APPENDIX B: NOISE TECHNICAL APPENDIX

Introduction

The purpose of a Noise Element is to identify sources of noise in a city and strategies for reducing the negative impact of noise on the community.

Noise is defined as unwanted sound. Noise can cause hearing loss and interfere with human activities. Noise annoys, awakens, angers, and frustrates people. It can disrupt communication and individual thoughts and affect a person's performance. According to the US Environmental Protection Agency, noise is one of the biological stressors associated with everyday life[1]. Freedom from excessive noise is one measure of the quality of life.

This report presents background information on the existing noise environment in Truckee. The purpose of the report is to present and characterize the sources of noise and the different noise settings within the town. This background information will serve as the basis for completing the first and fundamental step in updating the Noise Element of the Truckee General Plan—the requirement for local governments to "analyze and quantify noise levels and the extent of noise exposure through actual measurement or the use of noise modeling."[2]

The report has been organized to:

- provide information on the fundamentals of environmental noise and definitions of technical terms to assist the reader in understanding these issues and the City's current noise guidelines,
- report the results of the noise monitoring survey completed in May 2004,
- describe the major noise sources affecting the noise environment in Truckee including the results of noise modeling of existing and future conditions.

EXISTING CONDITIONS

Noise Fundamentals

Sound is caused by a vibrating surface that causes the air pressure to fluctuate sympathetically. A sound is usually considered objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its pitch or its loudness. *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. Higher *pitched* signals sound louder to humans than sounds with a lower pitch.

[1] Protective Noise Levels, Condensed Version of EPA Levels Document, EPA 550/9-79-100, November 1978.

[2] Guidelines for the Preparation and Content of the Noise Element of the General Plan, Governor's Office of Planning and Research, 1988.

To account for the concepts of pitch and loudness, several noise measurement scales are used to describe noise in a particular location. A *decibel* (dB) is a unit of measurement that 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.

The level of noise depends upon the distance from the source to the receiver. If a noise source is at a single point (e.g., a swimming pool pump), the noise level is reduced 6 dB with each doubling of the distance. Along a roadway, where the noise results from a line of traffic, the level drops 3 dB with each doubling of the distance from the road.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level, abbreviated 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 descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} 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 predictive models depends on the distance of the receptor from the noise source. Close to the noise source, the models are accurate to within plus or minus 1 to 2 dBA.

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 PM - 10:00 PM) and a 10 dB penalty added to nocturnal (10:00 PM - 7:00 AM) noise levels. The Day/Night Average Sound Level, L_{dn}, is essentially the same as CNEL, with the exception that the evening penalty is dropped and all occurrences during this three-hour period are grouped into the daytime period. State law requires that the Noise Element utilize L_{dn} or CNEL to describe the noise environment and its effects.[3]

Noise Measurements

A comprehensive noise monitoring survey was conducted to document noise generated by the predominant transportation noise sources that affect the community; namely highways, local arterial and collector roadways, the Union Pacific Railroad, and the Truckee-Tahoe Airport. The noise monitor-

[3] California Government Code Section 65302(f).

ing survey included a combination of long-term (24-hour durations) and short-term (15-minute durations) noise measurements throughout the Truckee Town limits. Long-term noise measurements characterized the daily distribution of noise levels in areas adjacent to the predominant noise sources in the community. Short-term noise measurements were conducted at selected locations to supplement the long-term noise data.

The measurements included a combination of 12 long-term measurements conducted during the daytime, evening, and nighttime and 7 short-term measurements throughout the city. Additional noise measurements conducted in Truckee within the last several years have also been included in the data summary. Figure 1 shows the noise measurement locations. Standard measuring practices were followed: precision sound level meters were calibrated before and after each survey; microphones were fitted with windscreens; and data were gathered during good weather.

The locations of the long-term (LT) and short-term (ST) noise measurements and the results of the measurements are summarized in Tables 3 and 4. The range of noise levels are presented during the daytime hours (7:00 AM to 10:00 PM) and the nighttime hours (10:00 PM to 7:00 AM), as well as the 24-hour Community Noise Equivalent Level (CNEL). The detailed results of each long-term measurement are shown in Figures 2 through 14.

Local Roadway Network

Noise levels along major roadways were measured and calculated using a computer model developed by the Federal Highway Administration and traffic data provided by LSC Transportation Consultants, Inc. The traffic noise model predicts hourly average noise levels using peak hour traffic volumes. The Community Noise Equivalent Level (CNEL) for each roadway was estimated using the relationships of the peak hour noise level to the CNEL actually measured. Noise levels were calculated at a standard distance of 100 feet from the centerline of the roadways. By selecting a standard distance, the relative noise levels along the various streets can be readily ascertained. Noise levels calculated using the traffic noise model correlated fairly well with actual noise measurements. On some roadway segments, the traffic noise model did not correlate as well with the data gathered during the noise monitoring survey. After a careful examination of the data, it was determined that the model was not accurately predicting noise levels because of the vehicle mix in the Town of Truckee. The traffic noise model calculates noise levels based on California's Reference Energy Mean Emissions Levels (REMELs) developed by statewide noise measurements of the vehicle fleet. Observations made during the noise monitoring survey indicate that the vehicle mix in the Town of Truckee includes more four-wheel drive vehicles or sport-utility vehicles with large mud and snow-tires. The vehicle mix and high travel speeds along low volume roadways yielded higher measured noise levels than could be modeled with the traffic noise model assuming travel speeds consistent with the posted speed limit. Where large discrepancies occurred between measured and modeled noise levels, the measured noise levels were selected to develop the existing noise level contours. Table 5 summarizes the existing noise level contour distances for area roadways.

Interstate 80

Interstate 80 is the major transportation corridor in the planning area and the loudest source of noise affecting the Town of Truckee. Noise levels at a distance of 100 feet from the center of Interstate 80 range from approximately 78 to 82 CNEL. Interstate 80 affects the noise environment in the community over a distance several thousand feet from the roadway.

State Route 89

State Route 89 provides access from the Town of Truckee northward to Sierraville (SR 49) and southward to Tahoe City. Noise levels at a distance of 100 feet from the center of SR 89 North range from approximately 70 to 71 CNEL. Along SR 89 South, average noise levels are 72-73 CNEL, slightly higher than SR 89 North as a result of higher traffic volumes along the roadway.

State Route 267

State Route 267 connects SR 89 North, I-80, and the Town of Truckee to the North Lake Tahoe area. Noise levels at a distance of 100 feet from the center of SR 267 range from approximately 70 to 71 CNEL.

Union Pacific Railroad

The Union Pacific Railroad bisects Truckee from east to west. The railroad has freight and passenger trains that generate intermittent, loud sounds during passbys. Noise generated by an individual train depends on the train type, length, speed, and whether the train uses its warning whistle. Trains are required to sound their warning whistle near "at-grade" vehicle crossings to warn motorists of the oncoming train. Oftentimes, trains also sound their warning whistles when entering or leaving the train station in Old Town Truckee and at bridges. At a distance of 100 feet, a train warning whistle can generate maximum noise levels about 100 to 105 dBA. Train engines typically generate maximum noise levels of approximately 80 to 85 dBA while train cars generate noise levels of about 70 to 75 dBA. Noise measurements indicate that the intermittent loud sounds of trains control the average noise level over the course of a day. Noise levels at a distance of 100 feet from the railroad are approximately 76 CNEL.

Truckee-Tahoe Airport

The Truckee-Tahoe airport is a general aviation airport located east of SR 267, south of Truckee. The airport is accessed by a mix of general aviation and jet aircraft. The primary flight paths follow the highways in the area (Interstate 80, SR 89 N, and SR 267). Noise generated by the airport was measured northwest of the airport during the noise monitoring survey. The measured CNEL at the nearest residential land uses was 56 dBA. Individual measurements of maximum instantaneous sounds generated by aircraft typically ranged from 55 to 71 dBA. During the peak travel season, CNEL noise levels would be approximately 60 dBA at the nearest residential receivers.

Stationary Noise Sources

The Town of Truckee is not significantly affected by stationary noise sources. Most large, noise generating operations (e.g., rock quarry) are located away from residential areas. Noise generating businesses are generally limited to commercial or industrial areas where noise generation does not generally pose compatibility problems.

FUTURE CONDITIONS

Future Noise Environment

The major noise sources in Truckee will continue to be transportation related, including roadways, trains, and aircraft. To a lesser degree, industrial sources such as mining and aggregate processing operations will also generate noise. Transportation noise sources, as well as individual stationary and industrial noise generators, must be considered in the planning process to ensure long-term noise compatibility.

This Technical Appendix provides detailed noise contour information for future motor vehicle noise throughout the Town. Future vehicle noise is based on the land uses and projected traffic volumes found in the Land Use and Circulation Elements of the Truckee General Plan. Anticipated train noise is taken from existing levels in the Noise Study since it is impossible to predict future levels of train activity. Future noise level contours established by the Truckee Tahoe Airport Land Use Compatibility Plan are shown in Figure 15.

The increase in noise levels from existing to future identifies those locations where anticipated noise impacts may occur. The greatest increases in noise are projected in the downtown area and along State Route 89, State Route 267, and Brockway Road. Noise levels along these roadways are estimated to increase by about 2 to 5 dBA with the build-out of the General Plan. New roadways also generate substantial noise increases in the ambient environment since there are now master planned roadways in this vicinity. Airport noise contours also show a substantial increase to future conditions and must be addressed by any new developments planned nearby.

