APPENDIX 5.7A

Tracy Peaker Plant 2003 Noise Study

consultants in engineering acoustics

Analysis and Planning for Vibration and Noise Control

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July 11, 2003

Mr. Mark Kehoe
Director of Environmental and Safety Programs
GWF Energy LLC
4300 Railroad Avenue
Pittsburg, CA 94565

Subject: Compliance with the California Energy Commission's Condition Noise-5 at GWF's Tracy Peaker Power Plant

Dear Mr. Kehoe:

Consultants in Engineering Acoustics (CIEA) measured noise levels near the two residences specified by the California Energy Commission (CEC) over a period of approximately 46 hours. The measurements began about 18 hours before the Tracy Peaker Power Plant (TPP) began operating, continued throughout the 25-hour[1] period when TPP was operating at base load conditions and terminated when only a single turbine continued operation. The purpose of these measurements was to determine whether or not TPP noise was in compliance with the limits specified by the CEC. (See Reference 1, listed at the end of this report.)

This report is in four parts: (I) an executive summary, (II) a brief description of the noise measurement equipment and procedure, (III) a detailed description and analysis of the noise measurement data and (IV) a conclusion.

I. Summary

Noise levels were measured over a period of about 46 hours at the two locations, LT-2 and ST-5, required by the CEC. The measurements, using two independent measuring systems, began before TPP began operating its two turbines and continued throughout the requisite 25-hour test period and after one turbine was shut down. The CEC required that (1) average sound levels from TPP at the two locations could not exceed 39 dBA (L_{eq}),[2] (2) plant sounds could not include tones and (3) plant noise must comply with San Joaquin County's limit.

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[1] Unit 1 started at 11:39 AM on May 20, 2003 and shut down at 2:39 PM on May 21. Unit 2 started at 11:56 on May 20 and shut down at 4:16 PM on May 21.

[2] L_{eq} and other noise metrics are defined in footnotes in Tables 2 and 4.

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As is summarized and shown in Table 1, the noise level measurements indicate that TPP noise did not significantly affect sound levels at either location and that TPP sound levels were below 39 dBA (L_{eq}). Tones were not detected at receptors and at no time were sounds attributable to TPP heard by on-site observers nor were they audible on tape recordings of the sounds at the two locations spanning 46 hours. The dominant night and early morning sounds are from traffic on Interstate 580 and other nearby sources – such as birds, insects, and nearby home projects – during daytime hours. Extensive noise controls implemented by TPP were apparently most effective.

San Joaquin County's Code (Reference 2) requires that the sound level should not exceed 50 dBA, L_{eq} in the daytime (7:00 AM to 10:00 PM) and 45 dBA, L_{eq} at night (10:00 PM to 7:00 AM) on the property line of residential land uses. With attainment of the lower noise limit of L_{eq} = 39 dBA at the two locations, as specified by the CEC, the County's limits are perforce attained and complied with.

TPP noise was not detected at either noise monitoring location. The calculated TPP noise at receptors, based on noise measured near TPP, is 37 dBA under good sound transmission conditions. Thus, TPP complies with CEC's environmental noise limit of 39 dBA or less. Thus, CIEA's conclusion and opinion is that TPP noise during the 25-hour test complies with all three requirements set forth by the CEC and additional noise mitigations are not required.

II. Equipment and Procedure

Standard and common acoustical equipment, techniques and procedures were used for the noise measurements. They are described in detail in Appendix A.

III. Results

A. At the Lopez Residence, Site LT-2

Figure 1 shows the distribution of hourly noise levels over the noise measurement period of about 46 hours measured by the Larson-Davis meter, model 812. The hourly average energy level (L_{eq}) is shown by the solid black line. One other parameter, the L_{90} (the noise level exceeded 90 percent of the time), is shown as well. This figure is pieced together because of the paper width limit in the computer display program.

It is apparent in Figure 1 that the noise level (the L_{eq} as well as the L_{90}) is consistently relatively high considering that the site is in a largely rural area and is relatively far (about 2,500 feet) from the largest local "point" noise source, the glass bottle plant, and a little farther from TPP. An observer noted that I-580 traffic was the dominant noise source at night, resulting in the high noise levels. The highest average noise levels are shown to be occurring during the evening and morning hours, including well before TPP began operating at noon on May 20.

The sound levels measured with the LD noise monitor, shown in Figure 1, are quantified more fully in Table 2. Information in the right-hand column (labeled "Prominent Noise Sources") of Table 2 identifies potential sources of some of the high average noise levels. In Figure 1 the high L_{eq} levels are the result of the occurrence of one or more relatively loud sounds: nearby or distant traffic, aircraft, noise from the glass plant and/or wind rustling nearby shrubs, barking dogs, etc. But of course, these noise sources did not occur every hour, rather, noises from different sources occurred during the various hours. However, it should be noted that the on-site observer reported that glass plant noise was audible (identified by frequent back-up alarms) only on the second morning of monitoring when a slight breeze was blowing from TPP and the glass plant towards the Lopez residence. The observer points out, however, that Mr. Lopez restores antique autos, and it is possible that Lopez has some equipment emitting sounds that were not easily identified from the 12-second-long recorded samples.

However, analysis of the recorded sound levels did not detect any identifiable TPP noise. In Figure 1 it can be seen that on May 20, 2003 the noise level was about 56 dBA at 10:00 and 11:00 AM, just before TPP began operating. When TPP began operating at noon on May 20, the L_{eq} was reduced to 51 dBA, increased to 54 dBA at 2:00 PM, then reduced again to 52 dBA at 3:00 PM. Subsequently, the noise level increased to 61 dBA as a result of a howling dog and a nearby crow's cawing. A similar pattern is seen in the L_{90} level. If it had been affected by TPP noise, the L_{90} would have been expected to increase when TPP is operating and to maintain a relatively constant level as long as TPP operates. In contrast, Figure 1 and Table 2 show that at 11:00 AM the L_{90} was 42.7 dBA. At 12:00 noon, with TPP in operation, the L_{90} decreased to 40.8 dBA and remained at about 41 dBA until 4:00 PM, after which the L_{90} increased as a result of traffic and a number of other sources. TPP noise was not audible to the observer during these measurements at the Lopez residence or on the tape recordings. Good sound transmission conditions occurred on the second morning when there was a very slight breeze from the northeast. The glass plant was at times distinctly audible, but TPP sounds could not be heard. This supports the calculations indicating that the TPP noise would not be audible, even during rare periods of good sound transmission.

