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**Attachment 14 to PLA-6219  
Sound Level Measurements Near  
Susquehanna Steam Electric Stationsite 1995.  
Operation Noise Progress Report**

*(NRC Document Request 49)*

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# **Acentech**

**Report No. 151**

**Sound Level Measurements Near Susquehanna  
Steam Electric Station Site 1995**

**Operation Noise Progress Report**

**E. W. Wood and J. D. Barnes**

**September 1995**

**Prepared for:  
Pennsylvania Power and Light Company  
Two North Ninth Street  
Allentown, PA 18101**

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## 1. INTRODUCTION

Pennsylvania Power and Light Company (PPL) sponsored an annual environmental noise monitoring program before construction, during construction, and during initial operation of the Susquehanna Steam Electric Station (Susquehanna SES). The sound monitoring program was started in 1972 to document the local ambient sound levels prior to station construction and continued until 1985, when both generating units were operating. This is the twelfth report in the series of progress reports that present the results of the environmental noise measurements obtained in the vicinity of the site. The first seven reports in this series summarize the pre-construction and construction noise measurements obtained in the years 1972 through 1981. The eight and ninth reports present acoustical data obtained during 1982 and 1983 while Unit 1 was in the operational phase and Unit 2 was in the latter stages of construction. Acoustical data presented in the tenth report was obtained during 1984 while Unit 1 was operating and Unit 2 was in the precommercial operation phase. The eleventh report presents acoustical data obtained during 1985 while both units were operating. The environmental noise monitoring program was then discontinued during the years 1986 until 1994.

PPL was recently granted approval to increase station generating power by 5%, from 3293 to 3441 MW<sub>t</sub>(Thermal). The power increase was completed during the spring of 1995. This report summarizes acoustical measurements and observations obtained by Acentech Incorporated during the week of 12 - 15 June 1995 while both units were operating at increased power. The measurement results reported here update the acoustical description of the environment near the station site during operation at increased power and provide sufficient data for the Susquehanna SES Annual Operating Report.

The authors of this report participated in the previous noise monitoring program conducted at the Susquehanna SES. Similar to the procedures for conducting the previous surveys, Acentech selected and reviewed the community noise measurement locations for consistency with previous measurement locations and to verify that they continue to represent the existing land uses in areas near the Susquehanna SES. The dominate noise sensitive land uses near the site remain rural and low density residential housing. The selected measurement locations consider on-site noise sources and nearby off-site noise sources in addition to topographical barriers. For the purpose of satisfying the requirements of PPL's Environmental Protection Plan (EPP) Non-Radiological, dated 17 July 1982, Acentech again selected three locations near the site for primary measurements and two locations farther from the site for secondary measurements. In addition, five locations distant from the site that were employed in previous surveys were also retained for supplemental measurements. The distances from the center of the station to the ten measurement locations ranges from approximately one-half mile to three miles.

During the week of 12 - 15 June 1995 while the acoustical measurements were obtained, Unit 2 operated at 100% of rated load, and Unit 1 also operated at 100% of rated load except from 2100 hours till midnight on 14 June and midnight till 1900 hours on 15 June when Unit 1 operated at

95.6% of rated load. The makeup water flow rate to both cooling towers during the survey was approximately 34,500 gallons per minute.

A total of approximately 1000 people are employed and work onsite for the operation of Units 1 and 2. This includes office and administration, plant operation, and security personnel. The number of people working onsite increases during times of scheduled outages, which last between one and two months. No substantial construction activity and little or no outdoor maintenance activity other than lawn mowing was observed during the 1995 survey period.

The weather conditions varied during the measurement period and ranged from overcast to generally clear skies, daytime temperatures ranged from about 60 to 80 degrees F and nighttime temperatures ranged from about 50 to 60 degrees F. Ground level wind conditions during the measurements ranged from calm to about 8 mph from the northwest. Monday morning and afternoon prior to the measurements included rain. During the measurement period, rain only occurred for about two hours on Wednesday afternoon (14 June 1995).

Figure 1 shows the three primary and two secondary measurement locations near the site. A photograph of the main power block, taken in the early 1990's with both units in commercial operation is presented in Figure 2.

The field measurement and instrument calibration techniques employed in the June 1995 survey were generally similar to those used in the previous 1982, 1983, 1984, and 1985 operating noise surveys. During the 1995 survey, the noise measurement samples were processed and digitized in the field whereas during the earlier surveys measurement samples were recorded on magnetic tape for later processing in the laboratory. The individual measurement samples collected during 1995 are being maintained and stored in electronic format on computer disks similar to the earlier samples that were maintained on magnetic tape.

Table 1 lists the measurement instrumentation used during the 1995 survey and provides the most recent calibration dates for the instruments. Each of these instruments were selected to be appropriate for the required measurements. They conform to applicable standards published by the American National Standards Institute<sup>1, 2</sup> (ANSI) and meet applicable portions of the Society of Automobile Engineers<sup>3</sup> (SAE) recommended sound data acquisition methods. Acoustical calibrations that are performed periodically in the laboratory are traceable to the National Institute of Standards and Technology (NIST).

At each primary location illustrated in Figure 1, 24-hour duration measurements were obtained continuously with a sound level monitor. A-weighted sound levels were sampled at the rate of 32 times per second during each 24-hour monitoring period. These measured data were processed to yield statistical sound levels and equivalent sound levels during daytime and nighttime periods.

<sup>1</sup>ANSI S1.4 - 1971 (R1983) American National Standard for Sound Level Meters

<sup>2</sup>ANSI S1.11 - 1966 (R1986) American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets

<sup>3</sup>SAE J184A-1970 (R1978) Qualifying a Sound Data Acquisition System

Octave band sound pressure levels and A-weighted sound levels were sampled at each primary and secondary location illustrated in Figure 1. These samples were obtained at the rate of twice per second during seven ten-minute periods in the morning, afternoon, evening and nighttime at each of the three primary and two secondary measurement locations. These measured data were also processed to yield statistical and equivalent sound levels.

In addition, a narrow-band frequency spectrum measurement was obtained at each primary and secondary location. Also, audible sound sources and weather conditions were noted during the measurement periods.

In addition, to collecting measurements at the primary and secondary locations, octave band sound pressure level and A-weighted sound level measurements were obtained during ten minute periods at the five supplemental locations illustrated in Figure Q-1 of Appendix Q. These supplemental measurement locations are within 1 to 3 miles of the Susquehanna SES.

The following sections of this report present the pertinent results of the sound level measurements.

## 2. SOUND LEVEL MEASUREMENTS AT PRIMARY AND SECONDARY LOCATIONS

Continuous sound level measurements during 24-hour periods were obtained at the primary locations 2', 3, and 4 shown in Figure 1. The sound levels and sound sources noted during the 1995 survey are generally similar to those reported during the 1985 and 1984 operational surveys. Table 2 summarizes the sound level data collected at these locations and presents the L90, L10, Leq and range of sound levels for the daytime and nighttime periods. Also summarized in Table 2 are the measured Ldn sound levels. Notes presented at the bottom of the table explain the various sound level descriptors and how the data were averaged. The octave-band sound pressure level data measured at these primary locations are presented in Appendix P along with lists of the sound sources noted during the measurements.

The daytime Leq sound levels at the three primary locations ranged from 46 to 48 dBA, while the nighttime Leq values ranged from 45 to 49 dBA. The 24-hour Leq sound level was 47 dBA at each primary location and the 24-hour Ldn sound levels ranged from 52 to 55 dBA. It was observed that the background sound level at the measurement locations was often controlled by off-site sources such as insects and traffic, and that on-site sources such as transformers and cooling towers were also audible at the nearest locations. Specific sources of sound noted during the measurements are listed in Appendix P along with the octave-band sound pressure level data.

Figure 1 also shows the secondary measurement locations 5 and 7 where additional sound measurements were obtained during ten-minute sampling periods. These secondary locations are farther from Susquehanna SES than are the three primary locations. Table 3 summarizes the measurements obtained at the secondary locations and includes notes describing how the data were averaged. The daytime Leq sound levels at the two secondary locations ranged from 40 to 43 dBA, while the nighttime Leq values ranged from 34 to 39 dBA. The 24-hour Leq sound levels ranged from 39 to 42 dBA at the secondary locations and the 24-hour Ldn sound levels ranged from 42 to 46 dBA. It was noted that local sound sources, including insects and traffic, generally controlled the background sound levels at these locations. The octave-band sound pressure level data measured at these secondary locations are presented in Appendix P along with lists of the sound sources noted during the measurements.