Table 6 provides the distances to the 70, 65, and 60 CNEL noise contours projected along area roadways. Sensitive receptors adjacent to these roadways may be impacted by future traffic noise. This is particularly true with older homes that take direct access from the roadway or where individuals in outdoor activity areas can see directly to vehicles driving behind their homes, with no intervening barriers. Outdoor activity areas are defined as locations in the front or rear yards where people congregate. Examples include swing sets, child play areas, picnic tables, barbeques, swimming pools, and front porch areas which are clearly in use.

Table 1
Definitions of Acoustical Terms Used in this Report

Term	Definitions
Decibel, dB	A logarithmic unit describing the amplitude of sound based on a comparison of the sound pressure to the lowest pressure a human ear can detect.
Sound Pressure Level	Sound pressure level is the quantity, in decibels, that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
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.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period. The hourly Leq used for this report is denoted as dBA Leq[h].
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 in the night between 10:00 pm and 7:00 am.
Day/Night Noise Level, L_{dn}	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.
L_{01}, L_{05}, L_{10}, L_{90}	The A-weighted noise levels that are exceeded 1%, 5%, 10%, and 90% of the time 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 Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 300 meters		Rock concert
	110 dBA	
Pile driver at 20 meters	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 15 meters		
	80 dBA	Noisy restaurant
		Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70 dBA	Vacuum cleaner at 3 meters
Commercial/Urban area daytime		Normal speech at 1 meter
Suburban expressway at 90 meters	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	
Most quiet remote areas	10 dBA	Quiet recording studio
Threshold of human hearing	0 dBA	Threshold of human hearing

Figure 1 Noise Measurement Locations

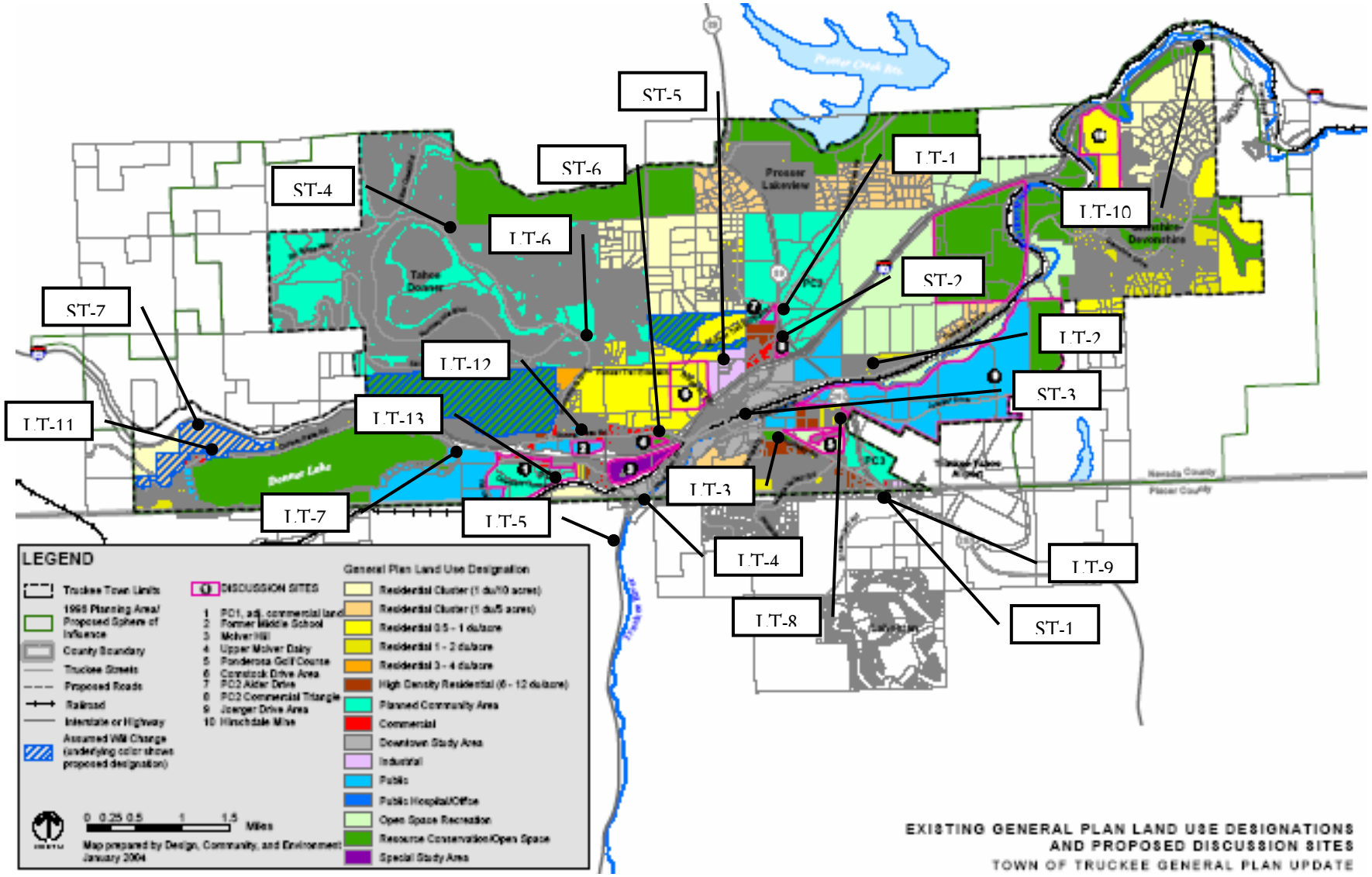


Table 3
Long-Term Noise Data Summary

Noise Measurement Location	Date	Time	Noise Level (dBA) Leq(hr) Range Daytime Nighttime	Noise Level (dBA) CNEL
LT-1 ~ 114 feet from the centerline of State Route 89 just south of Prosser Dam Road. Predominant noise source is vehicular traffic.	5/13/04 to 5/14/04	9:00 to 9:00	64-69 56-67	70
LT-2 ~ 81 feet from the centerline of Glenshire Drive between Olympic Boulevard and Highland Avenue. Noise sources include vehicular and train traffic.	5/13/04 to 5/14/04	10:00 to 10:00	58-64 50-62	65
LT-3 ~ 99 feet from the centerline of Brockway Road at Truckee River Regional Park. Predominant noise source is vehicular traffic.	5/13/04 to 5/14/04	10:00 to 10:00	61-66 50-64	67
LT-4 ~ 75 feet from the centerline of West River Street across from Donner Creek Mobile Home Park. Predominant noise source is vehicular traffic.	5/13/04 to 5/14/04	11:00 to 11:00	62-67 55-65	67
LT-5 ~ 93 feet from the centerline of State Route 89, one-quarter mile south of West River Street. Dominant noise source is vehicular traffic.	5/13/04 to 5/14/04	11:00 to 11:00	66-72 57-70	72
LT-6 ~ 69 feet from the centerline of Northwoods Boulevard. Predominant noise source is vehicular traffic.	5/13/04 to 5/14/04	12:00 to 12:00	67-73 55-69	72
LT-7 ~ 168 feet from the centerline of Interstate 80 and 51 feet from the center of Donner Pass Road near Coldstream Road. Predominant noise sources are Interstate 80 and Donner Pass Road.	5/13/04 to 5/14/04	12:00 to 12:00	73-74 69-74	78
LT-8 ~ Northwest of the Truckee-Tahoe Airport near intersection of Martis Drive and Reynolds Way Noise sources include aircraft overflights and distant traffic.	5/14/04 to 5/15/04	12:00 to 12:00	47-57 44-54	56
LT-9 ~ 93 feet from the centerline of State Route 89 near Placer County Line. Noise sources include vehicles and aircraft.	5/14/04 to 5/15/04	12:00 to 12:00	66-71 58-66	71
LT-10 ~ 300 feet from the centerline of Interstate 80 near Hirschdale Road. Dominant noise source is Interstate 80.	5/14/04 to 5/15/04	13:00 to 13:00	60-68 61-66	71

Table 3
Long-Term Noise Data Summary

Noise Measurement Location	Date	Time	Noise Level (dBA) Leq(hr) Range Daytime Nighttime	Noise Level (dBA) CNEL
LT-11 ~ 27 feet from the centerline of Donner Pass Road at Donner Lake Road. Dominant noise source is vehicle traffic on Donner Pass Road.	5/14/04 to 5/15/04	14:00 to 14:00	58-68 49-59	65
LT-12 ~ 75 feet from the centerline of Donner Pass Road and 1000 feet east of Northwoods Boulevard. Predominant noise source is vehicular traffic along Donner Pass Road.	5/14/04 to 5/15/04	14:00 to 14:00	61-63 51-61	65
LT-13 ~ 100 feet from the Center of the UPRR Right-of-Way at McIver Hill. Predominant noise source is railroad trains.	11/2/01 to 11/3/01	13:00 to 13:00	56-77 49-76	76