Because of the expected difficulty measuring a specific low noise level when background levels are much higher, a series of noise measurements were obtained at various distances along the top of the Delta-Mendota Canal levee between TPP and the Lopez residence. These measurements and observations of the audibility of TPP noise at various distances permit calculation of TPP noise at a distant receptor where TPP noise is expected to be inaudible and difficult to measure accurately. Table 3 summarizes the results. Table 5 provides octave band sound levels measured at each distance and calculations of A-weighted noise levels at the receptors from data at each distance discussed below.

It will be seen in Table 3 that, as expected, the noise levels decrease as the distances to TPP increase and that general TPP noise is audible and dominant up to a distance of 500 feet from the center of the plant. At a distance of 900 feet, primarily noise emanating from the top of the two exhaust stacks is audible and beyond that distance, I-580 traffic noise is dominant. At the bottom of Table 3 and the right-hand column of Table 5 the calculated noise level from TPP near the Lopez residence is 37 dBA and, based on on-site observations, TPP noise was inaudible. (Traffic noise, mostly from I-580, was clearly audible, however.) This calculation is based on hemispherical spreading, molecular absorption and anomalous attenuation as described in Reference 4. It does not include attenuations due to trees, earthen barriers or ground absorption. The calculations are shown in Appendix B.

B. At the Timmons Residence, ST-5

The results shown in Figure 2 (from LD noise monitor data) and Table 4 are relevant to the sounds at the Timmons residence. Noise levels, as shown in Figure 2, are not as scattered and variable as those measured at the Lopez residence. At the Timmons residence one clearly sees the expected pattern: an increase at night, which peaked at about 6:00 AM, and a drop during daytime hours. This pattern is typically caused by a combination of dominant distant noise sources, such as traffic, and a decrease in transmission of sound through the atmosphere during daytime hours, which is consistent with CIEA's observation.

In Table 4 the prominent noise source noted most frequently is traffic, and there is an absence typically of any mechanical sound such as might be associated with TPP. However, there was one unrecognizable sound that began at about 3:00 AM on May 21 and disappeared at 7:00 AM. Its source is unknown. I-580 traffic noise, including some individual trucks, was clearly audible at night, even though traffic was presumably less at night. During the day, traffic noise was generally inaudible and background noise consisted of aircraft or nearby sources.

As with the sounds at the Lopez residence, there does not appear to be any change in sound levels with starting, continuing or stopping TPP operations. For example, in Figure 2 the L_{eq} was 44.1 dBA at 11:00 AM; it decreased slightly (to 43.5 dBA) with the onset of operations at TPP, increased to 45.4 dBA at 1:00 PM and then dropped slowly to 43.8 dBA at about 5:00 PM. The lower noise parameter (L_{90}) shows similar small, slow changes in level. With a relatively continuous noise source emitting a relatively consistent level of noise, if that noise affects some distant receptor, one expects, at a minimum, an increase in the L_{90} with the onset of the noise followed by a relatively constant L_{90} level as long as the noise source continues to operate. This is not the case as shown in Figure 2 and Table 4; therefore, TPP noise did not significantly affect noise levels at the Timmons residence.

The Timmons residence is located southwest of TPP whereas the Lopez residence is located west of TPP. Both are about 2,600 feet from the acoustic center of TPP. Any differences in distances and terrain between the two residences and TPP are not sufficient to expect the sound attenuation with distance to differ widely from that demonstrated in Table 3. As a result, the calculated level of TPP noise is no more than 37 dBA at the Timmons residence, receptor ST-5, and is expected to be in compliance with the limits specified by the CEC and San Joaquin County.

C. Tones

In Noise-5, "Protocol," the CEC required a one-third octave band demonstration of the absence of tones. A common definition of the presence of an audible tone is that any single one-third octave band is at least 5 dB higher than its two adjacent bands. Figure 3 shows the one-third octave bands measured at three locations. It demonstrates that tones were not present at any of these locations and that the sound spectra near the two residences were in compliance with the CEC's requirement.

IV. Conclusion

Noise levels at LT-2 and ST-5, the Lopez and Timmons residences, respectively, were not shown to increase with or during operation of TPP. Noise from TPP was not noted as being audible at either location by onsite observers or on the tape recordings. TPP noise also was not audible at only half the distance to the Lopez residence, day or night. Because background, or ambient, noise levels – typically due to I-580 traffic – are generally much higher than the CEC-specified noise limit, determination of the noise produced by TPP was only possible with a series of measurements at locations between TPP and the receptors and calculations using conservative sound transmission characteristics. Based on this method, the sound level was calculated to be 37 dBA at both LT-2 and ST-5 and, thus, is in compliance with the limits specified by the CEC and San Joaquin County. A slight barrier noise reduction due to canal levies, which would have further reduced TPP noise at ST-5 (the Timmons residence) has not been included in these calculations. This result is not unexpected in light of the extensive noise controls implemented by TPP. These include:

A. Custom silencers on the ventilation fans of the four gas skid compartments,

B. Acoustical insulation around the two largest pipes between the gas skids and turbines,

C. Noise control blankets with an "STC 19" rating enclosing each of the six attemporating air fans,

D. Noise control blankets with an "STC 19" rating also enclosing most of the attemporator air ducts,

E. Sound absorptive walls built to enclose the turbine exhaust collector box and catalyst duct inlets and

F. The two GE turbines, which were purchased with comprehensive low-noise packages.

Because (a) noise levels at the two residential locations comply with the CEC's limits and (b) plant sounds do not show any tones, additional noise mitigations are not required.

Please call if you have any questions regarding this report.

Sincerely,

Jerome S. Lukas, Ph.D.
and

Thomas R. Norris, P.E.