Tonal sounds were noted when produced by the Susquehanna SES and noticeable at off-site locations. The two sources of tonal sound that continue to be audible are the transformers in the southwest switchyard and the cooling towers near the west side of the main plant. Figures 3 through 7 present A-weighted narrowband sound pressure level data that were measured at the primary and secondary locations. Figure 3, for example, illustrates the tonal sound produced by the cooling towers at 115 Hz and the tonal sound produced by the transformers at 240 Hz that were measured at Location 2'.

### 3. SUPPLEMENTAL SOUND LEVEL MEASUREMENTS

As during previous surveys, supplemental acoustical measurements were obtained at five locations quite distant from the site. These measurements were performed to increase the existing data base of background sound level measurements for locations up to five miles from the site. Figure Q-1 in Appendix Q shows the supplemental measurement locations where ten-minute duration sound level samples were obtained. The statistical sound level data, notes on sound sources that were observed during the measurements, and a legend are also presented in Appendix Q, in the same format as Appendix P.

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#### 4. ASSESSMENT

The Susquehanna Steam Electric Station office of the Special Assistant to the President was contacted to identify and review any complaints that community members may have made regarding noise from the station. The Special Assistant indicated that no noise complaints have been received. Discussions with a residential neighbor living near the station indicates that the station noise is sometimes noticeable but is not considered to be objectionable. Also, the June 1995 acoustical measurements obtained during increased power operation and reported here are generally similar to previously reported measurements obtained during station operation in 1984 and 1985. Based on this information, and the measured acoustical data and observations reported here, no reason can be found to recommend additional noise control treatments be installed at this time.

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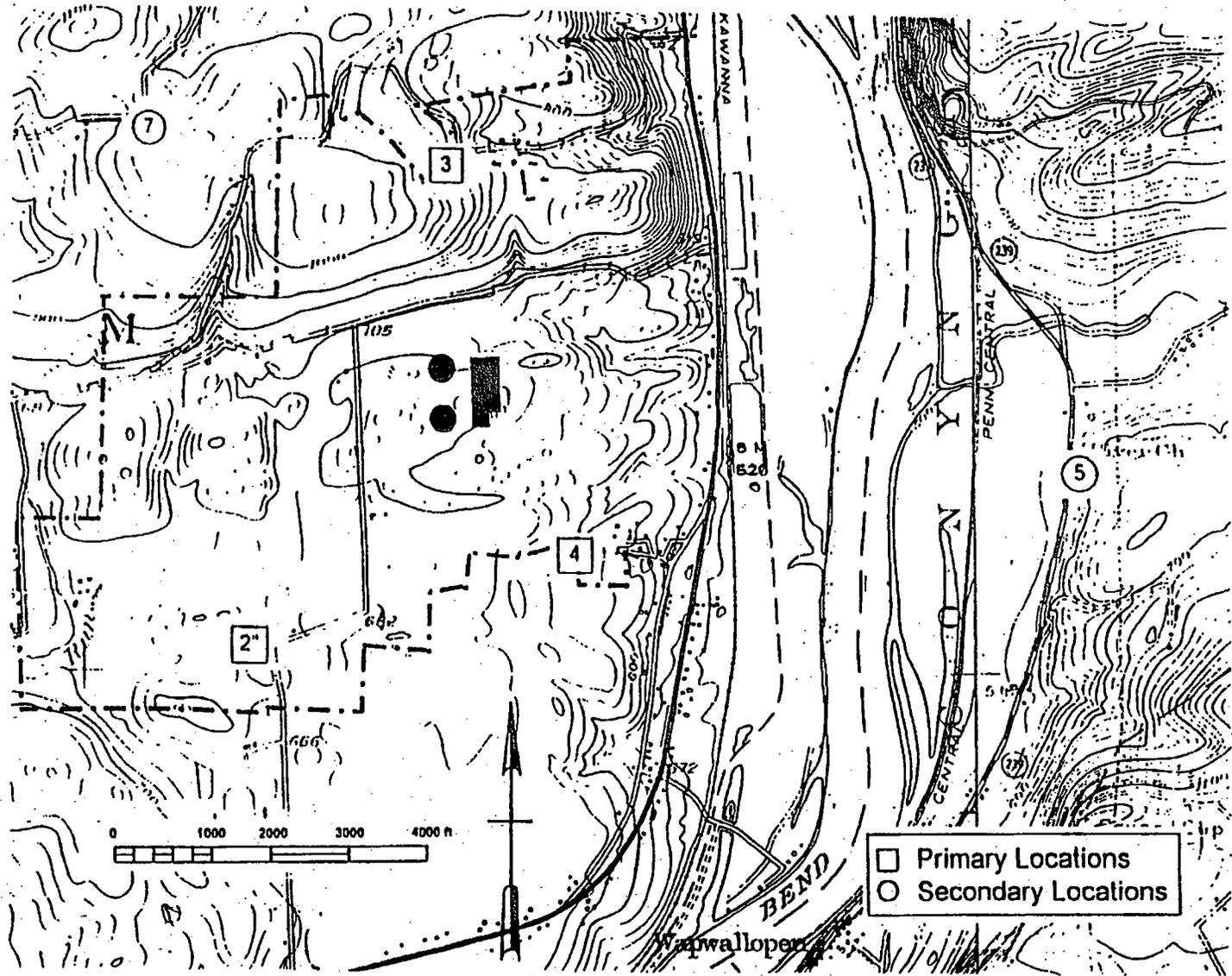
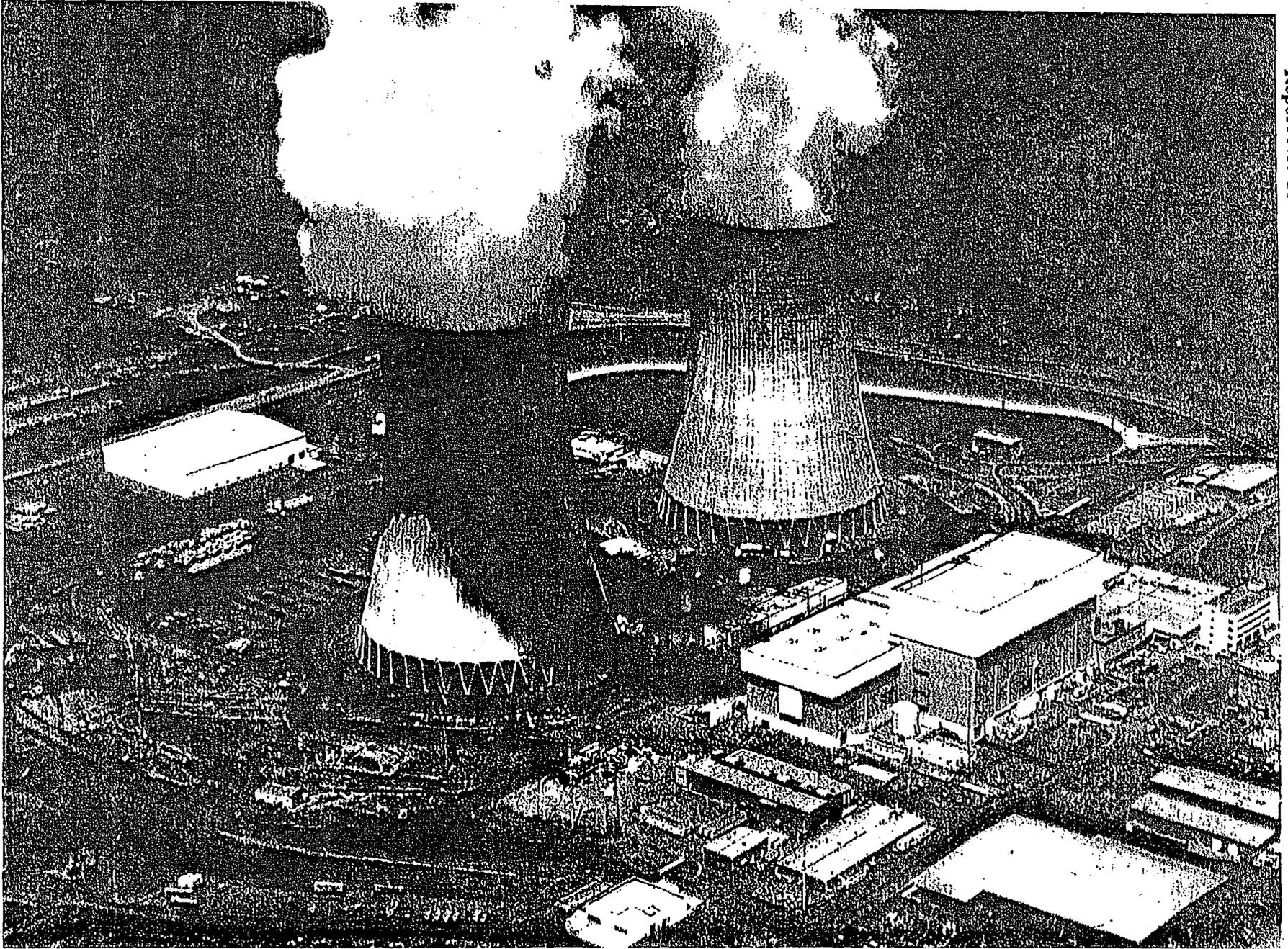


