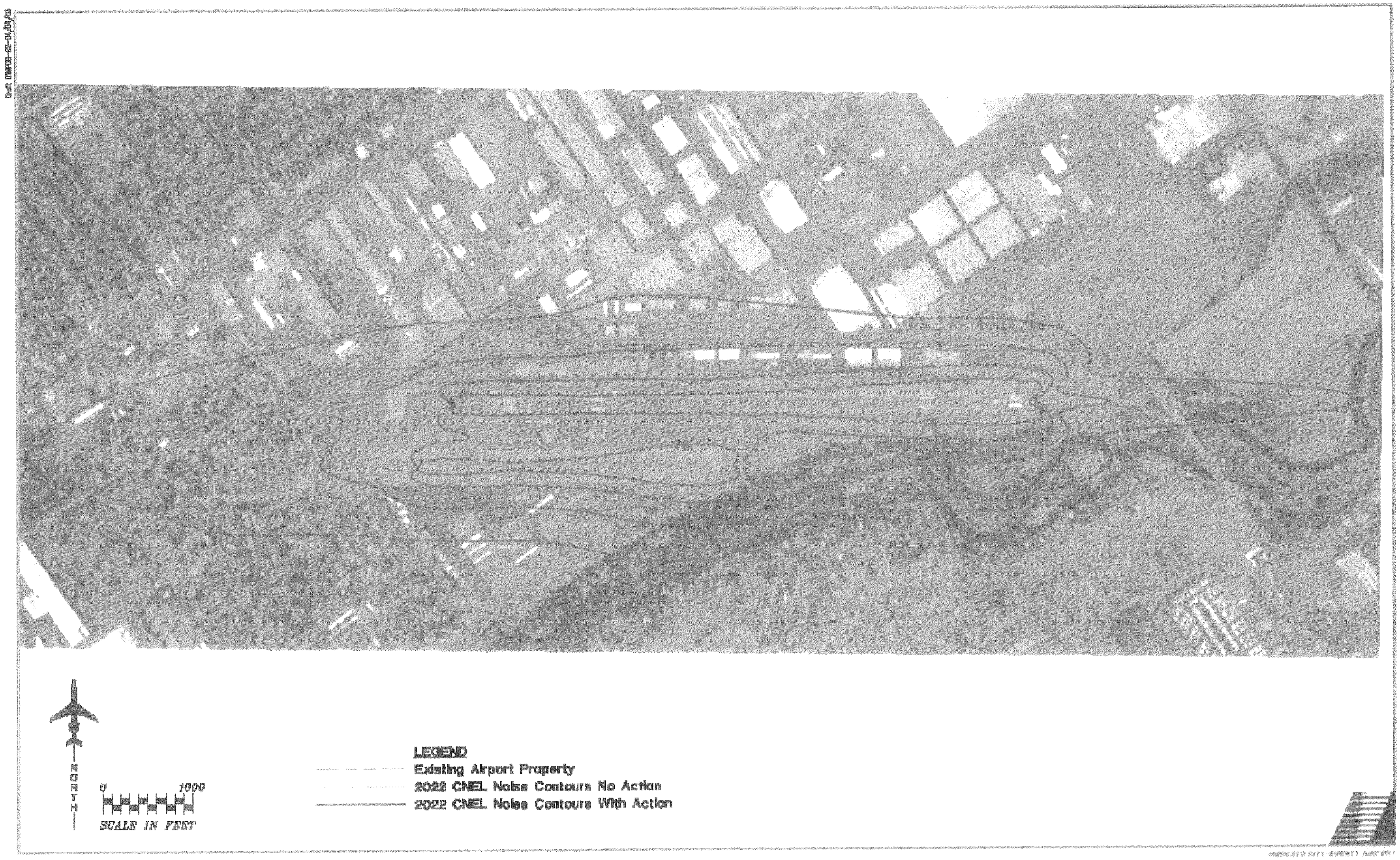
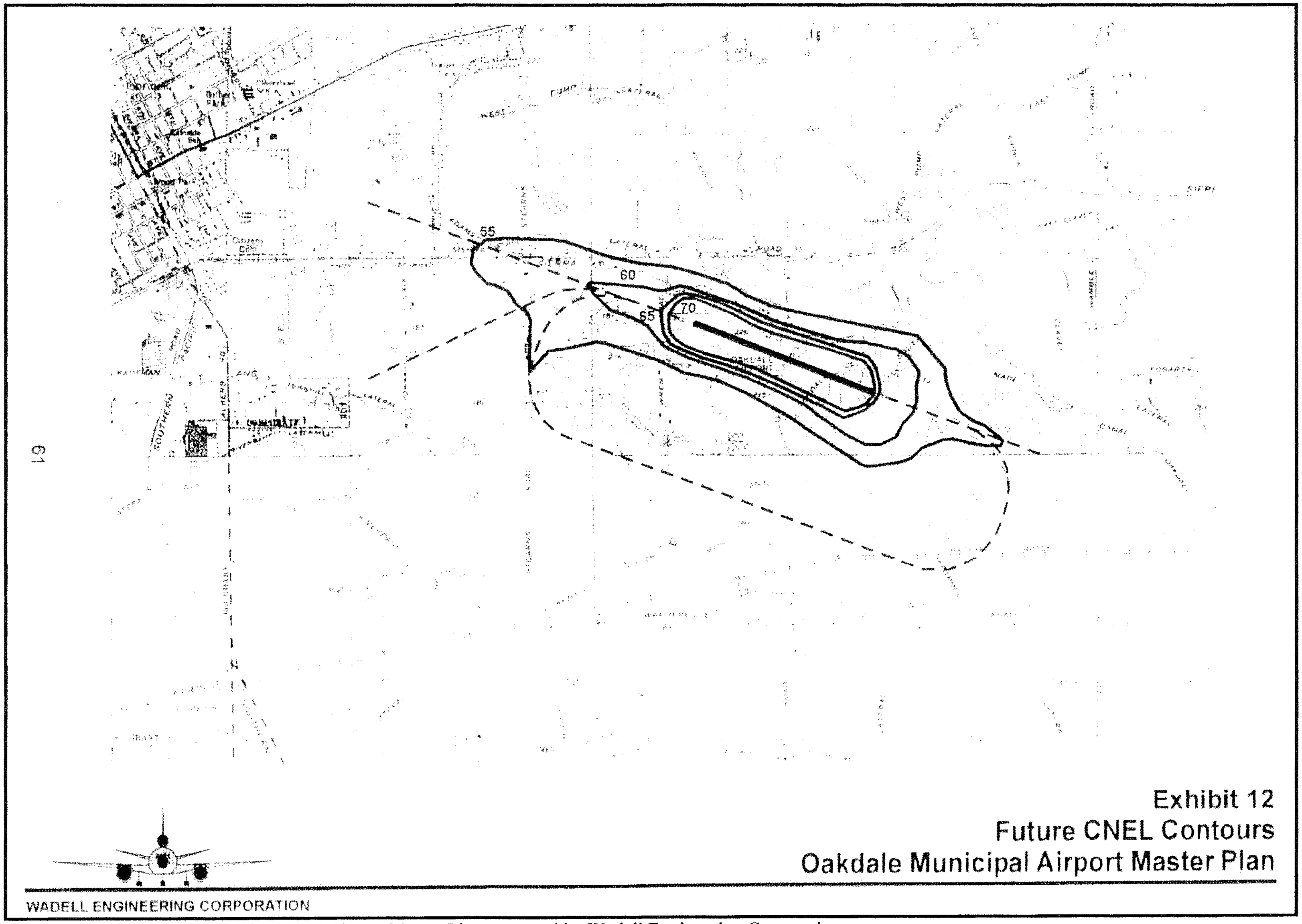


Figure B-2: Long Term (2022) CNEL Noise Contours for Modesto City-County Airport



Source: Modesto City-County Airport (Harry Sham Field) 2002 Airport Master Plan, prepared by Coffman Associates.

Figure B-4: Future (2015) CNEL Noise Contours for Oakdale Municipal Airport



Source: Oakdale Municipal Airport 1996 Airport Master Plan, prepared by Wadell Engineering Corporation