References:

1. Energy Resources Conservation and Development Commission of the State of California, Docket No. 01-AFC-16, Order No. 02-0717-02, Application for Certification of the GWF Tracy Peaker Project, July 17, 2002

2. San Joaquin County Code, Section 9-1025.9, as described in Conditions of Certification by California Energy Commission, Staff Report, Section D, Summary and Discussion of the Evidence, page 261 (no date on the available copy)

3. URS – Pre-compliance – Noise Survey of Tracy Peaker Plant, Final Report, April 25, 2003

4. Edison Electric Institute, Electric Power Plant Environmental Noise Guide, 2nd Edition, Vol. 1, 1984, page 5-2 (EEI, 1111 19th Street NW, Washington, DC 20036)

Enclosures: Figures 1, 2, 3 and 4
Tables 1, 2, 3, 4 and 5
Appendices A and B

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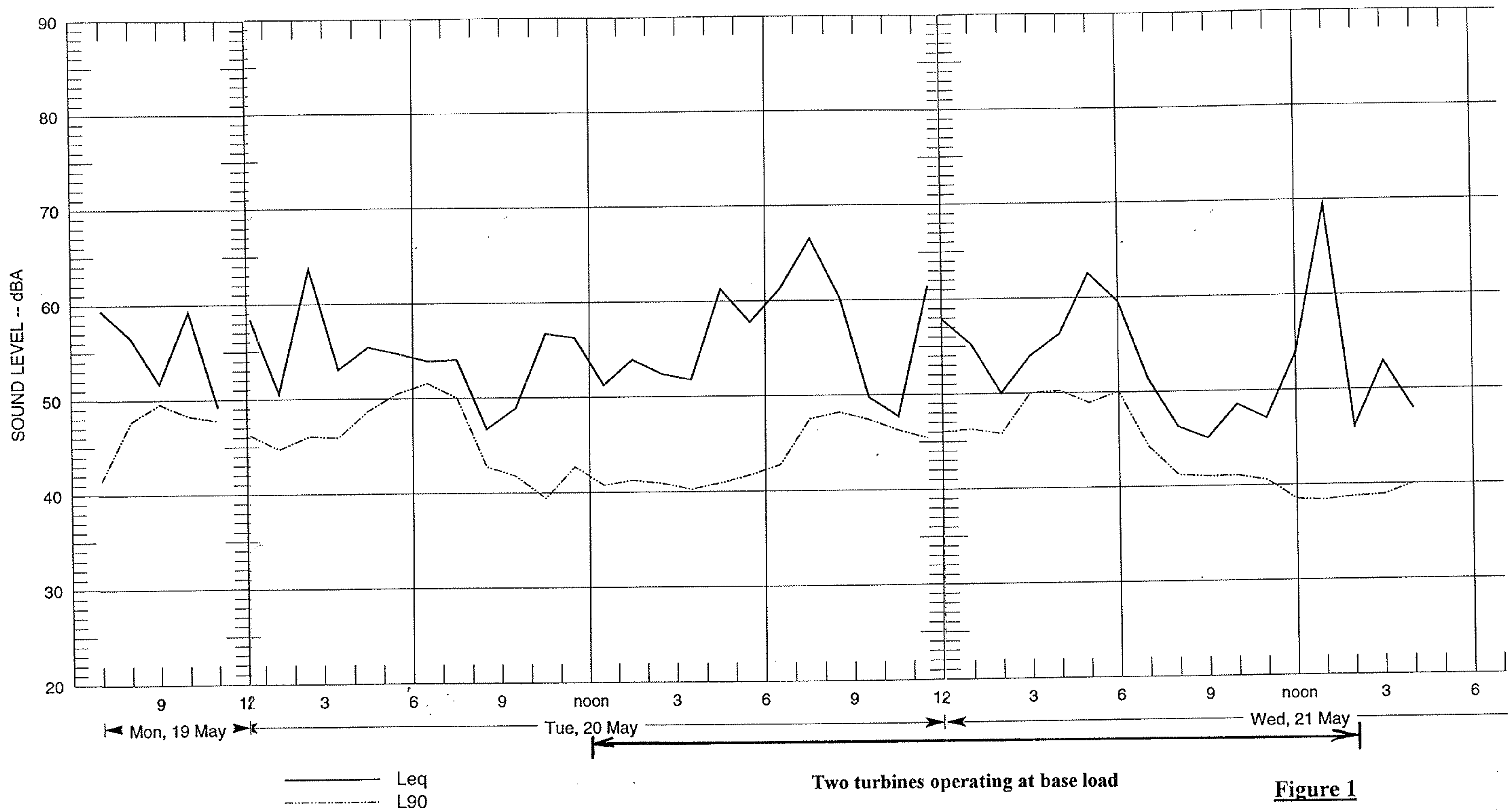

Figure 1

Hourly noise levels in dBA near the Lopez residence, LT-2, in 2003 before and concurrent with operation of Tracy Peaker Power Plant