Table 4
Short-Term Noise Data Summary

Noise Measurement Location (Date – Time of Noise Measurement)	Noise Level (dBA)					
	L_{eq}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	Est. CNEL
ST-1 ~ 78 feet from the centerline of State Route 267 near Placer County Line. Noise sources include vehicles and aircraft. (5/13/04 – 11:05 to 11:20)	68	75	73	67	53	70
ST-2 ~ 34 feet from the centerline of State Route 89, just north of the intersection of State Route 89 and Interstate 80. Dominant noise source is vehicle traffic on State Route 89. (5/13/04 – 11:43 to 11:58)	68	78	72	64	52	71
ST-3 ~ 75 feet from railroad track at Amtrak Depot in Old Town Truckee. Predominant noise source is railroad trains with vehicles and aircraft contributing to the background. (5/14/04 – 9:43 to 9:58)	79	95	65	58	54	77
ST-4 ~ 27 feet from the centerline of Hansel Drive between Northwoods Boulevard and Oslo Drive. (5/14/04 – 11:10 to 11:25)	53	70	47	41	37	55
ST-5 ~ End of Bridge Street and 450 feet from the centerline of Interstate 80. Dominant Noise Source is Interstate 80. (5/14/04 – 12:00 to 12:15)	58	64	61	57	53	62
ST-6 ~ 400 feet from Donner Pass Road at the Nevada County Courthouse. Noise sources include Donner Pass Road and Interstate 80. (5/14/04 – 12:33 to 12:48)	55	60	56	55	53	58
ST-7 ~ 20 feet from the centerline of Donner Lake Road and ~200 feet from Interstate 80. Predominant noise source is vehicular traffic along Interstate 80 and Donner Lake Road. (5/14/04 – 13:10 to 13:25)	63	75	64	60	57	68

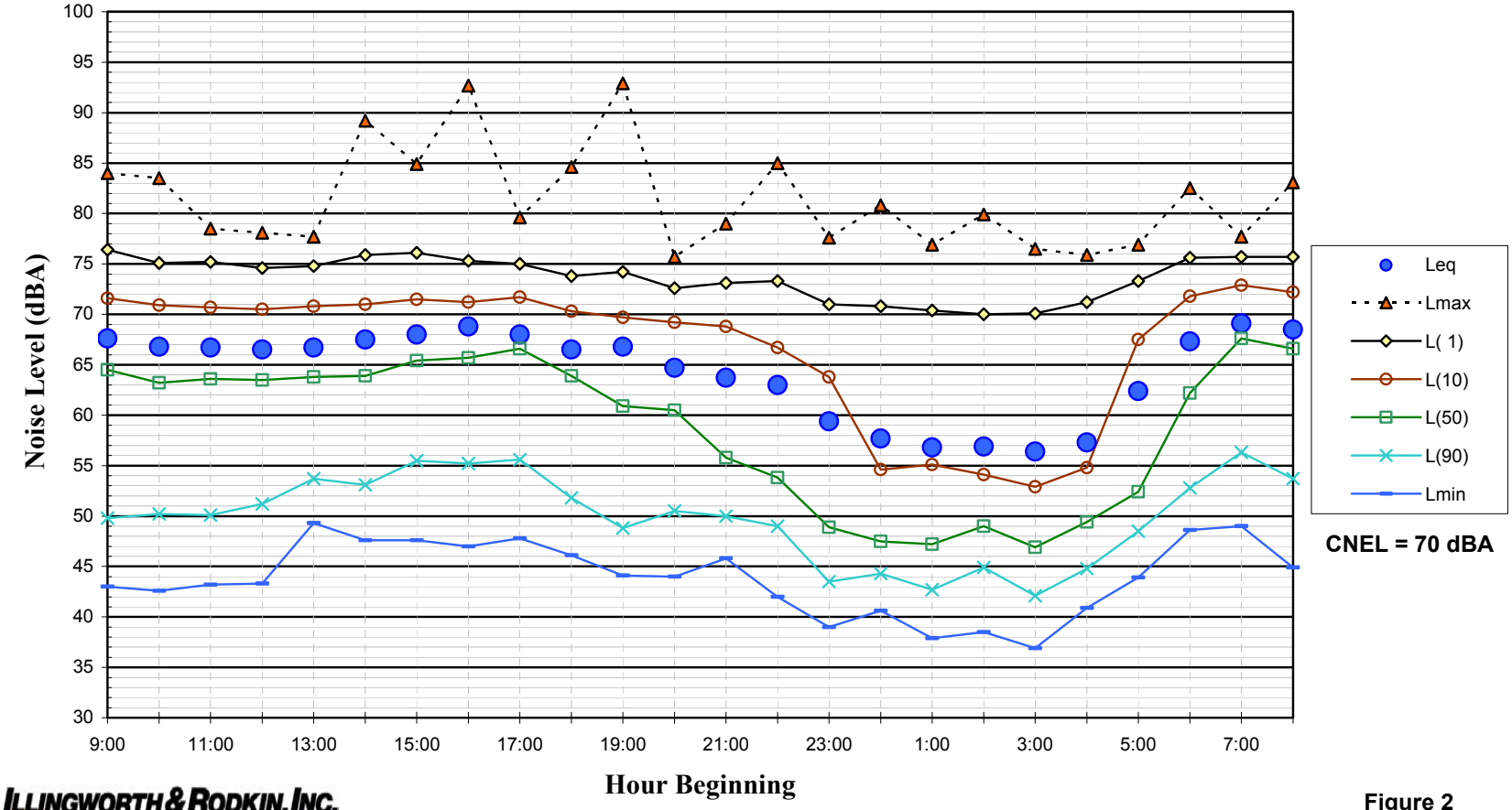
Table 5
Existing Noise Level Contour Distances

			Distance to Noise Contour (feet)		
Roadway	**Segment**	**CNEL at 100 feet**	**70 CNEL**	**65 CNEL**	**60 CNEL**
Interstate 80	West of Donner Lake Road	82	580	1260	2710
	East of Donner Lake Road	82	580	1260	2710
	East of Donner Pass Road	82	580	1260	2710
	East of Southbound SR 89	82	610	1320	2840
	East of Northbound SR 89 / Southbound 267	78	340	720	1560
State Route 89 South	South of I-80	73	160	350	760
	South of West River Street	72	130	280	610
	South of Squaw Valley Road	72	140	310	660
	South of Alpine Meadows Road	73	150	320	690
State Route 89 North	North of Alder Creek Road	70	100	220	460
	South of Alder Creek Road	70	100	220	460
	South of Prosser Dam Road	71	110	240	510
	South of Donner Pass Road	71	110	250	530
State Route 267	South of I-80	70	100	220	480
	South of Brockway Road	71	110	250	530
	South of Airport Road	71	120	260	570
Donner Pass Road	West of Cold Stream Road	62	--	60	130
	East of Cold Stream Road	61	--	60	120
	East of Northwoods Boulevard	64	--	80	180
	East of River Road	65	50	100	220
	East of I-80 (downtown)	64	--	90	190
	East of Bridge Street	62	--	70	140
	North of Glenshire Drive	62	--	60	130
	South of SR 89	59	--	--	80
Brockway Road	East of Bridge Street	67	60	130	290
	East of Palisades Drive	67	60	130	280
Glenshire Drive	East of Donner Pass Road	64	--	80	180
Northwoods Boulevard	North of Donner Pass Road	70	100	230	490
River Street	East of River Road	66	50	120	260
	East of McIver Crossing	70	100	220	460
	East of Bridge Street	68	70	150	330

Table 6
Future Noise Level Contour Distances

			Distance to Noise Contour (feet)		
Roadway	**Segment**	**CNEL at 100 feet**	**70 CNEL**	**65 CNEL**	**60 CNEL**
Interstate 80	West of Donner Lake Road	83	720	1560	3360
	East of Donner Lake Road	84	850	1840	3950
	East of Donner Pass Road	84	850	1840	3950
	East of Southbound SR 89	84	890	1920	4140
	East of Northbound SR 89 / Southbound 267	80	490	1060	2280
State Route 89 South	South of I-80	75	200	440	950
	South of West River Street	74	180	390	850
	South of Squaw Valley Road	74	200	420	910
	South of Alpine Meadows Road	74	190	420	900
State Route 89 North	North of Alder Creek Road	74	170	380	810
	South of Alder Creek Road	74	170	380	810
	South of Prosser Dam Road	74	190	410	890
	South of Donner Pass Road	75	210	440	960
State Route 267	South of I-80	75	220	470	1010
	South of Brockway Road	76	240	520	1110
	South of Airport Road	75	220	470	1020
Donner Pass Road	West of Cold Stream Road	64	--	90	190
	East of Cold Stream Road	64	--	90	200
	East of Northwoods Boulevard	65	50	100	210
	East of River Road	66	50	110	240
	East of I-80 (downtown)	66	50	110	240
	East of Bridge Street	64	--	90	190
	North of Glenshire Drive	64	--	90	190
	South of SR 89	65	50	100	220
Brockway Road	East of Bridge Street	71	110	240	510
	East of Palisades Drive	70	110	230	490
Glenshire Drive	East of Donner Pass Road	67	60	130	270
Northwoods Boulevard	North of Donner Pass Road	71	110	240	510
River Street	East of River Road	68	70	160	350
	East of McIver Crossing	73	160	350	750
	East of Bridge Street	71	120	260	560

Noise Levels at LT-1
114 feet from the Centerline of State Route 89
South of Prosser Dam Road
May 13-14, 2004