Figure 1. Map of General Area Near the Susquehanna SES Site Showing Primary and Secondary Sound Level Measurement Locations and Approximate Site Property Lines.



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Figure 2. Photograph of Main Station Complex Taken During Early 1990's. View Towards the Northwest.

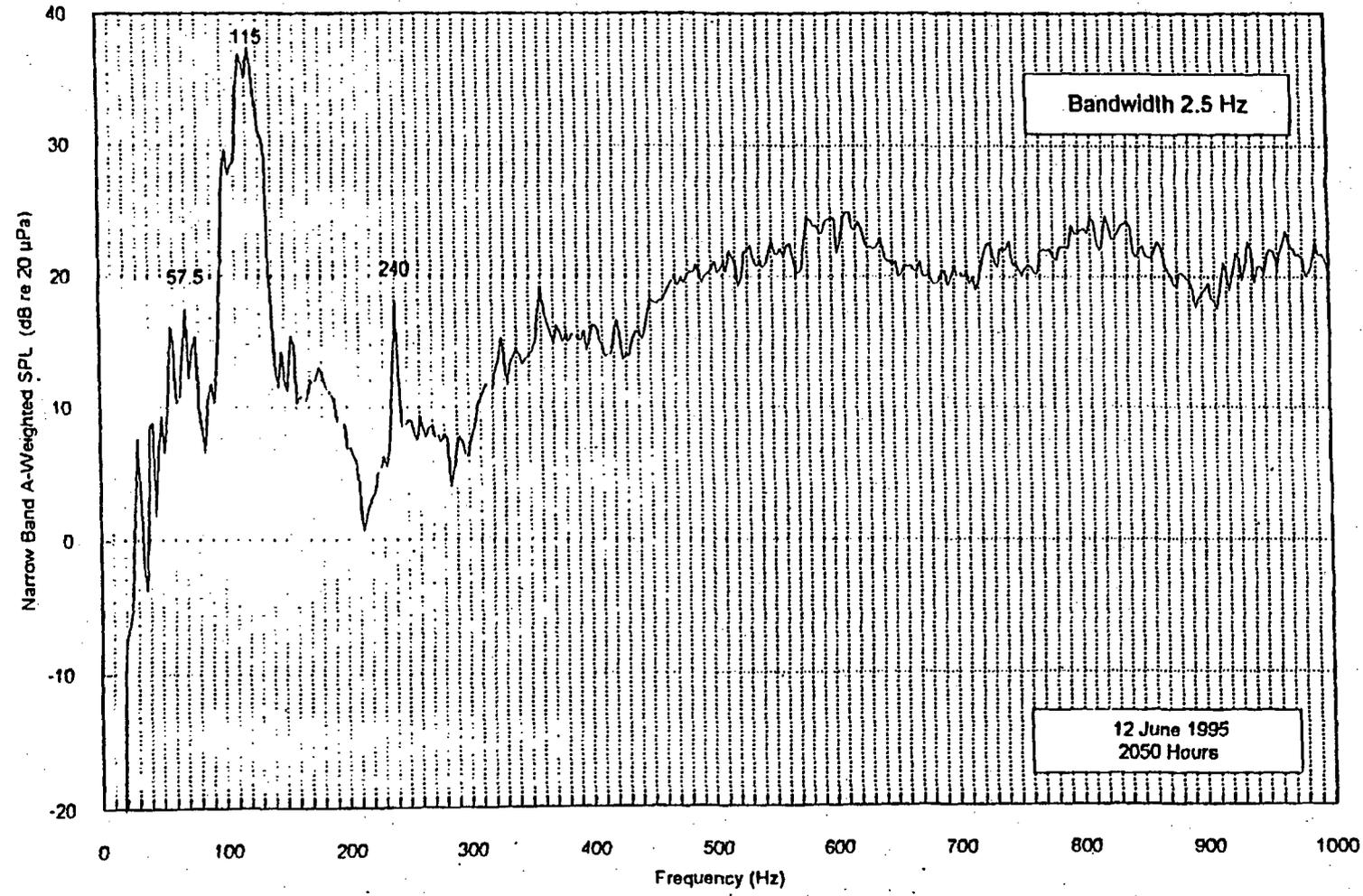


Figure 3. Narrowband A-weighted Sound Pressure Levels Measured at Location 2" - 1995 operation.

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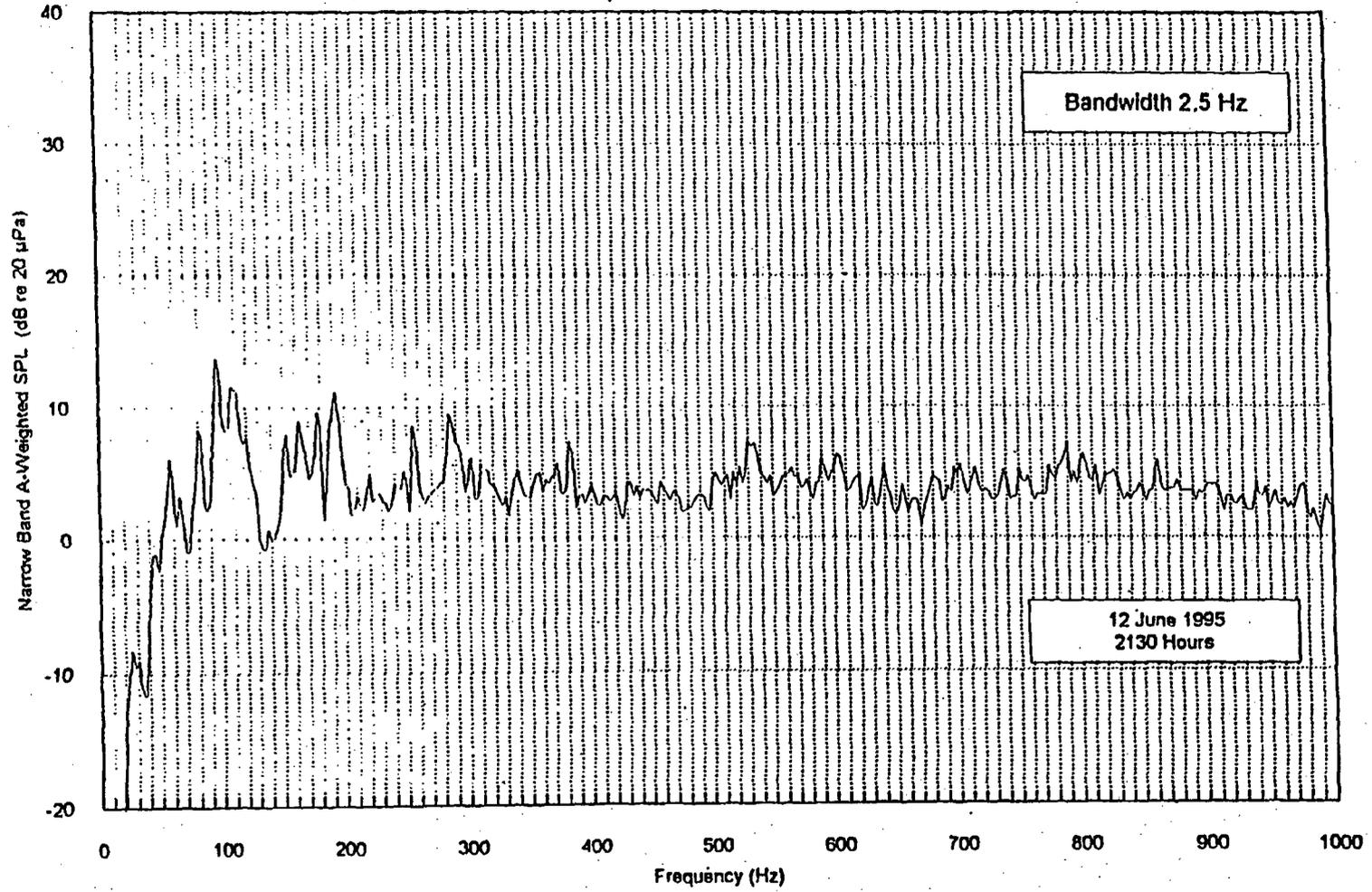