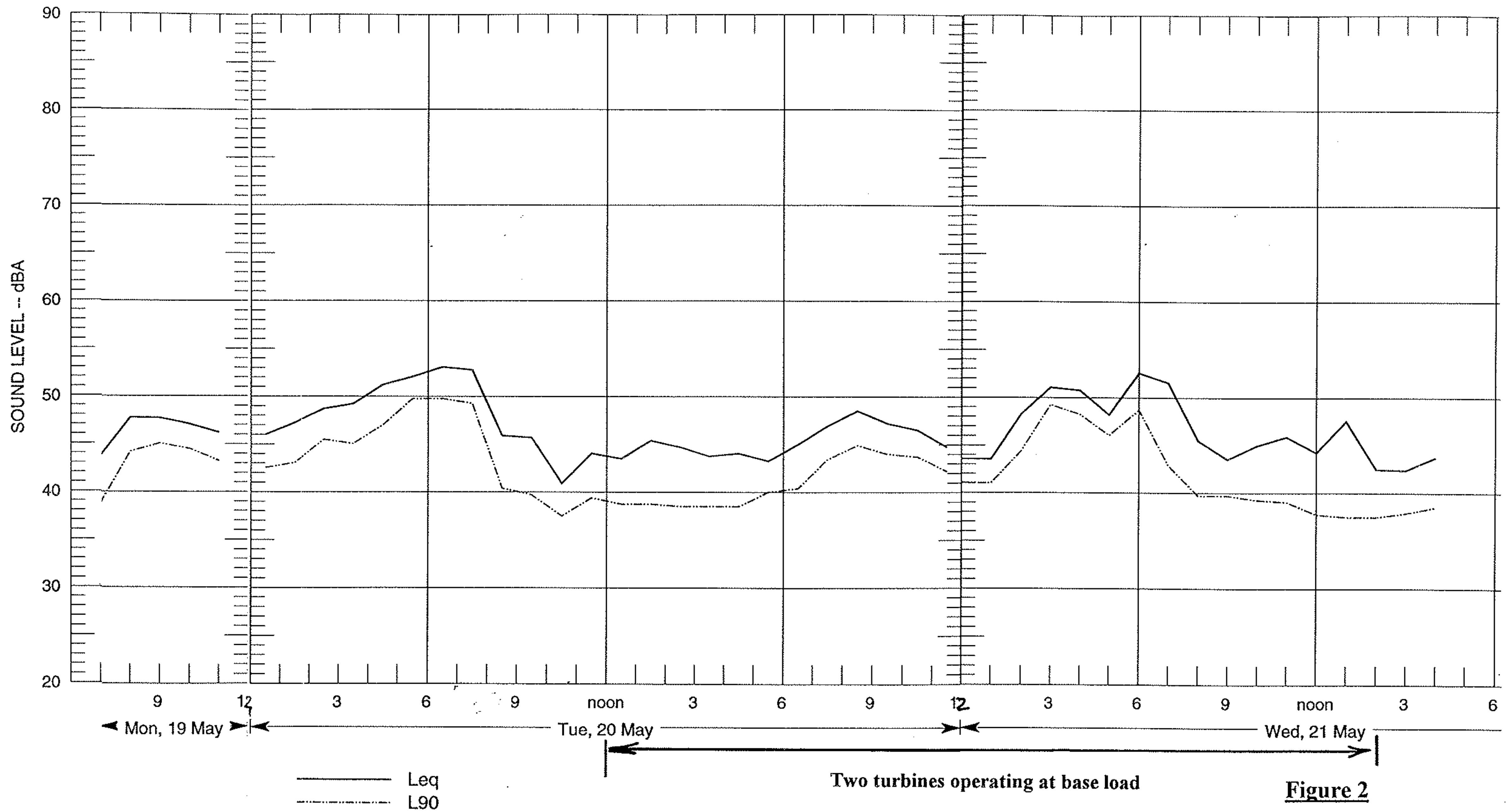

Figure 2

Hourly noise levels in dBA near the Timmons residence, ST-5, in 2003 before and concurrent with operation of Tracy Peaker Power Plant

Code	Site	Date/Time	Dominant Noise/Comment
•—•	Lopez, LT-2	5/20/03 at 10:50 PM	Can't hear plant; far traffic and high jet
o—o	Timmons, ST-5	5/20/03 at 7:30 PM	Wind rustling leaves, far traffic
x—x	On bridge over canal near plant entrance	5/20/03 at 8:00 PM	Traffic noise dominant; can hear air compressor at times