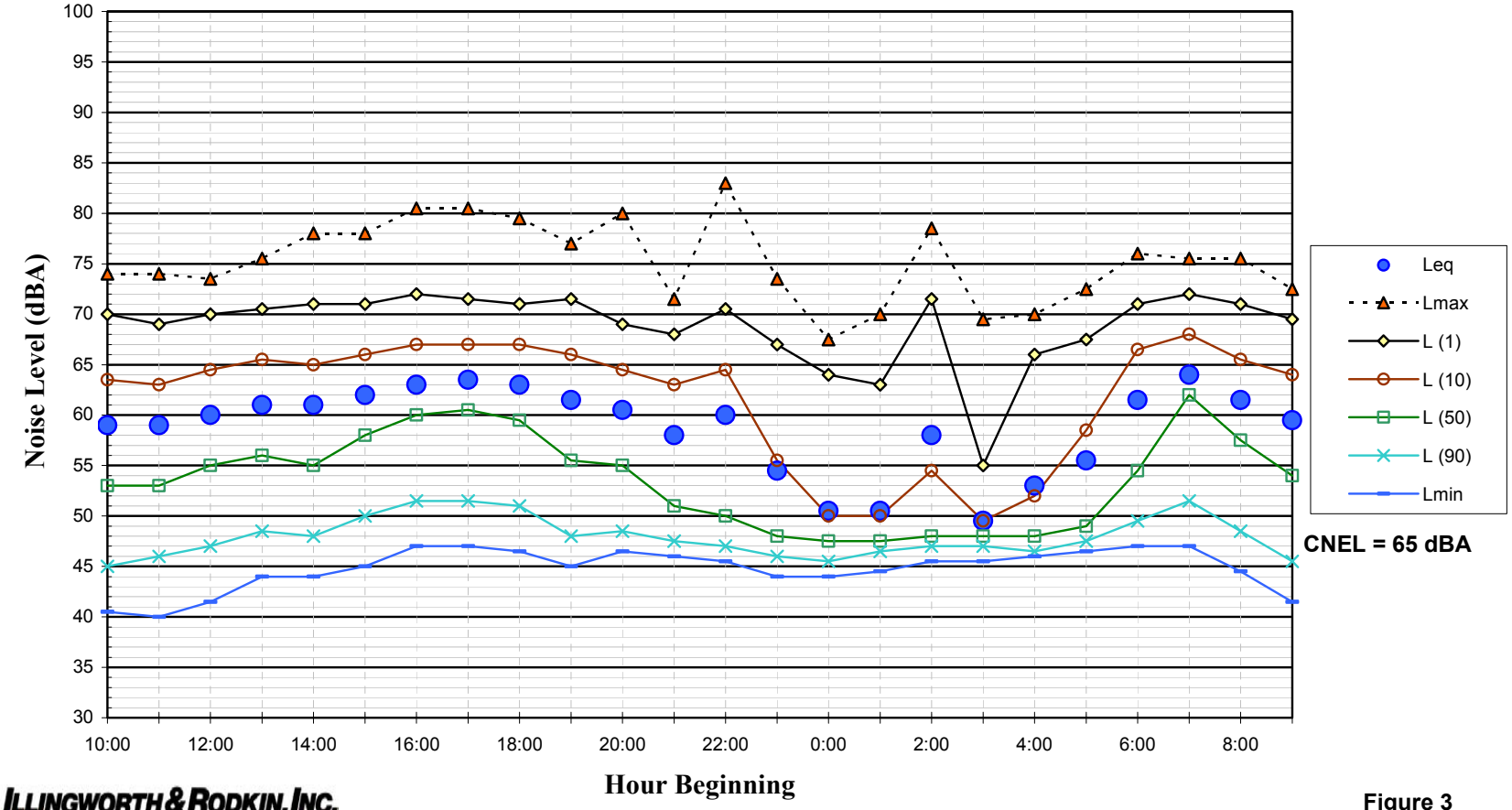


CNEL = 70 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 2

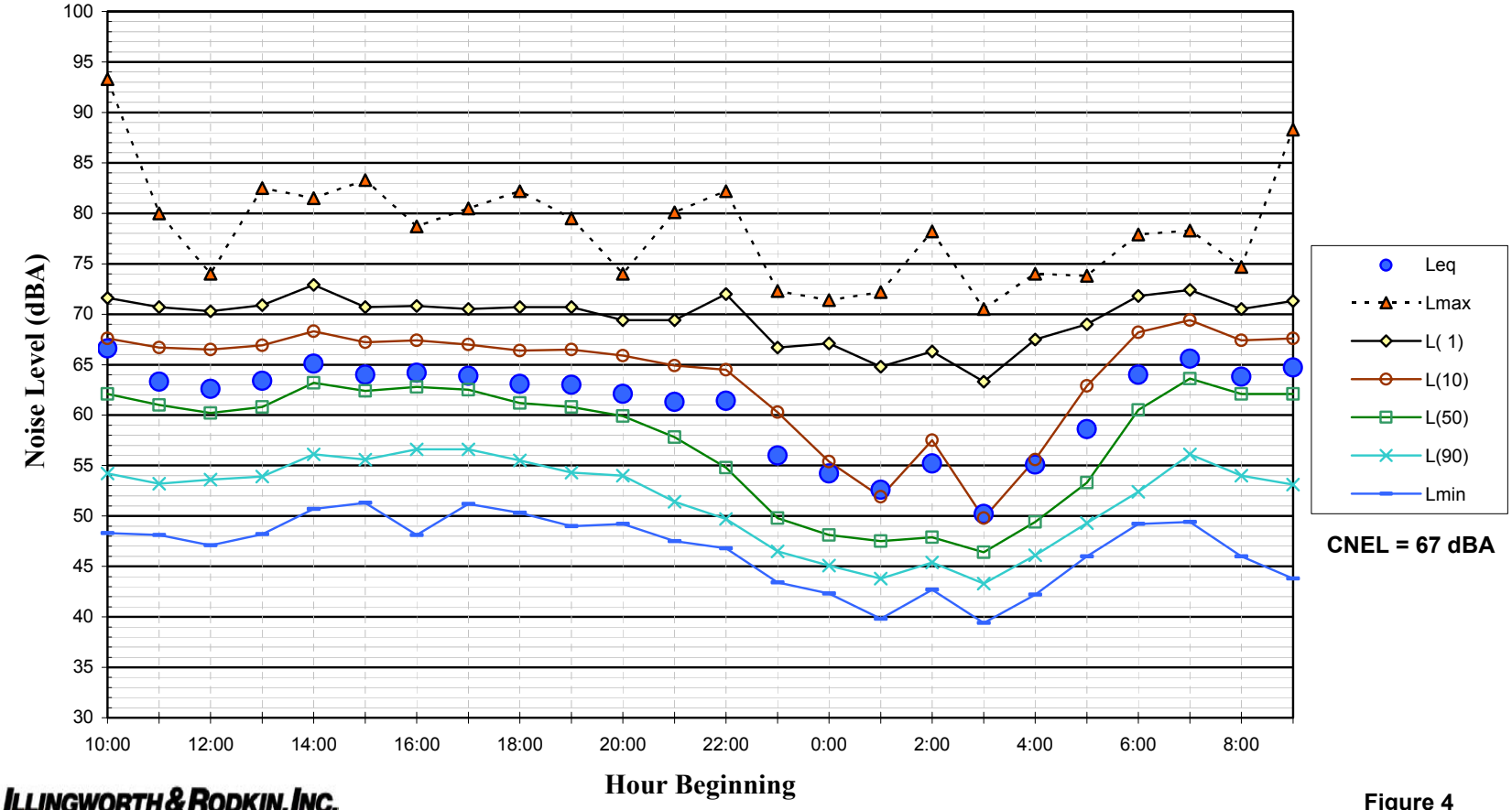
Noise Levels at LT-2
81 feet from the Centerline of Glenshire Drive
Between Olympic Boulevard and Highland Avenue
May 13-14, 2004



ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 3

Noise Levels at LT-3
99 feet from the Centerline of Brockway Road
Truckee River Regional Park
May 13-14, 2004