Figure 4. Narrowband A-weighted Sound Pressure Levels Measured at Location 3 -1995 Operation.

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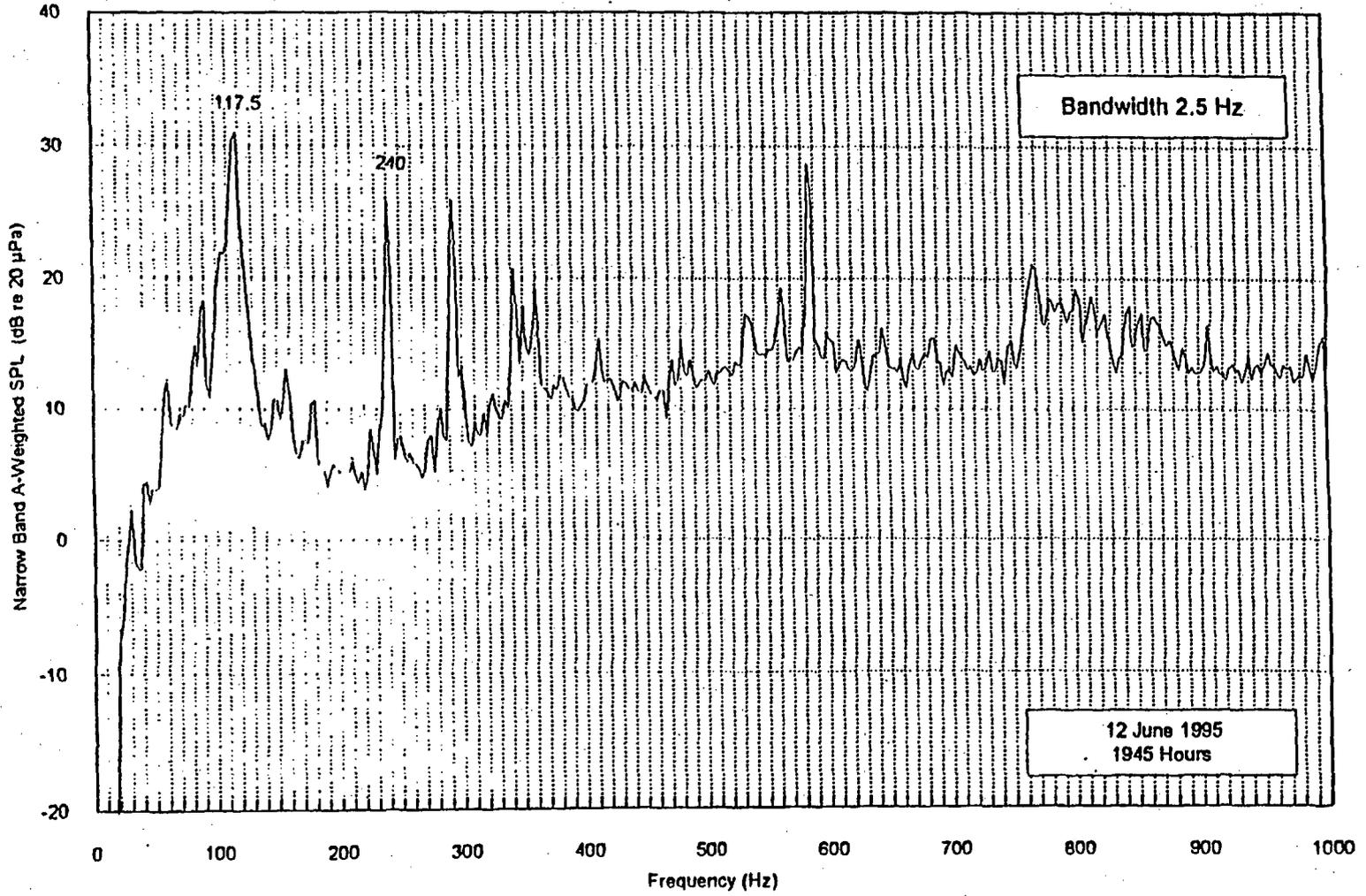


Figure 5. Narrowband A-weighted Sound Pressure Levels Measured at Location 4 - 1995 Operation.

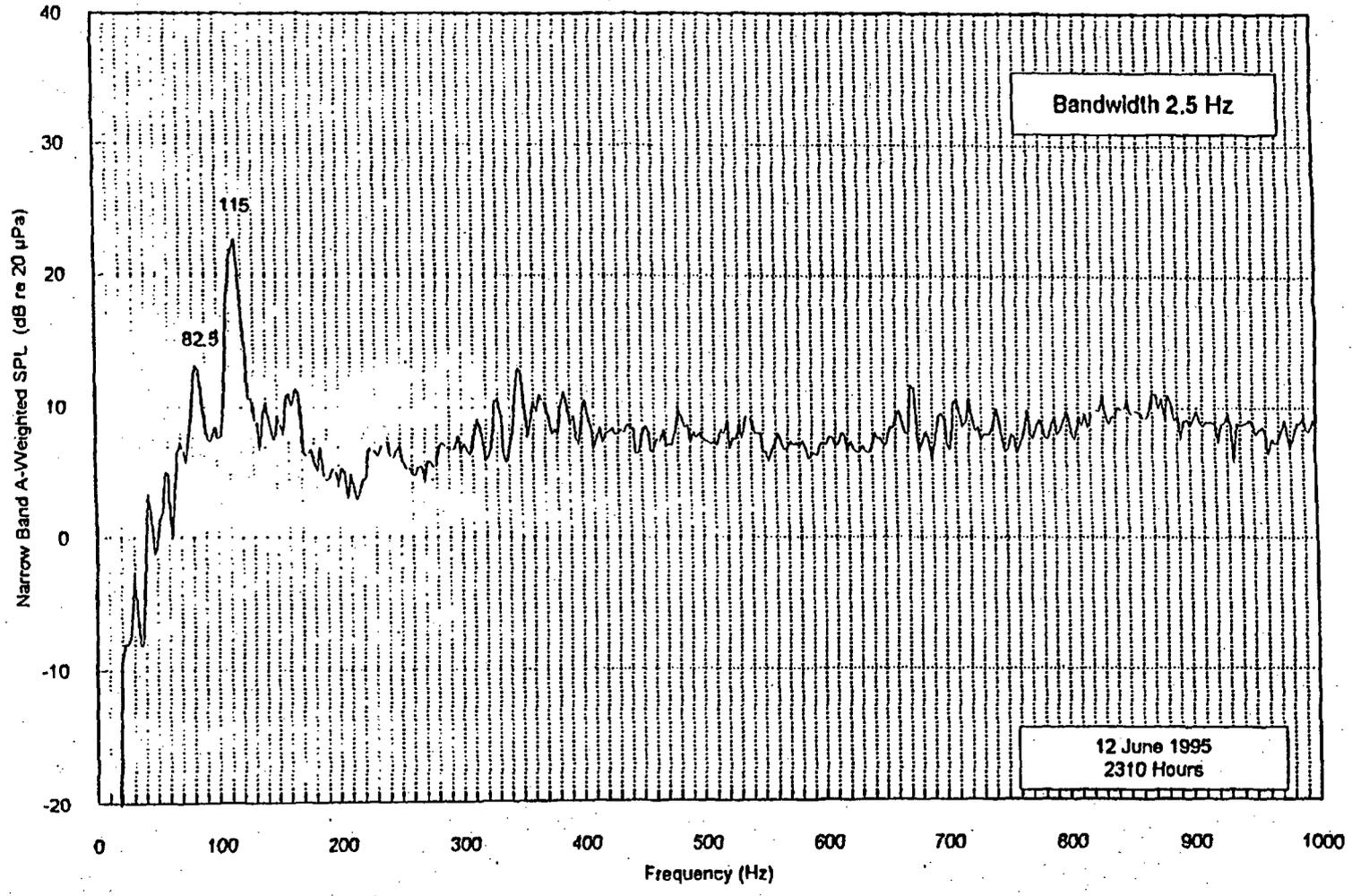


Figure 6. Narrowband A-weighted Sound Pressure Levels Measured at Location 5 - 1995 Location.