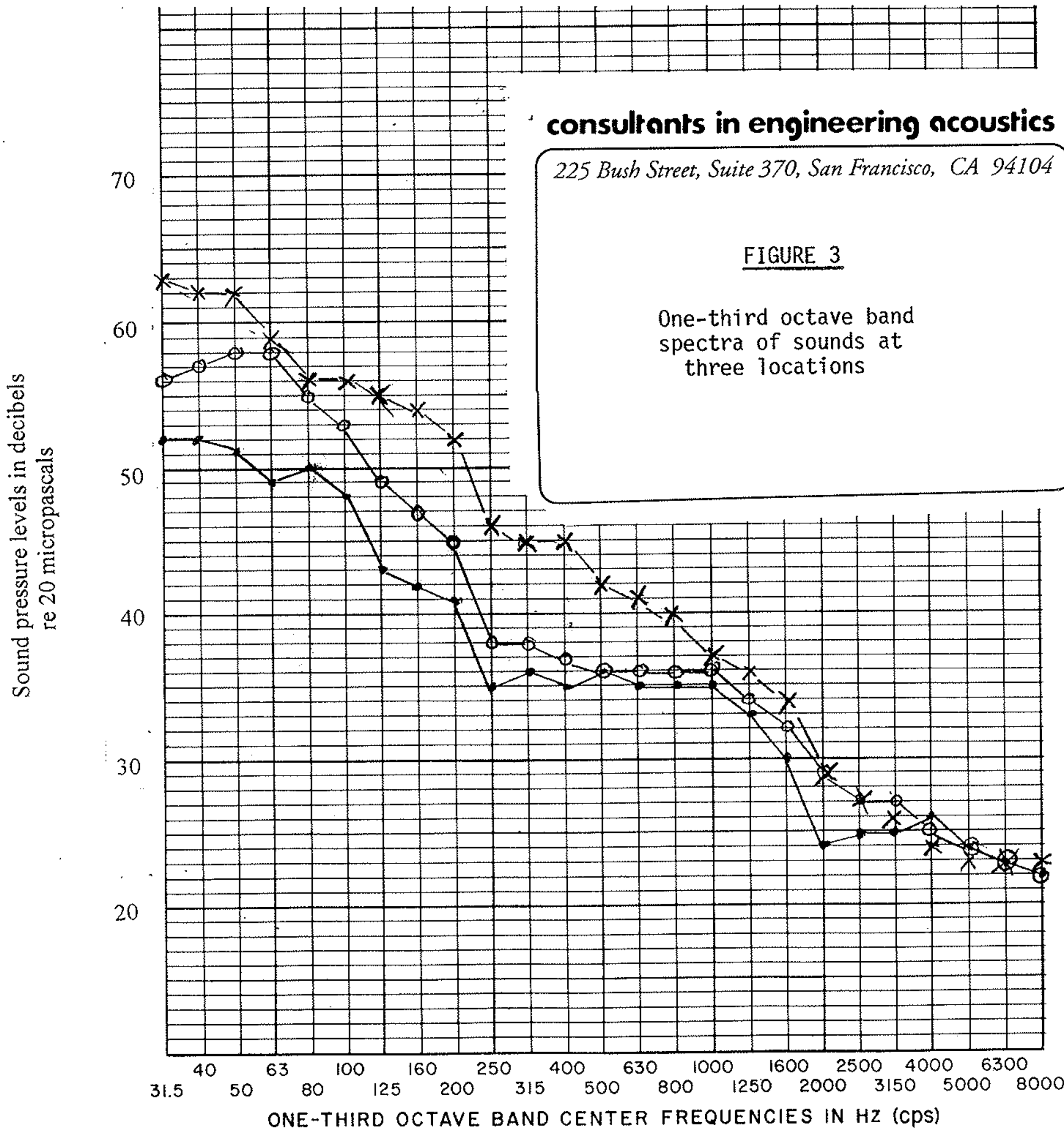

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FIGURE 3

One-third octave band spectra of sounds at three locations

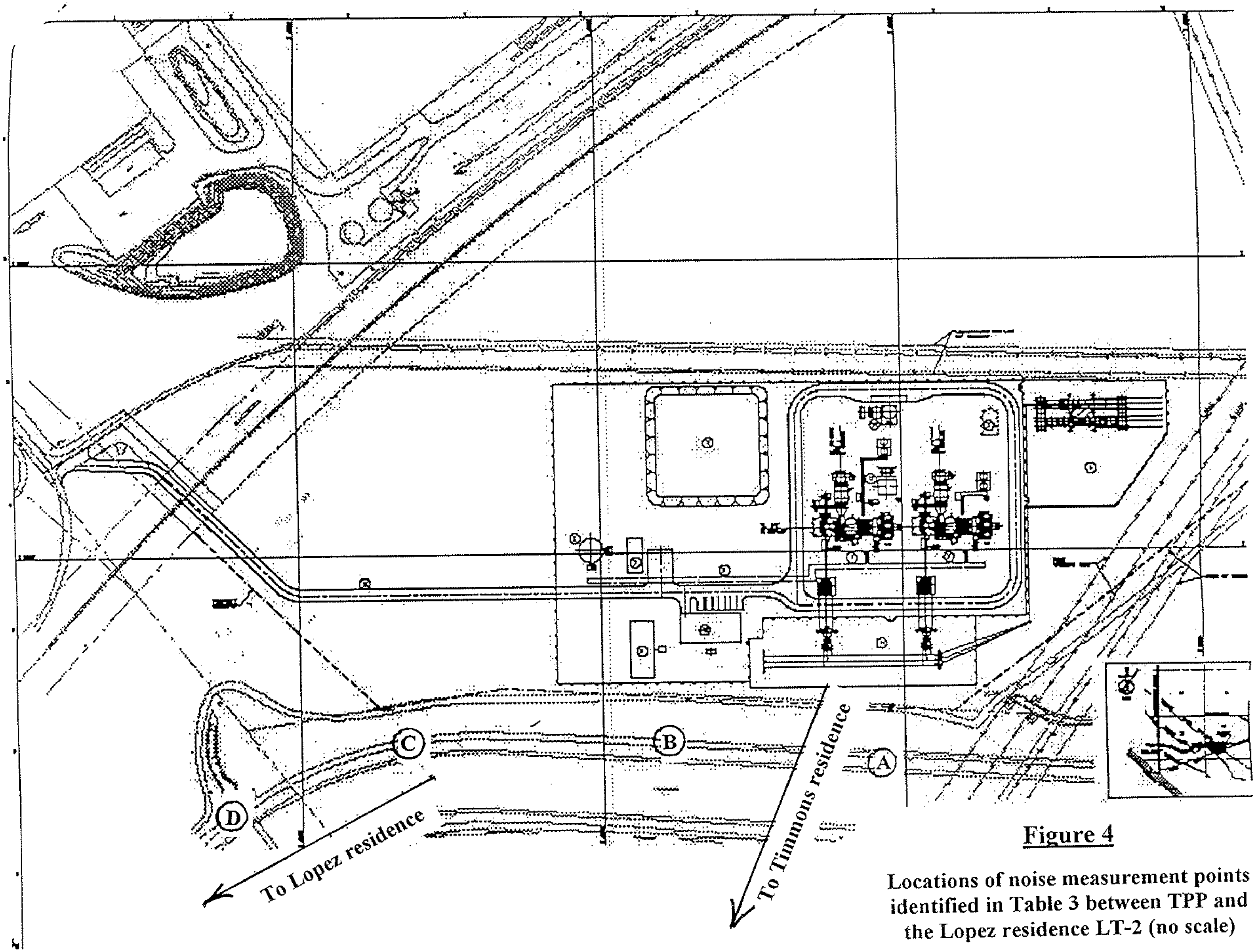

Figure 4

Locations of noise measurement points identified in Table 3 between TPP and the Lopez residence LT-2 (no scale)

Table 1

Noise Level Limits and Calculated[1] Sound Level Contribution from the Tracy Peaker Plant near the CEC-Specified Locations

Locations	Noise Limit: CEC: L_{eq} > 39 dBA	Noise Limit: CEC: No tones	Noise Limit: County: Nighttime L_{eq} > 45 dBA	Comment
Lopez, LT-2	37 dBA	None	37 dBA	Audible sounds not attributable to TPP
Timmons, ST-5	37	None	37	Audible sounds not attributable to TPP
Compliance:	Yes	Yes	Yes	No additional mitigations required

[1] Calculated from octave band levels measured at Location A (Table 3) using "standard day" rates for molecular absorption and anomalous excess attenuation as described in Reference 4. See also Appendix B.

TABLE _

DISTRIBUTION OF NOISE LEVELS - IN dBA -NEAR RECEPTOR LT-2 (LOPEZ)
IN TRACY, CA., BEGINNING ON MONDAY MAY 19, 2003 at 7:00 PM
UNTIL 5:00 PM ON WEDNESDAY MAY 21, 2003