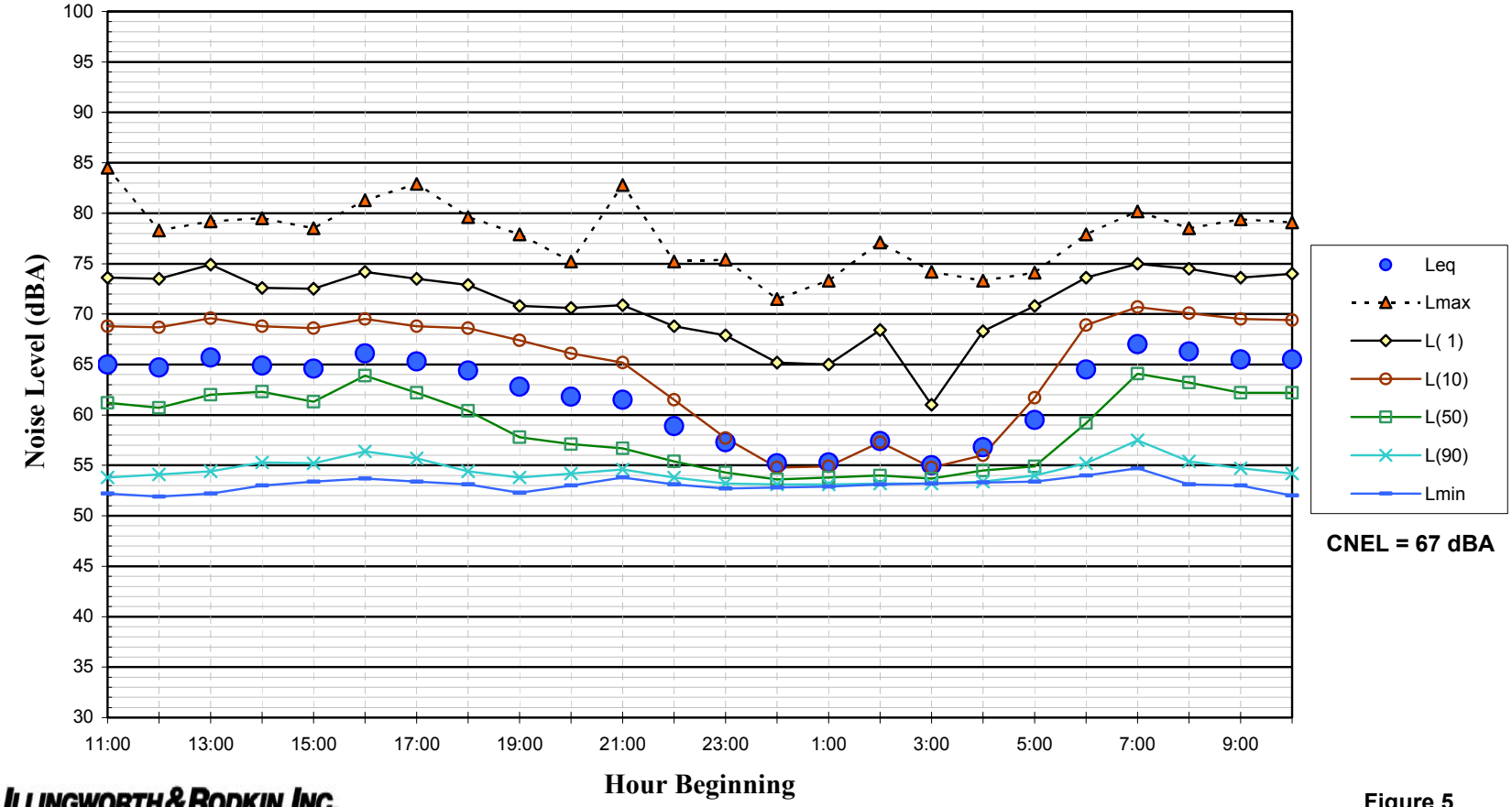


CNEL = 67 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 4

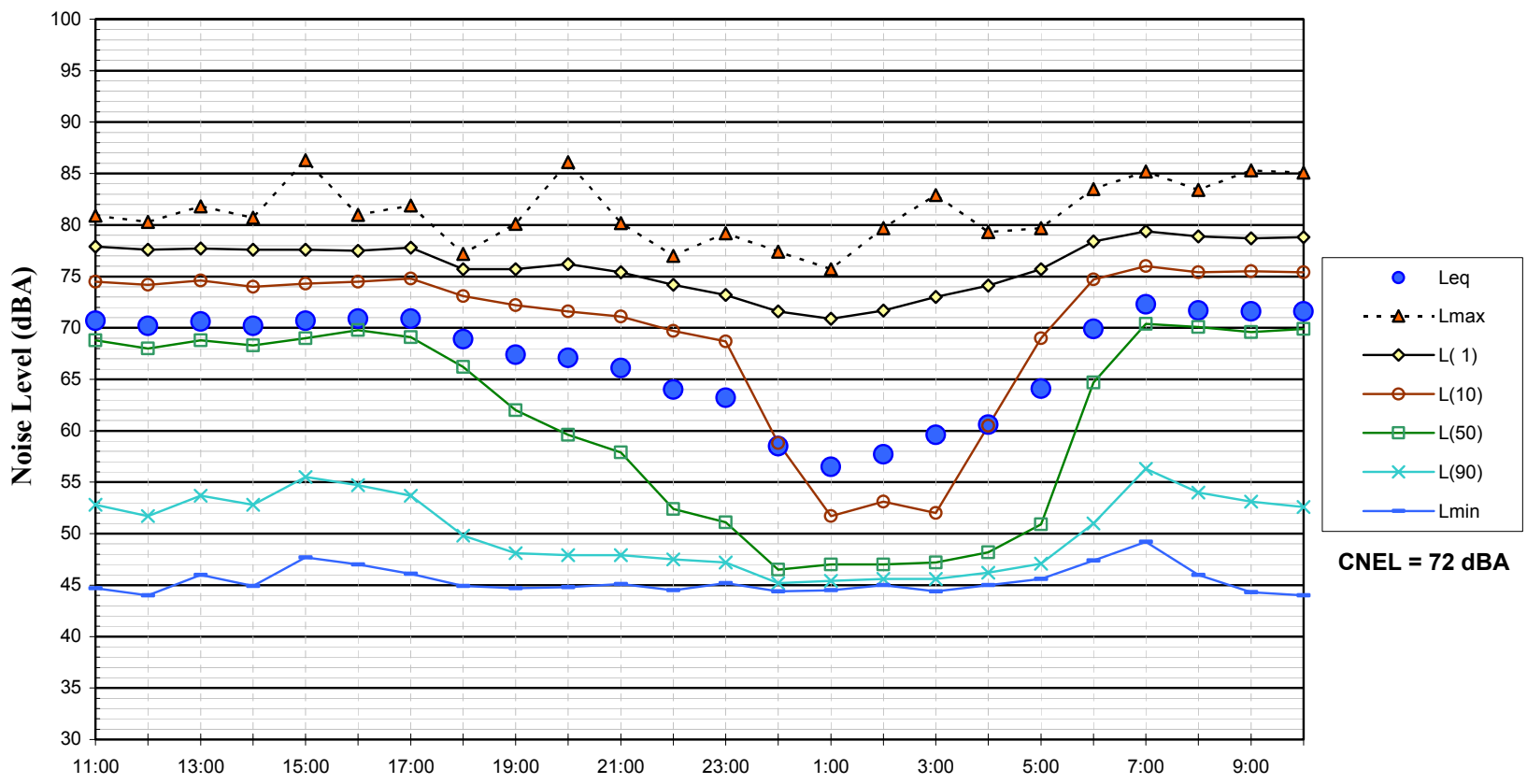
Noise Levels at LT-4
75 feet from the Centerline of West River Street
Across from Donner Creek Mobile Home Park
May 13-14, 2004