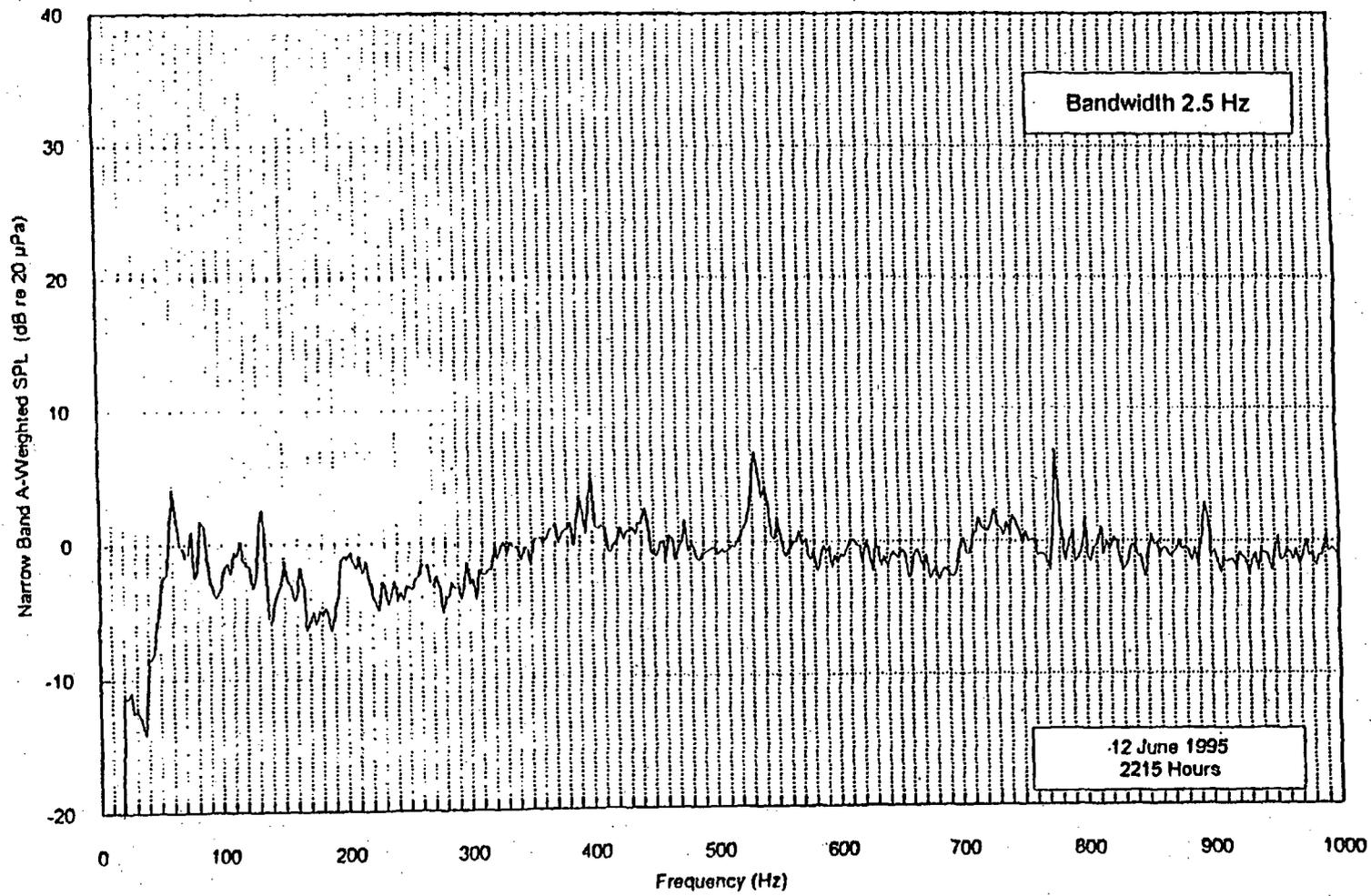


Figure 7. Narrowband A-weighted Sound Pressure Levels Measured at Location 7 - 1995 Operation.

**Table 1. List of Instruments Used During 1995 Sound Monitoring Survey and Dates of Most Recent Laboratory Calibration.**

Survey Dates	Type	Make	Model	Serial Number	Typical Calibration Schedule	Recent Calibration Date
6/12/95	SLM/OBF	R	29E	10810382	Annual	4/5/95
	NBSA	R	SA-77	10510575	Annual	8/3/94
	SLC	BK	4230	584522	Annual	4/5/95
	SLC	BK	4230	442056	Annual	4/3/95
	PSMS	LD	870A	0159	Annual	4/12/95
to	PA	GR	1560-P42	SO156	Annual	7/8/95
	M	GR	1662-9610	11992	Annual	7/8/95
	PSMS	LD	870A	0160	Annual	5/2/95
	PA	GR	1560-P42	TD109	Annual	1/23/95
	M	GR	1962-9601	6488	Annual	1/23/95
6/15/95	SLC	GR	1987	9387069017	Annual	11/30/94

**Instrument Type:**

- SLM/OBF - Sound Level Meter and Octave Band Filters
- NBSA - Narrow-Band Spectrum Analyzer
- SLC - Sound Level Calibrator
- PSMS - Portable Sound Monitor System
- PA - Preamplifier
- M - Microphone

**Instrument Manufacturer:**

- R - Rion
- BK - Bruel & Kjaer
- LD - Larson Davis
- GR - GenRad

Table 2. Summary of Continuous Sound Level Measurements at Primary Locations Near Susquehanna SES - 1995 Operation (dBA)

Loc.	Date and Time*	Daytime (0700 - 2200 hours)				Nighttime (2200-0700 hours)				24-hours	
		Back-ground L90	Intrusive L10	Equiv. Leq	Range L99 to L1	Back-ground L90	Intrusive L10	Equiv. Leq	Range L1 to L99	Equiv. Leq	Day-Night Ldn
2''	6/13 @ 10:15 6/14 @ 12:45	41	49	46	39-54	44	49	49	42-53	47	55
3	6/14 @ 13:15 6/15 @ 14:40	36	49	48	35-57	34	41	45	32-48	47	52
4	6/12 @ 19:45 6/14 @ 13:50	41	48	47	39-54	35	43	45	33-50	47	52

\*Date and time of continuous 24-hour measurements at primary sampling locations.

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Notes:

- L90 is defined as the sound level that is exceeded during ninety percent of the sampling time period. Similarly, L10 is defined as the sound level exceeded during ten percent of the sampling time period. Data were measured continuously during each hour and the arithmetic average of the daytime and nighttime L90 and L10 data are presented in this table.
- Leq is defined as the energy average or equivalent sound level for the sampling time period. The energy average of the hourly Leq values for the daytime and nighttime periods are presented in this table.
- L99 and L1 are defined as the sound levels that are exceeded during ninety-nine and one percent of the sampling time period, respectively. The range of the measured L99 and L1 sound level values are presented in this table.
- Leq24 is the energy average or equivalent sound level during a 24-hour period. Ldn is defined similarly, and includes a weighting factor of +10 dBA during nighttime hours.