DAY/ DATE	HOUR BEGINNING AT	Leq	L90	PROMINENT NOISE SOURCES
MON.,	1900	59.4	41.5	traffic, birds
5/19	2000	56.6	47.7	traffic, glass plant, wind, birds
	2100	51.7	49.6	trucks nearby, glass plant,wind, traffic far
	2200	59.3	48.3	glass plant,wind, far traffic
	2300	49.2	47.8	far traffic, glass plant, wind
TUES.,	2400	58.4	46.2	far traffic, glass plant, wind
5/20	100	50.6	44.7	nearby traffic, far traffic, glass plant
	200	63.7	46.1	one truck relatively nearby, far traffic, glass plant
	300	53.1	45.9	one truck or auto relatively near, glass plant, far traffic
	400	55.4	48.7	couple trucks or autos nearby, glass plant
	500	54.7	50.5	some traffic relatively nearby, glass plant
	600	53.9	51.6	traffic relatively close
	700	54	50	nearby traffic, glassplant
	800	46.7	42.8	traffic, glass plant? 1 smpl low freq. hum
	900	48.9	41.8	2 smpls prop. planes, glass plant, far traffic
	1000	56.7	39.4	far traffic, hammering, some animal sounds
	1100	56.3	42.7	1 smpl prop. plane, some nearby mcncl noises, traffic near, nearby birds and animals
	1200	51.3	40.8	nearby mechanical noises, cheeping of birds,traffic
Turbines	1300	53.9	41.3	nearby mechanical, hammering, prop plane loud
on	1400	52.4	40.9	nearby mechnical noises, 1 prop plane, jet, many misc. snds
	1500	51.8	40.3	many nearby and far sounds,
	1600	61.3	40.9	dog howking, crow nearby, knocking, traffic near
	1700	57.8	41.7	prop plane, misc. nearby sounds, train horn
	1800	61.3	42.8	dogs barking near mike, prop plane, glass plant, far traffic
	1900	66.5	47.6	nearby dog barking, prop plane
	2000	60.3	48.2	prop plane 1 smpl, dogs barking, far traffic
	2100	49.8	47.4	nearby cat howling, far jet, far traffic
	2200	47.7	46.3	only far traffic
	2300	61.4	45.4	1 relatively near aut, far traffic otherwise
WED.,	2400	57.9	46.1	far traffic, 1 smpl with near barking dog eliminated
5/21	100	55.2	46.3	howling dog, far jet 1 smpl
	200	50	45.8	far traffic 3 smpls, howling dog 1 smpl eliminated
	300	53.9	50	glass plant, same noise heard night of 19th, 1 far back up beeper, far train horn
	400	56.2	50.2	noise similar to that from glass plant on 19th
	500	62.6	48.9	glass plant - like sound, 1 nearby dog barking out
	600	59.6	50.1	some nearby traffic, glass plant-like sound throughout
	700	51.4	44.3	nearby traffic, 1 truck, last smpl glass plant-like sound level reduced
	800	46.3	41.2	glass plant - like sound gone all samples, far traffic
	900	45.1	41	no glass plant- like sound, some distant traffic
	1000	48.6	41.1	prop. plane 1 smpl, nearby mechanical sound + truck-like
	1100	47.1	40.6	2 smpls prop plane: near and far, talking, quiet otherwise
	1200	53.9	38.5	far and near prop plane, far jet, far traffic, quiet
	1300	69.4	38.4	prop planes near and far 4 smpls
	1400	46.1	38.8	talking and nearby mechanical sound, far traffic
	1500	52.9	38.9	prop plane, talking nearby, birds, traffic
Turbine	1600	47.9	40.1	nearby mechanical sounds, prop plane,far traffic
off	1700	69.3	32.8	prop plane, talking nearbybirds, traffic

Leq, or Equivalent Sound Level, is the sound level of a continuous, or steady, sound which contains the same sound energy as the actual time varying sound over a specified period, one hour in the present case.

L01, L10, etc., are the noise levels exceeded 01, 10, etc. percent of the time, one hour in the present case. L01 may be considered to be near the highest, or loudest, noise level, and L99 as nearly the lowest, or most quiet, level.

TABLE 4

DISTRIBUTION OF NOISE LE...S - in dBA - near RECEPTOR "ST5" (Timmons)
IN TRACY, CA., BEGINNING ON MONDAY MAY 19, 2003 at 7:00 PM
UNTIL 5:00 PM ON WEDNESDAY MAY 21, 2003

DAY/ DATE	HOUR BEGINNING AT	Leq	L90	PROMINENT NOISE SOURCES
MON.,	1900	43.8	38.8	far traffic, crow cawing
5/19	2000	47.8	44.2	nearby traffic, many crows cawing
	2100	47.7	45.1	far and near traffic
	2200	47.1	44.5	mostly far traffic
	2300	46.2	43.3	far traffic
TUES.,	2400	46	42.6	traffic
5/20	100	47.3	43.1	nearby traffic? (sound not typical), far traffic
	200	48.7	45.5	nearby traffic
	300	49.2	45.1	some relatively nearby traffic, possibly trucks
	400	51.2	47	1 relatively nearby auto, far jet, far traffic
	500	52.1	49.8	increaing traffic, crows cawing
	600	53.1	49.8	traffic, some nearby relatively, train
	700	52.8	49.3	traffic, some near, train horn
	800	45.9	40.4	traffic, back-up-beepers
	900	45.7	39.7	prop planes, traffic decreasing, back-up-beepers
	1000	40.9	37.5	two far jets, back up beepers, quiet traffic
	1100	44.1	39.4	prop plane, far jet, back up beepers
Turbines on	1200	43.5	38.8	1 noisy truck or motorcycle, far traffic, beepers
	1300	45.4	38.8	2 prop planes, quiet otherwise
	1400	44.7	38.5	prop planes near and far, quiet otherwise
	1500	43.8	38.5	near and far prop planes, quiet otherwise
	1600	44.1	38.5	far jet , prop plane
	1700	43.3	40	train horn, prop plane, traffic increasing
	1800	45	40.4	wind gusts, traffic, crow cawing
	1900	46.9	43.4	wind gusts and traffic,--- till 1930- new tape
	2000	48.5	44.9	prop plane, traffic, several gusts of wind
	2100	47.2	44	far prop plane, traffic, frog
	2200	46.5	43.7	2 far jets, traffic, dog barks
	2300	44.8	42.2	far traffic
	2400	43.6	41.1	far traffic at times
WED.,	100	43.6	41	some far traffic
5/21	200	48.3	44.4	some relatively nearby traffic, and far traffic
	300	51.1	49.3	one far jet, and an unrecognizeable sound throughout hour
	400	50.8	48.3	same sound as @ 0300
	500	48.2	46.1	same sound as previously + back up beeper, glass plant
	600	52.6	48.7	same sound as previously,but a little noisier
	700	51.6	42.9	previous noise present 4 smpls, 1 quieter, then gone
	800	45.5	39.7	some traffic, far back up beepers
	900	43.6	39.7	far traffic, some wind gusts, far prop plane
	1000	45	39.3	far motorcycle, far traffic, some bird sounds
	1100	45.9	39.1	prop plane, far truck or jet, 1 far jet, birds
	1200	44.3	37.8	prop planes near and far, few far birds, quiet otherwise
	1300	47.6	37.5	prop planes near and far, far back up beepers, far traffic
	1400	42.5	37.5	prop plane near, far traffic, quiet otherwise
Turbine off	1500	42.4	37.9	2 prop planes nearby, quiet otherwise
	1600	43.8	38.5	far and near prop planes 3 total, traffic

Leq, or Equivalent Sound Level, is the sound level of a continuous, or steady, sound which contains the same sound energy as the actual time varying sound over a specified period, one hour in the present case.