CNEL = 67 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

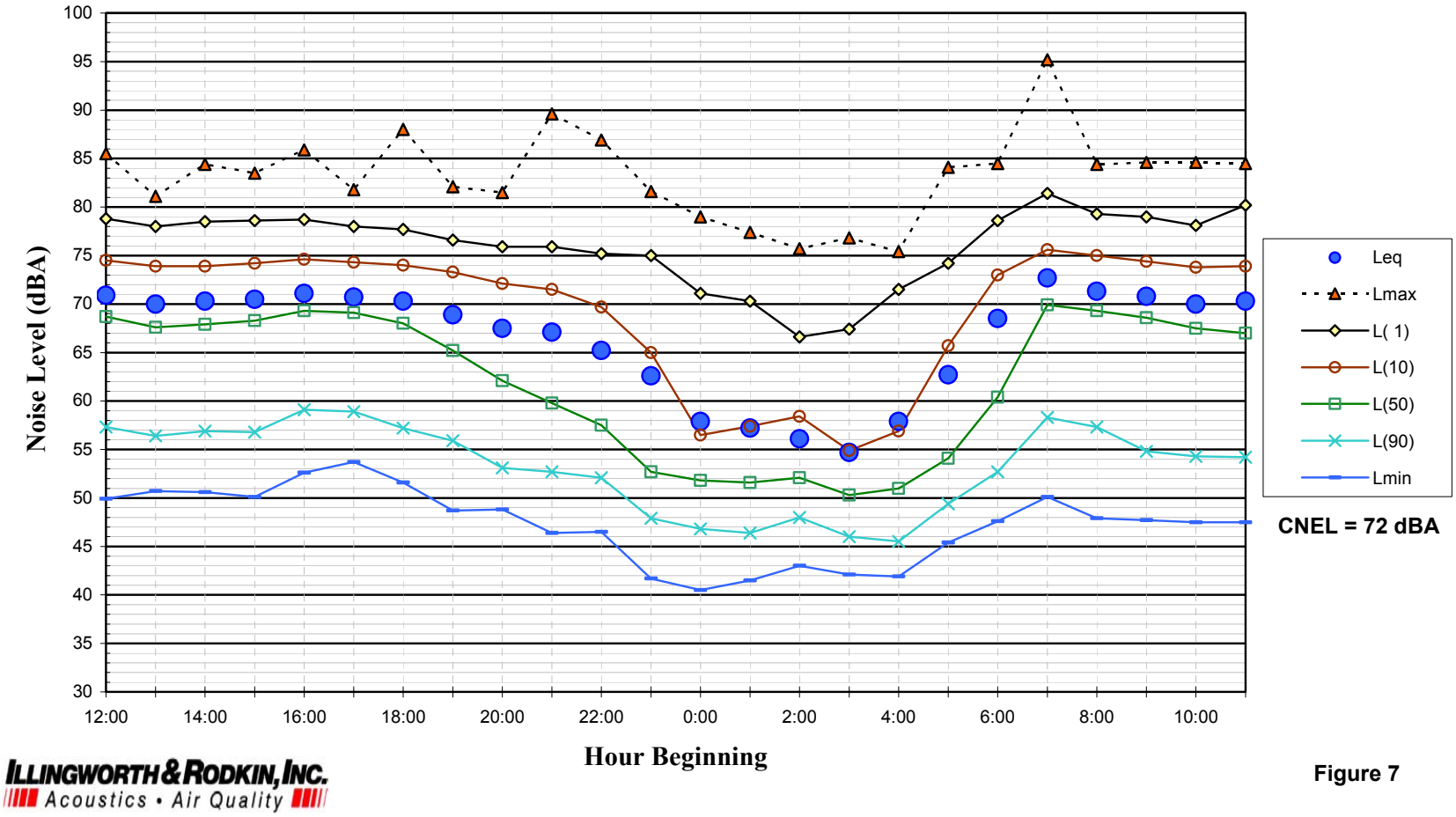
Figure 5



ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 6

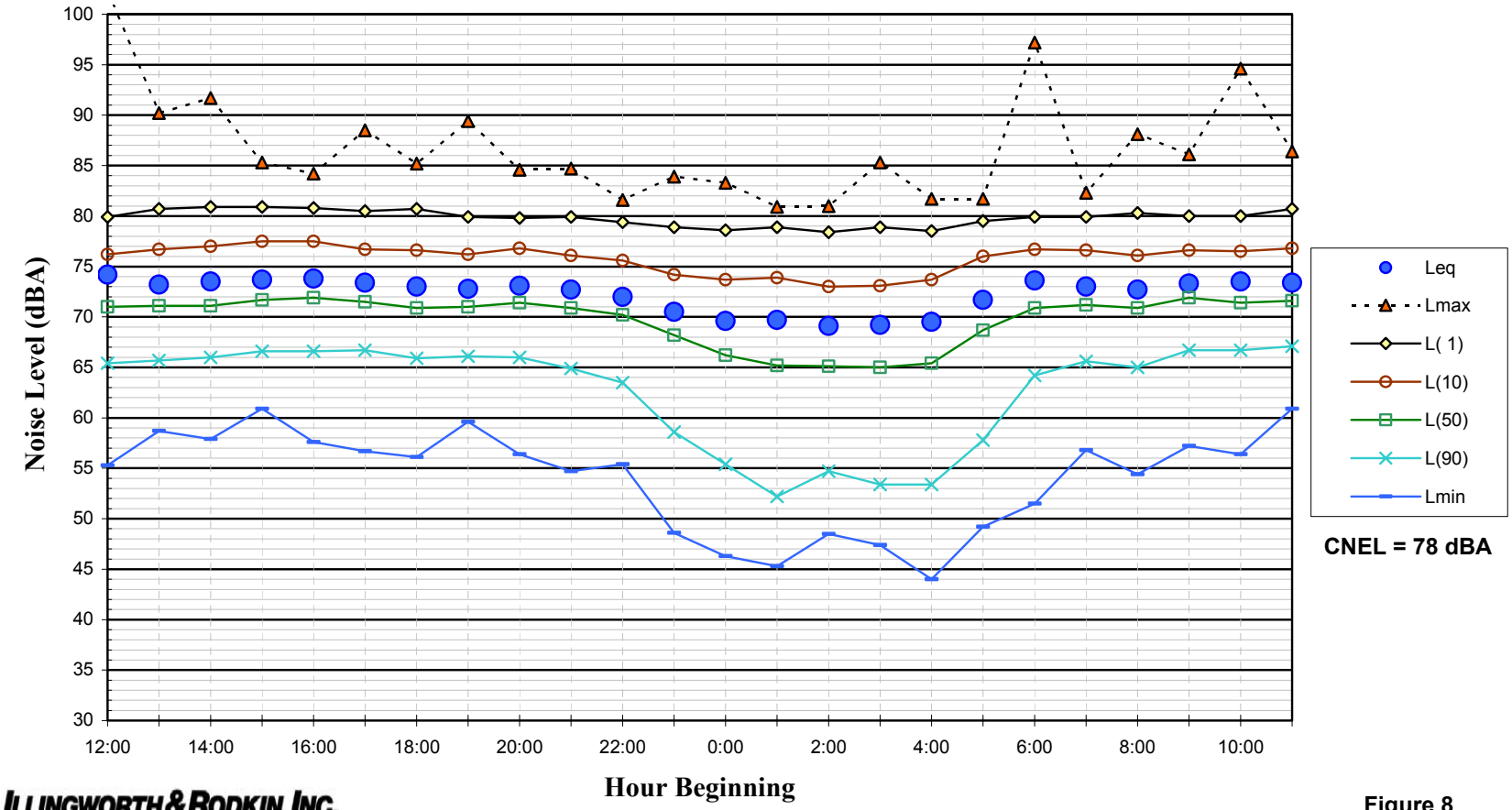
Noise Levels at LT-6
69 feet from the Centerline of Northwoods Boulevard
May 13-14, 2004



ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 7

Noise Levels at LT-7
168 feet from the Centerline of Interstate 80
51 feet from the Center of Donner Pass Road
May 13-14, 2004