**Table 3. Summary of Intermittent Sound Level Measurements At Secondary Locations Near Susquehanna SES Site - 1995 Operations (dBA)**

Loc.	Date and Time*	Daytime (0700 - 2200 hours)				Nighttime (2200-0700 hours)				24-hours	
		Back-ground L90	Intrusive L10	Equiv. Leq	Range L99 to L1	Back-ground L90	Intrusive L10	Equiv. Leq	Range L1 to L99	Equiv. Leq	Day-Night Ldn
5	6/12 - 6/15	39	49	43	35-60	35	44	39	34-53	42	46
7	6/12 - 6/15	36	44	40	33-52	32	35	34	31-37	39	42

\*Dates during which measurements were made at secondary sampling locations.

Notes:

- L90 is defined as the sound level that is exceeded during ninety percent of the sampling time period. Similarly, L10 is defined as the sound level exceeded during ten percent of the sampling time period. This table presents the arithmetic average of the L90 and L10 samples measured during the daytime and nighttime periods.
- Leq is defined as the energy average or equivalent sound level for the sampling time period. This table presents the energy average of the Leq samples measured during the daytime and nighttime periods.
- L99 and L1 are defined as the sound levels that are exceeded during ninety-nine and one percent of the sampling time period, respectively. The range of the measured L99 and L1 sound level values are presented in this table.
- Leq24 is the energy average or equivalent sound level during a 24-hour period. Ldn is defined similarly, and includes a weighting factor of +10 dBA during nighttime hours.
- Since the values presented in this table are calculated based on intermittent samples, they are considered estimates for the daytime and nighttime periods.
- Measured sound levels at these positions were controlled by non-station sources. Sound sources are listed in Appendix.

**APPENDIX P**

**INTERMITTENT SOUND LEVEL DATA - JUNE 1995 OPERATION**

**(Sound Pressure Levels dB re: 20 Micropascals)**

**SOUND SOURCE LEGEND FOR  
INTERMITTENT SOUND LEVEL SAMPLES IN TABLE P**

a	aircraft
b	birds
ba	backup alarms
c	cow
ch	children
ct	cooling tower
d	dog barking
eng	engine powered eq
i	insects
j	jackhammer
m	lawn mowing
p	page system
t	local traffic
t(a)	traffic on plant access road
t(d)	distant traffic
t(11)	traffic on Route 11
tfr	transformer
tra	tractor
trn	train
s	shooting
w	wind in brush/trees
99%	
95%	
90%	percent of sample period
50%	sound level was exceeded
10%	
5%	
1%	
Leq	energy average sound level
OA	overall sound level
dBA	A-weighted sound level

Note that the sound produced by insects during the June 1995 monitoring survey continues to be a major contributor to the A-weighted sound level data measured in the vicinity of the Susquehanna SES.

**Table P. Intermittent Sound Level Data - June 1995 Operation  
(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 2" SSES-2 20:50 hours 12 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	51	53	54	34	37	38	34	30	17	58	44	
95%	52	54	56	34	38	38	35	30	17	59	45	
90%	52	54	57	34	38	39	35	31	17	60	46	
50%	53	56	59	36	40	41	37	33	19	61	47	
10%	55	57	61	38	42	43	38	35	23	63	48	
5%	55	58	61	39	43	44	39	35	25	64	49	
1%	55	59	62	42	44	44	39	37	29	65	49	
Leq	53	56	59	37	41	41	37	33	21	62	47	

Sound Sources: i, ct, t(d), trf

LOCATION 2" SSES-6 10:15 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	51	53	49	35	33	33	30	25	19	56	40	
95%	52	53	50	36	34	34	30	27	21	57	41	
90%	53	54	50	36	35	35	31	28	23	57	42	
50%	54	55	53	39	38	37	33	33	30	59	44	
10%	57	56	56	42	42	39	35	41	37	61	49	
5%	57	59	58	43	49	41	36	44	41	63	52	
1%	58	63	66	47	56	44	44	50	48	69	54	
Leq	55	56	55	40	43	37	34	38	36	60	45	

Sound Sources: i, ct, L, a, b, trf

LOCATION 2" SSES-14 22:40 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	50	51	47	32	37	36	30	23	16	55	41	
95%	51	53	48	33	38	37	31	23	16	56	41	
90%	52	54	51	33	38	37	31	24	16	57	42	
50%	53	57	56	35	39	39	32	25	17	61	44	
10%	55	59	58	45	42	40	34	29	19	63	46	
5%	55	61	59	47	43	41	34	29	20	64	47	
1%	56	64	60	54	44	41	35	31	22	66	49	
Leq	53	58	56	42	40	39	32	26	18	61	44	

Sound Sources: i, ct, a

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

**LOCATION 2" SSES-17 10:15 hours 14 June 1995**

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	47	40	27	25	25	25	26	20	52	35	
95%	50	47	40	28	25	26	27	28	21	52	35	
90%	50	47	41	28	26	26	27	29	22	52	36	
50%	51	49	42	31	27	28	30	33	28	54	39	
10%	53	54	47	36	33	33	34	39	35	57	43	
5%	54	56	51	39	36	36	36	41	37	59	47	
1%	61	62	61	53	51	52	47	48	43	67	55	
Leq	52	52	48	40	37	39	34	37	32	56	39	

Sound Sources: i, b, ct, t, a

**LOCATION 2" SSES-19 12:45 hours 14 June 95**

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	45	35	27	24	22	22	27	20	51	34	
95%	49	46	36	27	24	23	24	29	23	51	35	
90%	49	46	37	28	24	23	25	31	24	51	36	
50%	51	48	42	32	27	27	29	36	30	53	40	
10%	54	52	47	40	34	33	34	42	38	57	45	
5%	57	57	51	42	37	36	36	43	40	60	47	
1%	66	64	62	49	42	46	42	46	41	69	52	
Leq	54	56	49	38	34	35	33	38	33	58	40	

Sound Sources: i, ct, b, t, a

**LOCATION 2" SSES-27 19:00 hours 14 June 1995**

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	50	43	31	36	35	28	25	19	53	40	
95%	49	51	44	32	37	36	29	26	20	54	40	
90%	49	52	45	32	37	36	30	27	21	54	41	
50%	51	55	49	34	39	37	31	34	29	58	43	
10%	53	59	52	39	41	39	34	43	41	61	47	
5%	54	60	53	42	43	40	37	44	42	62	49	
1%	64	64	56	48	48	45	42	47	47	68	53	
Leq	53	57	50	38	40	38	33	38	37	59	44	

Sound Sources: ct, i, b, a, t, w

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 2" SSES-32 13:25 hours 15 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	47	38	29	29	26	23	24	20	51	35	
95%	49	47	39	29	29	27	24	26	22	52	36	
90%	50	48	40	29	30	27	25	27	24	52	36	
50%	52	50	43	31	31	29	28	33	29	54	39	
10%	54	55	46	36	33	34	33	42	36	58	44	
5%	55	57	47	37	34	36	35	43	38	60	45	
1%	56	62	49	39	35	38	38	44	40	63	46	
Leq	52	52	44	33	31	31	30	37	32	56	40	

Sound Sources: i, b, ct, a, gs

LOCATION 3 SSES-3 21:30 hours 12 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	41	34	28	25	20	19	18	16	50	30	
95%	49	42	35	29	25	20	21	21	17	50	32	
90%	49	42	36	30	26	21	22	23	17	50	33	
50%	49	45	39	34	31	25	27	28	17	51	36	
10%	51	50	47	42	38	32	31	31	19	55	40	
5%	52	51	49	45	42	34	31	32	21	56	43	
1%	53	55	50	51	46	37	32	32	25	59	47	
Leq	50	47	43	39	36	28	28	28	18	53	36	

Sound Sources: i, i(11), a

LOCATION 3 SSES-7 11:00 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	42	33	28	27	26	27	29	23	50	35	
95%	49	43	34	28	28	27	28	30	24	50	37	
90%	49	43	35	29	28	27	29	32	25	51	38	
50%	49	44	37	32	33	31	34	36	30	51	41	
10%	49	46	41	38	38	37	39	44	38	53	48	
5%	50	46	42	39	39	39	41	47	41	54	50	
1%	53	50	45	43	43	42	44	51	42	57	53	
Leq	50	46	38	34	35	34	36	41	34	52	42	

Sound Sources: i, t, b, w.