L01, L10, etc., are the noise levels exceeded 01, 10, etc. percent of the time, one hour in the present case. L01 may be considered to be near the highest, or loudest, noise level, and L99 as nearly the lowest, or most quiet, level.

Table 3

Sound Levels Measured[1] at Various Distances[2] from the Tracy Peaker Plant along the Delta-Mendota Canal at around 8:00 PM on May 20, 2003

Location		Sound Level	Most Audible Sound Source
A.	375 ft. from TPP center, 325 ft. from gas compressors	62 dBA	Line-of-sight to plant; noise from gas pipe and turbines
B.	500 ft. from TPP center	58	Line-of-sight to plant; TPP noise
C.	900 ft. from TPP center	46	Line-of-sight to plant; stack noise
D.	1,225 ft. from TPP center	44	Traffic noise dominant
E.	2,600 ft. from TPP center, LT-2, Lopez residence	37[3]	Cannot hear TPP; traffic noise only
F.	2,600 ft. from TPP center, ST-5, Timmons residence	37[3]	Cannot hear TPP; traffic noise only

[1] Sound levels at Locations A, B, C and D are averages over periods of about ten minutes occurring between 8:00 and 8:45 PM on May 20, 2003.

[2] Distances measured on the site plans. Wind during these measurements was generally from the northeast varying in velocity from 0 to 8 mph. A windscreen was used during all measurements. Wind conditions were favorable for sound propagation toward the receptors.

[3] Calculated from octave band levels measured at Location A (above) using "standard day" rates for molecular absorption and anomalous excess attenuation as described in Reference 4. See also Appendix B.

GWF-0709.TB3

Table 5: Octave Band Sound Levels Measured with Analog SLM on Levee Top or at Receptors near GWF Tracy Peaker Plant during 25 Hour Noise Test and Noise Levels Projected to 2600 Feet Distance from TPP

Data measured May 20-21, 2003 by T. Norris, Consultants in Engineering Acoustics, San Francisco
Analog Sound Level Meter is GenRad Model 1933

Rev. 7/11/03 TRN GWF-TPP25hr-table.xls

Location	Distance from Dominant Noise at TPP	Major Noise Sources Noted	Measured dBA	Octave Band Center Frequency of Measured Sound Levels									Noise Level Calc.for 2600 Ft (dBA)
				31	63	125	250	500	1000	2000	4000	8000	
A,On Levee 8:29 PM 20-May	325 ft. from gas heaters (375 ft. from TPP center) Even with tall pole near center of switchyard so. fence Slight wind from NW to N	Gas pipe squeal, turbine inlet "singing" tone	62	73	71	61	55	56	57	57	48	35	36.9
B,on Levee Approx.8:20pm 20-May	500 ft from TPP center Approx 300 ft NW of Loc. "A" Even with control bldg. Slight wind from NW to N	Gas pipe squeal, turbine inlet "singing" tone	58	74	69	59	50	52	50	53	41	30	36.8
C, on Levee 8:10 PM 20-May	900 ft from TPP center Approx 800 ft NW of Loc. "A" Slight wind from NW to N	Faint,muted gas pipe noise, some exhaust stack "whoosh"	46	77	62	52	47	45	40	36	35	24	36.7
D, on Levee 8:00 PM 20-May	1225 ft from TPP center Approx 1100 ft NW of Loc."A" At N. end of bridge for creek over DM Canal Slight wind from NW to N	Traffic on I 580, occasionally just audible air compressor but not turbines or gas pipes or other TPP sounds	44	62	58	55	46	42	37	29	24	23	**36.7 (See last Note Below**
E, Lopez Res,LT-2 10:51am 21-May	2600 ft from TPP center NE breeze 0-3 mph est.	Traffic on I 580, occasional glass plant back up alarms	40	52	49	43	36	36	35	24	21		N/A
F, Timmons Res, ST-5 7:28 PM 20-May	2600 ft from TPP center Near calm winds	Traffic on I 580, occasional plane, leaf rustle	47	50	58	49	38	36	36	29	25	22	N/A
Atmospheric attn.used in each octave band for projection of sound to 2600 ft: (in dB per 100 feet)				0.0305	0.0488	0.0823	0.1189	0.1798	0.2987	0.5181	1.0576	1.7678	db/100 ft.

NOTES:
Calculations of sound at 2600 feet based on measured sound levels tabulated above.
Distances used are from ACOUSTIC center of plant AFTER noise controls installed, which is judged midway between the trubines. An exception is noise at Loc."A", which was dominated by gas pipe noise originating 50 ft closer to the microphone.
Stack noise determined to be lower than other TPP noise by measuring sound below levee top, so plant is shielded from microphone except for stack top. At Location "B", noise was 50 dBA, compared to 58 dBA on levee top.
At Location "A", noise was 52 dBA, compared to 62 dBA on levee top with plant in full view. Traffic on I 580 was plainly audible when only the stack was in view.
Use standard day air attenuation from reference 4. Values are to rightleft in dB/100ft
No credit given for barrier attenuation of levee, no credit given for any vegetation attenuation by orchard at Timmons res.
Calculated sound at 2600 ft using Location "D" noise data is nearly same as using measurements at closer distances. This is coincidence, since Loc."D" noise is primarily ambient, not TPP noise

Appendix A

Detailed Descriptions of Equipment and Procedure

A. Equipment

Because of the generally recognized difficulty of accurately measuring a relatively low noise level (39 dBA, L_{eq}) in environments where ambient or background noise levels are higher than 39 dBA (see Reference 3, in particular Table 1 and Figure 1, which show the typical average background level (L_{eq}) as being well above 39 dBA), two different noise measurement techniques were employed: (1) automated noise measurements and (2) calibrated tape recordings of the actual sounds.

1. Automated Measurements

   In this technique a computerized sound level meter continuously measures any and all sounds impinging on its microphone, then calculates and records the distribution of noise levels over specified time periods (one hour in the present case). The systems used in this study were two Larson-Davis logging sound meters, type 1, model 812. These noise level data are summarized in Figures 1 and 2 and Tables 2 and 4.