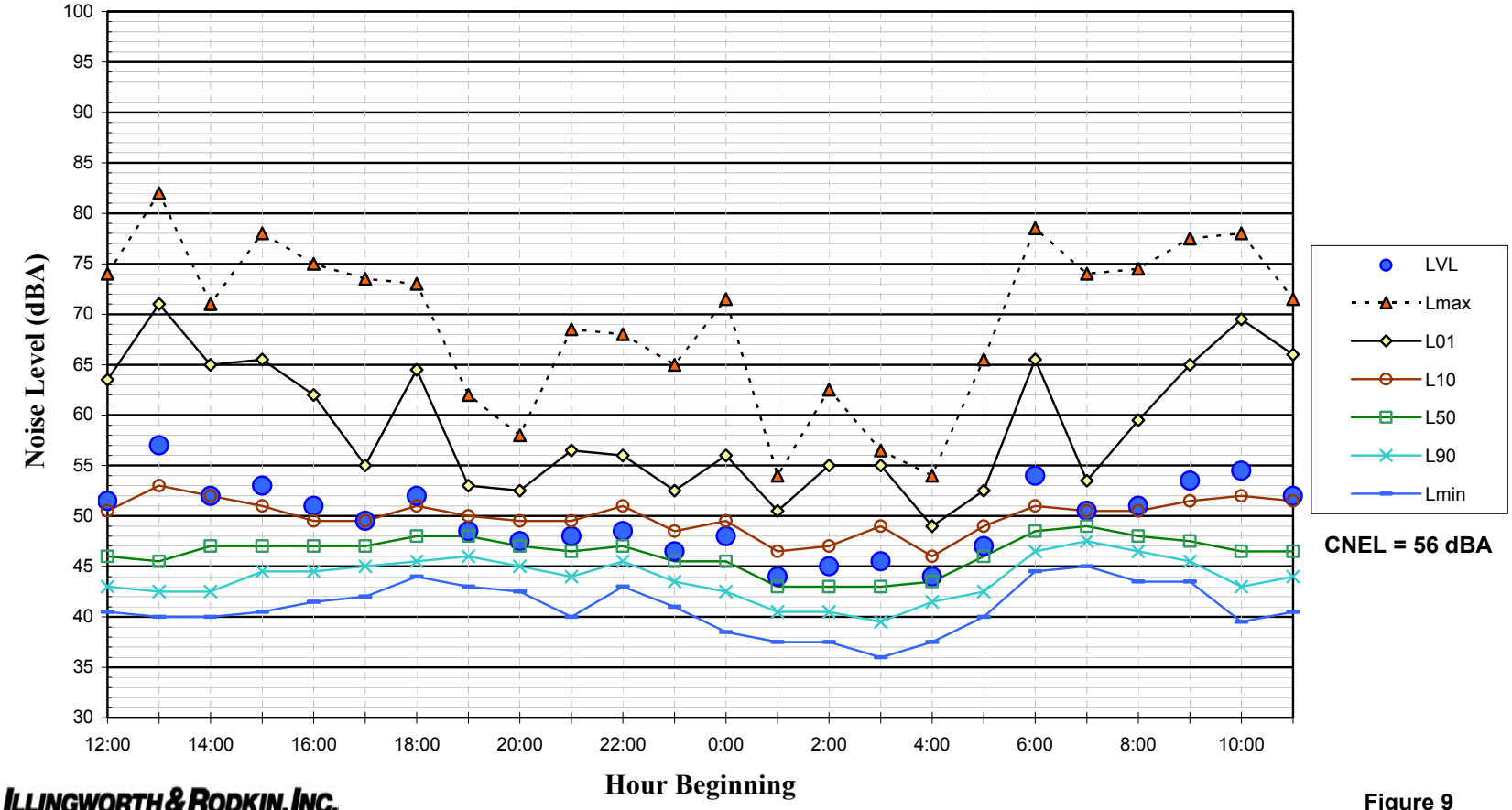


CNEL = 78 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 8

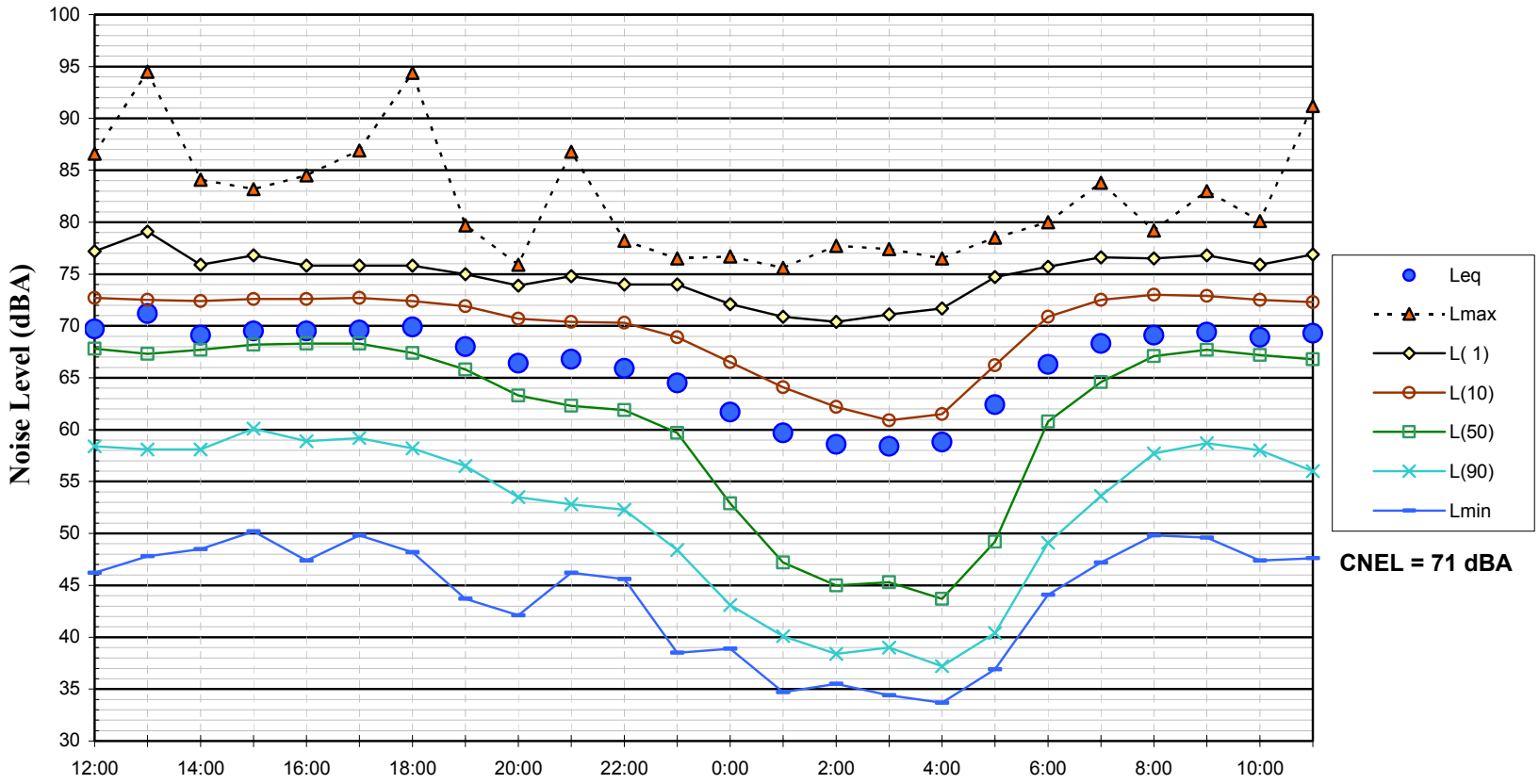
Noise Levels at LT-8
Northwest of the Truckee-Tahoe Airport
near intersection of Martis Drive and Reynolds Way
May 14-15, 2004



CNEL = 56 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

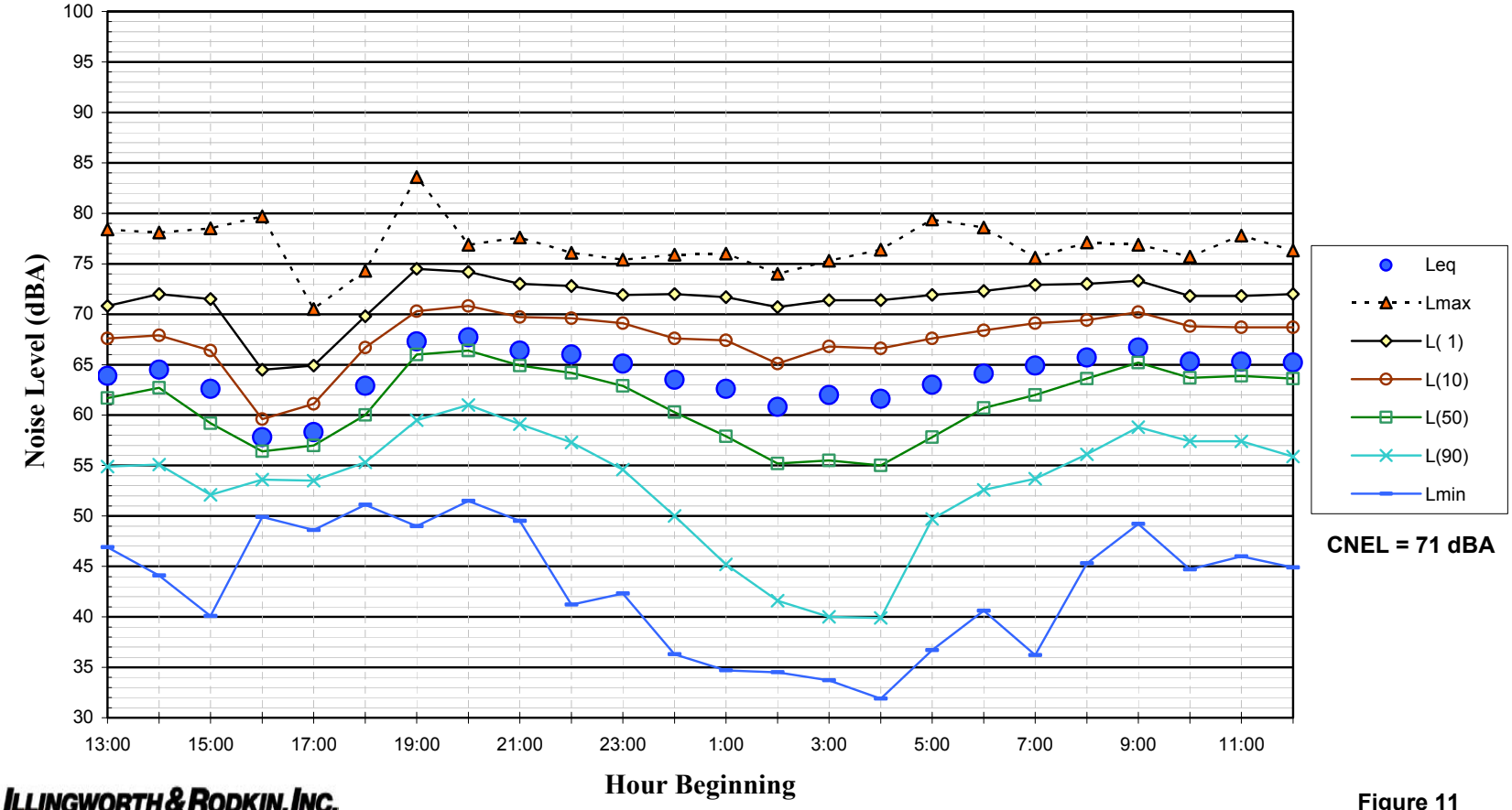
Figure 9



ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 10

Noise Levels at LT-10
300 feet from the Centerline of Interstate 80
Near Hirschdale Road
May 14-15, 2004