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

**LOCATION 3 SSES-12 19:00 hours 13 June 1995**

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	38	32	27	25	24	26	28	20	50	34
95%	49	38	33	27	26	24	28	29	21	50	36
90%	49	39	33	28	26	25	29	30	22	50	36
50%	49	41	37	31	28	27	35	40	29	51	43
10%	49	45	48	39	31	29	43	46	39	54	49
5%	51	47	52	43	32	30	44	47	40	56	50
1%	55	52	55	49	34	34	46	49	43	60	52
Leq	50	43	44	37	29	28	39	42	34	52	43

Sound Sources: i, b, ct, a

**LOCATION 3 SSES-15 23:15 hours 13 June 1995**

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	40	32	22	21	18	15	17	16	50	26
95%	49	41	33	23	21	19	16	18	17	50	27
90%	49	42	33	24	22	19	16	18	17	50	28
50%	49	44	36	29	27	23	18	19	18	51	31
10%	49	47	44	37	34	28	22	23	19	52	36
5%	49	49	46	44	35	29	23	23	21	53	38
1%	51	53	47	47	37	32	28	28	25	56	40
Leq	49	45	39	36	29	25	20	21	19	51	31

Sound Sources: a, i

**LOCATION 3 SSES-20 13:15 hours 14 June 1995**

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	40	33	24	22	22	23	27	22	50	32
95%	49	41	34	24	23	22	25	28	23	50	33
90%	49	41	34	25	23	22	26	29	23	50	34
50%	49	42	36	26	24	24	33	37	26	51	40
10%	49	44	38	32	27	26	41	43	32	52	46
5%	49	44	40	34	29	28	42	44	34	52	48
1%	49	45	42	38	32	31	44	46	38	53	50
Leq	49	43	36	29	26	25	37	39	29	51	40

Sound Sources: i, b, ct

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 3 SSES-25 18:10 hours 14 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	42	37	26	24	22	25	31	23	50	35	
95%	49	43	37	27	24	22	26	32	24	51	36	
90%	49	43	37	27	24	23	28	32	25	51	37	
50%	49	45	40	30	26	24	36	38	27	51	43	
10%	49	47	44	37	31	27	43	47	36	54	49	
5%	49	48	45	40	33	30	44	49	40	55	51	
1%	53	49	49	44	35	36	46	51	42	58	53	
Leq	50	45	41	34	28	26	39	43	32	52	43	

Sound Sources: i, b, ct

LOCATION 3 SSES-34 14:40pm 15 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	39	32	27	26	24	25	25	21	50	33	
95%	49	39	33	28	27	26	26	26	21	50	34	
90%	49	40	34	28	27	26	27	27	22	50	35	
50%	49	45	40	33	30	27	31	32	25	51	38	
10%	50	53	49	44	37	31	34	38	31	56	43	
5%	51	54	51	46	39	33	36	41	33	58	46	
1%	54	58	53	49	43	41	41	45	36	61	49	
Leq	50	49	44	39	34	31	33	35	28	53	39	

Sound Sources: a, i, b, t

LOCATION 4 SSES-1 19:45 hours 12 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	48	47	34	31	32	29	24	18	53	39	
95%	50	49	49	34	32	32	30	26	18	54	40	
90%	50	49	50	35	32	33	31	27	19	55	40	
50%	52	52	53	37	35	36	34	31	21	57	43	
10%	55	59	56	42	41	41	38	36	25	62	46	
5%	57	60	56	44	43	43	39	37	26	63	47	
1%	58	62	57	49	44	46	41	39	27	65	48	
Leq	53	55	53	39	38	38	35	33	22	59	43	

Sound Sources: trf, b, t(11), pt, i, a

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 4 SSES-10 16:15 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	51	52	49	37	34	36	32	25	21	55	42	
95%	52	53	50	38	35	38	33	27	21	56	43	
90%	52	53	50	38	35	38	34	28	22	57	43	
50%	54	56	53	40	38	42	38	31	24	60	46	
10%	60	62	56	44	43	51	45	37	29	65	53	
5%	62	66	57	47	44	53	48	40	31	68	56	
1%	66	74	60	56	52	58	52	45	37	75	59	
Leq	57	61	54	43	41	47	42	35	27	63	47	

Sound Sources: i, b, t, w

LOCATION 4 SSES-13 22:15 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	47	44	32	34	34	27	20	16	52	38	
95%	50	48	45	33	35	34	28	21	16	53	38	
90%	50	49	46	34	35	35	29	21	16	54	39	
50%	52	52	50	36	38	37	31	24	17	56	42	
10%	57	57	54	41	42	42	37	28	19	61	46	
5%	58	59	55	44	44	44	39	30	21	63	48	
1%	61	62	57	46	47	46	42	32	25	65	49	
Leq	54	54	51	38	40	39	34	25	18	58	42	

Sound Sources: t(11), trf, i, tm, pt

LOCATION 4 SSES-16 9:30 hours 14 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	52	50	43	30	28	29	27	23	18	54	36	
95%	52	51	44	31	30	30	28	25	19	55	37	
90%	53	52	45	32	30	31	29	26	19	56	38	
50%	55	55	47	35	33	35	33	31	23	59	41	
10%	60	61	53	40	38	40	37	37	28	64	45	
5%	62	64	55	41	40	42	38	38	29	66	47	
1%	64	66	58	45	43	44	41	43	44	69	50	
Leq	57	58	50	37	35	37	34	34	31	61	41	

Sound Sources: t(11), b, i, trf.

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

**LOCATION 4 SSES-22 14:30 hours 14 June 1995**

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	51	50	42	37	30	31	29	24	18	54	38
95%	52	51	43	38	31	32	30	25	19	55	39
90%	52	51	44	38	32	33	31	26	19	55	40
50%	58	56	47	41	38	37	35	31	23	61	43
10%	66	61	54	48	47	49	49	46	41	67	55
5%	67	64	59	51	50	50	50	48	44	69	57
1%	72	72	68	60	55	53	53	51	47	76	59
Leq	64	61	57	53	48	44	43	41	36	67	45

Sound Sources: i, b, trf, t(11), a

~~LOCATION 4 SSES-26 18:30 hours 14 June 1995~~

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	45	41	38	31	30	28	25	19	52	38
95%	49	46	42	39	33	32	29	26	20	52	39
90%	50	48	42	39	33	33	30	27	21	53	39
50%	52	53	47	40	37	37	35	31	25	56	43
10%	58	61	52	43	44	45	43	40	33	63	51
5%	60	63	53	45	47	48	50	42	37	65	54
1%	62	66	55	49	57	59	59	50	45	69	65
Leq	55	57	48	42	46	47	46	38	32	60	44

Sound Sources: trf, b, i, t(11), pt

**LOCATION 4 SSES-30 9:45 hours 15 June 1995**

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	50	50	43	30	28	30	30	28	20	54	38
95%	51	51	44	31	29	30	32	30	21	55	40
90%	52	52	45	32	30	31	33	31	21	55	41
50%	54	56	47	35	33	34	38	36	25	59	44
10%	59	61	53	41	40	39	47	45	29	64	51
5%	60	62	54	48	42	40	49	47	32	65	53
1%	62	65	57	58	49	43	51	50	39	68	55
Leq	56	58	49	44	37	35	42	41	28	61	45

Sound Sources: eng, trf, t(11), i, b, a

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation  
(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 5 - SSES-5 23:10 hours 12 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	41	38	32	29	27	23	24	16	50	34	
95%	49	42	39	33	30	28	24	25	16	51	35	
90%	49	42	40	33	31	28	25	26	16	51	35	
50%	49	45	44	35	35	33	28	29	18	52	38	
10%	52	51	48	39	39	40	37	32	22	56	44	
5%	54	54	49	41	40	43	41	33	24	58	47	
1%	57	59	55	45	44	48	48	39	30	62	53	
Leq	50	49	46	37	36	38	36	31	21	54	39	

Sound Sources: t, i, ct, t(11)