2. Sound Recordings

   These self-contained and internally powered noise monitors consist of a cassette tape recorder (Sony model TC-D 5M), a Quest sound level meter (model 215R) and relay and power distribution circuits, all of which are controlled by a pocket computer (Sharp model PC 1500A). For these measurements, the noise monitors were programmed to record calibrated 12-second-long samples of the environmental sounds every ten minutes. The pocket computer generated hourly time codes, which were recorded on the hour on one channel of the two-channel tape recorder.

   The tape recordings were played back on a Sony tape recorder and the sound signals were measured by a GenRad precision sound level meter and analyzer (model 1933). These sound levels were then recorded, stored and analyzed statistically to develop hourly noise level distributions in a special-purpose computer (Chicotech). In addition, the tape recordings were listened to and, insofar as possible, the major or dominant noise sources during each 12-second sample were identified and noted. This recording and analytic technique has the advantages of permitting (a) identification of any dominant noise sources and (b) isolation and analysis of particularly informative samples. The dominant and identifiable noise sources are listed by hour in the "Prominent Noise Sources" column in Tables 2 and 4.

3. Short-term Measurements

   To quantify more accurately noise level reductions with increasing distances from TPP and to establish thereby the relationship between TPP noise and its levels at the two receptors, a GenRad precision sound level meter and analyzer (model 1933) was used.

This involved walking along the Delta-Mendota Canal between TPP and the Lopez residence and stopping at identifiable locations or paced distances to make the necessary noise measurements. These measurement periods lasted about ten minutes at each location and are summarized in Table 3. One-third octave band measurements occurred at three locations: the two residences and on the bridge over the canal. These data are summarized in Figure 3.

4. Calibration

A Quest acoustic calibrator (model CA-12) was used before, during and after the recording periods with the noise monitors. A Brüel and Kjær calibrator (model 4230) was used with the automated measurement systems before and after their recording periods. The systems maintained their correct calibrations throughout the data acquisition period.

B. Procedure

The noise monitors and Larson-Davis devices were located near each other and near the two residences (LT-2, Lopez, and ST-5, Timmons) specified by the CEC. At LT-2 the microphones were located on a stack of concrete slabs between the residence and the canal road. At ST-5 the microphones were affixed to a wooden post on the northeast side of the residence. As noted above, the noise recording systems were calibrated before, during and after the recording period that began at both residences at about 7:00 PM on May 19, 2003 and ended at about 4:00 PM on May 21, 2003 when only a single turbine remained in operation at TPP.

After calibration, the microphones were temporarily affixed to tripods or posts so that the microphones were approximately five feet above ground level. The measurement systems were checked occasionally during the recording period to assure that they were operating correctly. In the case of the two monitors, at about 7:00 PM on May 20 the cassettes – with specified durations of 45 minutes – were recalibrated, turned over to side B, calibrated again and reactivated. This procedure was necessary to assure that enough recording tape was available to last to the end of the recording period, to check the status of the six-volt battery and change it as necessary, and to assure that the systems were operating properly.

An observer noted audible sounds. I-580 traffic noise was identified by direction and individual pass-bys of noisier vehicles, typically trucks.

C. Weather

During the three days of measurements the skies were clear with low humidity. Winds were calm to variable, generally coming from the northeast or northwest with subjectively estimated velocities of 0 to 8 mph. These ambient conditions are conducive to good sound transmission between TPP and the receptors.

Appendix B: Calculation of Noise Levels at 2600 Feet from TPP Using Octave Band Noise Levels at Intermediate Distances

Calculation of Noise at 2600 Feet Based on Measured Octave Band Sound Levels at 325 to 1225 from Tracy Peaker Plant

Location	Closer Distance &Delta Distance (feet)		Measured dBA	Octave Band Center Frequency of Measured Sound Levels 31	63	125	250	500	1000	2000	4000	8000	TPP Contri Calc.dBA at 2600 ft.
A,On Levee			62	73	71	61	55	56	57	57	48	35	
8:29 PM	325	20log(d/D)		-18.06	-18.06	-18.06	-18.06	-18.06	-18.06	-18.06	-18.06	-18.06	
20-May	2275	atm.attn		-0.694	-1.11	-1.872	-2.705	-4.09	-6.795	-11.79	-24.06	-40.22	
		A-wtd		-35	-25	-15	-8	-3	0	1	1	-1	
		dB sum=		19.244	26.828	26.066	26.233	30.848	32.143	28.151	6.8778	-24.28	36.9
B,on Levee			58	74	69	59	50	52	50	53	41	30	
Approx.8:20pm	500	20log(d/D)		-14.32	-14.32	-14.32	-14.32	-14.32	-14.32	-14.32	-14.32	-14.32	
20-May	2100	atm.attn		-0.641	-1.025	-1.728	-2.497	-3.776	-6.273	-10.88	-22.21	-37.12	
		A-wtd		-35	-25	-15	-8	-3	0	1	1	-1	
		dB sum=		24.039	28.655	27.952	25.183	30.904	29.407	28.8	5.4703	-22.44	36.8
C, on Levee			46	77	62	52	47	45	40	36	35	24	
8:10 PM	900	20log(d/D)		-9.215	-9.215	-9.215	-9.215	-9.215	-9.215	-9.215	-9.215	-9.215	
20-May	1700	atm.attn		-0.519	-0.83	-1.399	-2.021	-3.057	-5.078	-8.808	-17.98	-30.05	
		A-wtd		-35	-25	-15	-8	-3	0	1	1	-1	
		dB sum=		32.267	26.956	26.386	27.764	29.729	25.707	18.978	8.8062	-16.27	36.7
D, on Levee			44	62	58	55	46	42	37	29	24	23	
8:00 PM	1225	20log(d/D)		-6.537	-6.537	-6.537	-6.537	-6.537	-6.537	-6.537	-6.537	-6.537	
20-May	1375	atm.attn		-0.419	-0.671	-1.132	-1.635	-2.472	-4.107	-7.124	-14.54	-24.31	
		A-wtd		-35	-25	-15	-8	-3	0	1	1	-1	
		dB sum=		20.044	25.792	32.332	29.828	29.991	26.356	16.339	3.9213	-8.844	36.7
E, Lopez Res,LT-2 10:51am 21-May			40	52	49	43	36	36	35	24	21		
F, Timmons Res, ST-5 7:28 PM 20-May			47	50	58	49	38	36	36	29	25	22	
Atmospheric Attenuation in dB/100 ft				0.0305	0.0488	0.0823	0.1189	0.1798	0.2987	0.5181	1.0576	1.7678	