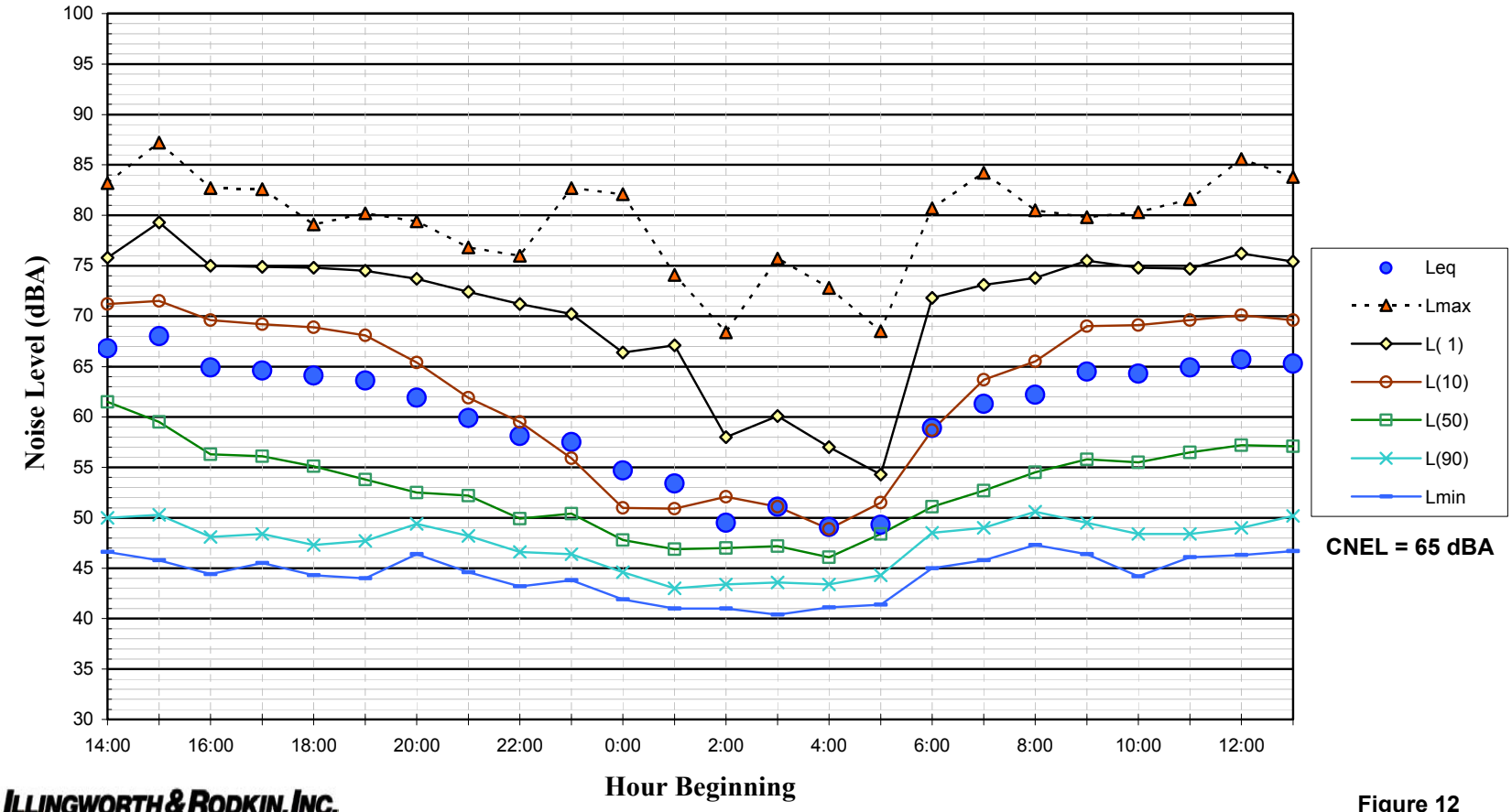


CNEL = 71 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 11

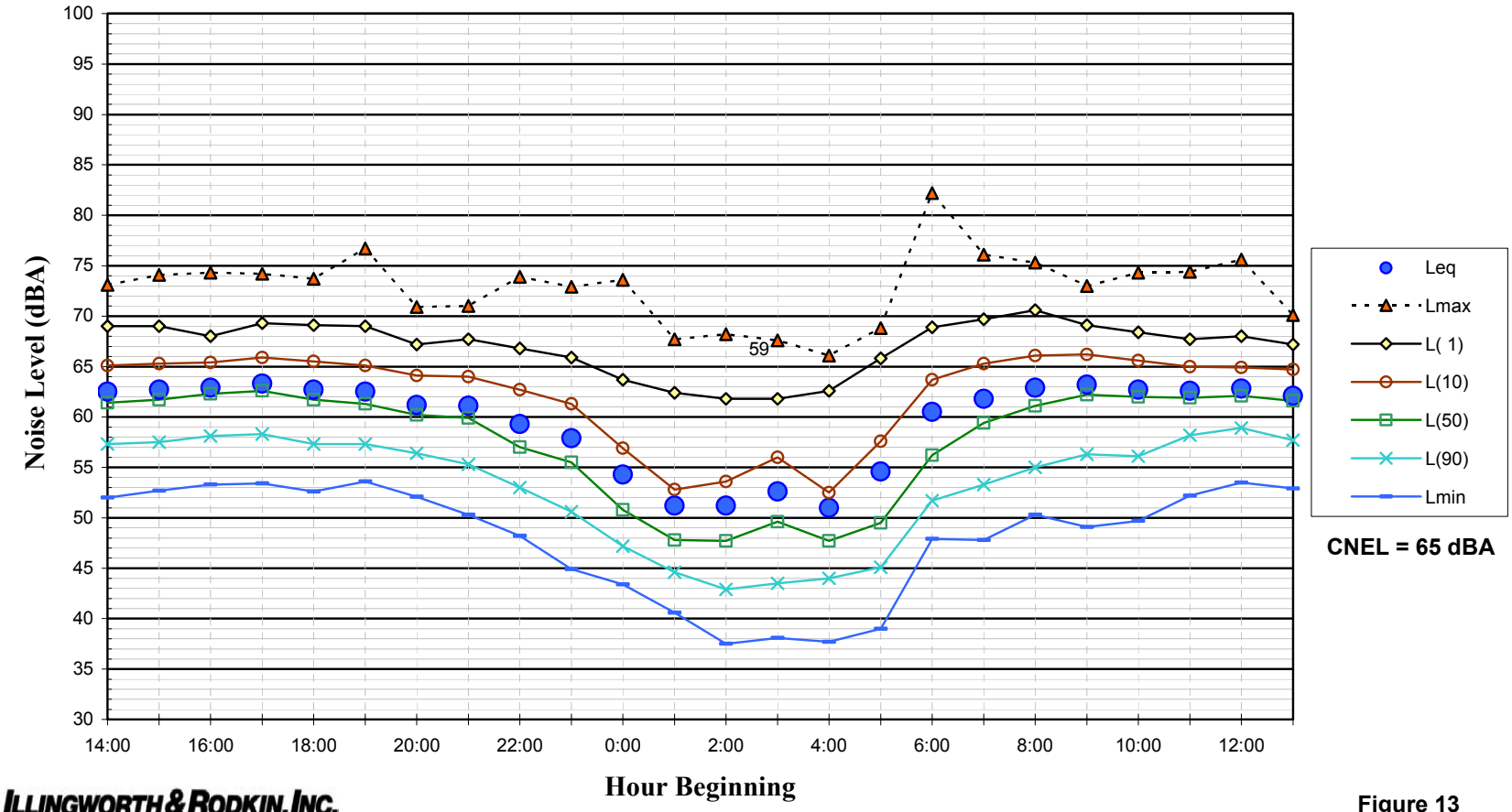
Noise Levels at LT-11
27 feet from the Centerline of Donner Pass Road at Donner Lake Road
May 14-15, 2004



ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 12

Noise Levels at LT-12
75 feet from the Centerline of Donner Pass Road
May 14-15, 2004



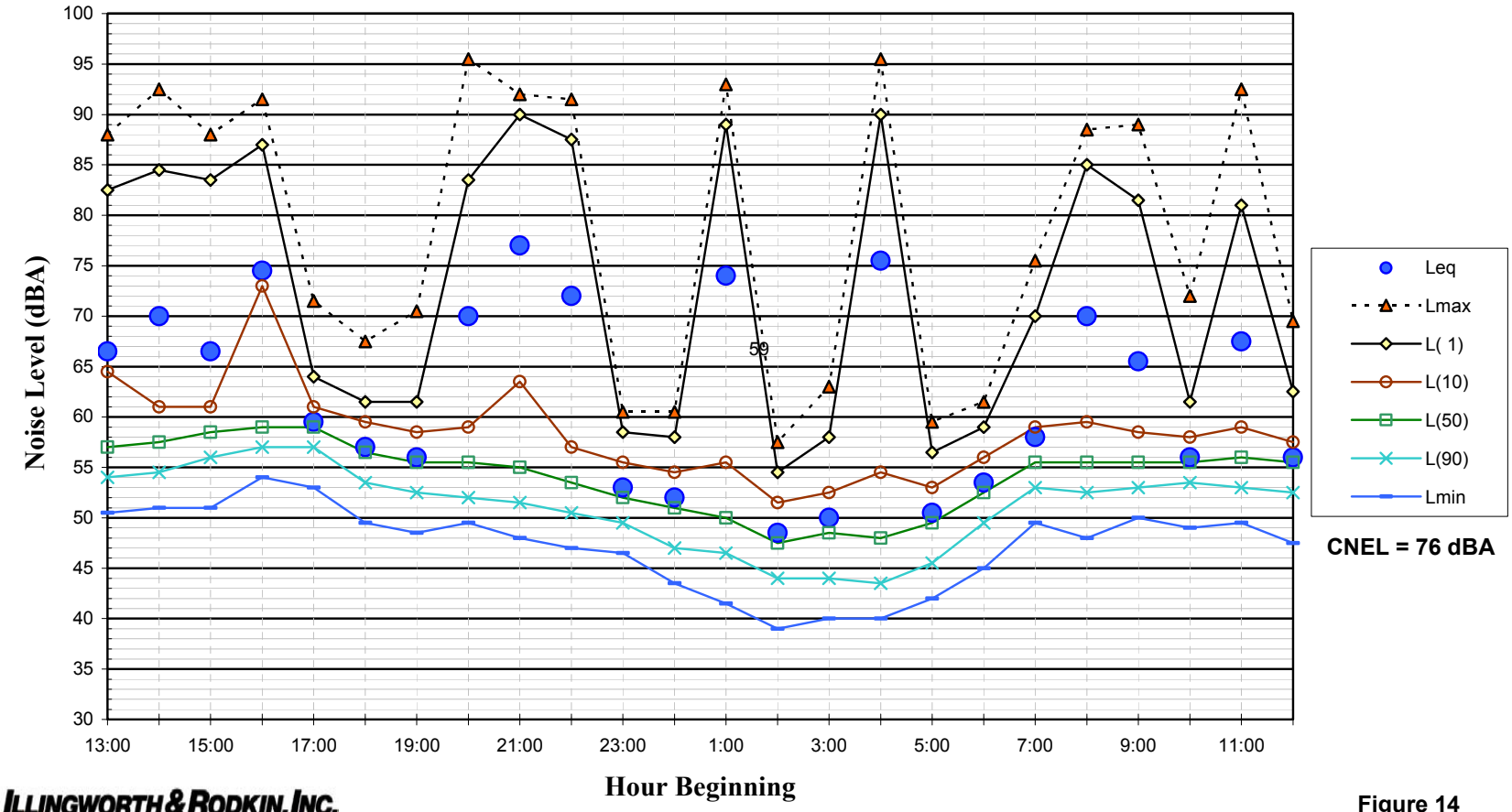
Hour Beginning

CNEL = 65 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 13

Noise Levels at LT-13
~ 100 feet from the Center of the UPRR Right-of-Way at McIver Hill
November 2- 3, 2001



CNEL = 76 dBA

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Figure 14

Figure 15 Future Noise Level Contours for Truckee-Tahoe Airport