LOCATION 5 - SSES-9 13:00 hours 13 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	42	34	32	31	28	26	24	19	50	35	
95%	49	43	35	33	32	29	26	25	21	51	36	
90%	49	44	36	34	32	30	27	26	22	51	37	
50%	52	49	40	37	37	35	31	30	26	54	41	
10%	57	58	51	44	43	43	40	38	33	61	48	
5%	58	62	53	46	46	47	43	40	35	64	50	
1%	63	67	57	50	50	53	50	43	39	69	56	
Leq	54	55	47	40	40	41	39	34	30	58	42	

Sound Sources: i, b, t, t(11)

LOCATION 5 SSES-18 11:30 hours 14 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	41	38	29	28	26	25	33	28	50	38	
95%	49	42	38	29	29	27	26	34	29	51	39	
90%	49	43	39	30	30	29	27	35	30	51	39	
50%	49	47	42	33	34	35	32	37	31	52	42	
10%	56	57	51	41	40	42	40	39	34	60	47	
5%	58	59	55	43	41	44	42	40	35	63	49	
1%	62	66	61	47	43	46	44	42	38	69	51	
Leq	53	54	49	37	36	38	36	37	32	57	43	

Sound Sources: i, b, t, t(11), a

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 5 SSES-23 15:45 hours 14 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	50	49	44	35	34	32	29	28	21	53	40	
95%	50	50	45	36	35	33	29	29	22	54	40	
90%	51	50	45	36	36	34	30	29	23	54	41	
50%	54	53	48	41	40	37	35	34	28	57	44	
10%	60	59	54	47	45	45	45	41	35	64	51	
5%	62	61	56	49	46	48	47	42	37	66	53	
1%	68	64	58	53	50	54	52	45	40	70	57	
Leq	58	56	50	44	42	43	41	37	31	61	45	

Sound Sources: t, i

LOCATION 5 SSES-24 17:15 hours 14 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	41	37	29	27	26	25	24	20	50	35	
95%	49	42	37	30	29	27	27	27	22	51	37	
90%	49	44	38	31	30	29	28	28	23	51	38	
50%	52	49	41	35	35	35	34	34	30	54	42	
10%	58	55	50	42	42	44	42	42	36	60	49	
5%	59	56	52	45	45	48	46	44	40	62	52	
1%	63	61	56	50	50	53	51	47	45	66	57	
Leq	54	51	47	40	39	41	40	38	34	57	43	

Sound Sources: l, i, t(11),

LOCATION 5 SSES-31 10:30 hours 15 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	43	40	31	31	29	26	29	25	51	38	
95%	49	44	41	31	32	30	28	31	26	51	39	
90%	49	45	42	32	32	30	29	32	27	51	40	
50%	49	48	46	35	34	34	35	37	30	53	43	
10%	54	58	52	44	39	42	41	41	33	60	48	
5%	58	62	55	47	41	43	42	42	35	64	50	
1%	62	70	69	53	47	47	45	44	39	73	55	
Leq	52	57	55	42	37	38	37	38	31	60	43	

Sound Sources: b, i, t(11), ct, gs, t, a

**Table P: (Cont'd) Intermittent Sound Level Data - June 1995 Operation  
(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 5 SSES-35 15:20 hours 15 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	47	42	35	33	31	24	20	17	52	38
95%	49	49	44	36	34	32	25	22	18	53	39
90%	49	49	45	37	35	32	26	23	18	53	40
50%	54	53	49	42	38	37	34	29	22	58	43
10%	60	65	56	47	43	44	43	36	29	67	49
5%	63	69	60	50	44	46	44	39	32	70	51
1%	70	79	73	60	48	48	47	45	37	81	60
Leq	58	65	58	47	40	41	39	34	26	67	44

Sound Sources: i, b, t, gs, t(11)

LOCATION 7 - SSES-4 22:16 hours 12 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	36	27	19	17	16	15	28	20	50	31
95%	49	36	28	19	18	16	16	29	21	50	32
90%	49	36	28	19	18	16	16	30	21	50	32
50%	49	38	31	22	20	19	20	31	22	50	34
10%	49	49	42	31	27	22	24	33	24	53	35
5%	49	52	45	35	30	23	25	34	24	54	36
1%	49	55	48	38	34	27	28	34	27	57	37
Leq	49	45	38	28	24	20	21	31	23	51	34

Sound Sources: i, a,

LOCATION 7 SSES-B 11:25 hours 13 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	38	32	27	27	26	28	29	26	50	36
95%	49	39	32	28	28	27	28	30	27	50	36
90%	49	39	33	28	29	28	29	30	27	50	36
50%	49	41	35	31	31	30	31	32	29	50	38
10%	49	43	42	37	34	34	35	39	34	52	44
5%	49	46	45	40	36	36	36	43	37	53	46
1%	50	53	52	44	40	39	39	47	42	58	50
Leq	49	43	42	35	32	32	32	37	32	51	39

Sound Sources: i, b, t

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 7 SSES-11 18:20 hours 13 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	41	40	31	23	23	21	34	27	51	37
95%	49	42	41	33	25	23	22	34	27	51	38
90%	49	43	42	34	26	24	23	34	27	51	38
50%	49	48	48	44	30	26	25	35	31	54	42
10%	54	57	52	47	38	29	30	45	34	60	47
5%	56	59	52	48	39	30	31	47	35	62	49
1%	60	62	55	50	41	33	33	48	36	65	50
Leq	52	53	49	44	34	30	30	40	32	57	42

Sound Sources: i, b, a, eng

Octave Band Center Frequency (Hz)

LOCATION 7 SSES-21 13:45 hours 14 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	46	45	32	27	29	26	28	23	52	37
95%	49	47	47	34	28	29	27	28	24	53	38
90%	49	47	48	34	29	29	27	29	24	53	38
50%	51	49	50	38	32	31	29	30	26	55	40
10%	53	52	54	45	38	34	33	33	29	58	43
5%	54	53	56	49	41	35	34	36	30	60	45
1%	56	56	58	52	46	37	36	44	34	62	48
Leq	52	50	52	42	35	32	30	33	27	56	40

Sound Sources: i, eng, b, a

LOCATION 7 SSES-28 19:40 hours 14 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	40	36	26	24	24	23	31	25	50	34
95%	49	42	37	27	25	25	24	31	25	50	35
90%	49	43	38	27	26	25	25	31	25	51	35
50%	49	47	43	32	28	28	29	32	26	52	38
10%	49	53	51	42	32	33	33	35	29	56	41
5%	51	54	52	43	33	34	36	36	31	57	43
1%	55	55	54	47	34	38	40	40	33	60	46
Leq	50	49	46	37	29	30	31	33	28	54	38

Sound Sources: eng, w, i, b

**Table P. (Cont'd) Intermittent Sound Level Data - June 1995 Operation**  
**(Sound Pressure Levels dB re: 20 Micropascals)**

LOCATION 7 SSES-29 7:45 hours 15 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	41	34	24	21	19	22	28	19	50	33	
95%	49	42	34	25	22	20	24	29	20	50	34	
90%	49	42	35	26	22	21	25	30	21	50	35	
50%	49	45	37	28	25	23	28	36	27	51	39	
10%	49	49	41	33	29	26	33	41	35	53	43	
5%	50	52	43	35	31	29	34	43	37	55	46	
1%	58	55	46	40	33	32	38	46	45	60	49	
Leq	50	47	39	31	27	24	30	38	33	52	39	

Sound Sources: i, b, t(d)

LOCATION 7 SSES-33 14:20 hours 15 June 1995

	Octave Band Center Frequency (Hz)										OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000			
99%	49	37	32	26	23	23	21	27	22	50	33	
95%	49	38	33	26	24	24	23	28	23	50	33	
90%	49	39	34	26	25	25	24	29	25	50	34	
50%	49	42	37	31	30	29	30	34	29	51	39	
10%	54	50	42	37	36	35	35	43	36	56	46	
5%	57	53	44	39	38	37	37	46	38	59	48	
1%	63	56	55	47	41	42	40	50	42	64	52	
Leq	52	48	41	36	33	32	32	39	32	54	40	

Sound Sources: a, i, b, t

**APPENDIX Q**

**SUPPLEMENTAL DATA - JUNE 1995 OPERATION**

**(Sound Pressure Levels in dB re: 20 Micropascals)**

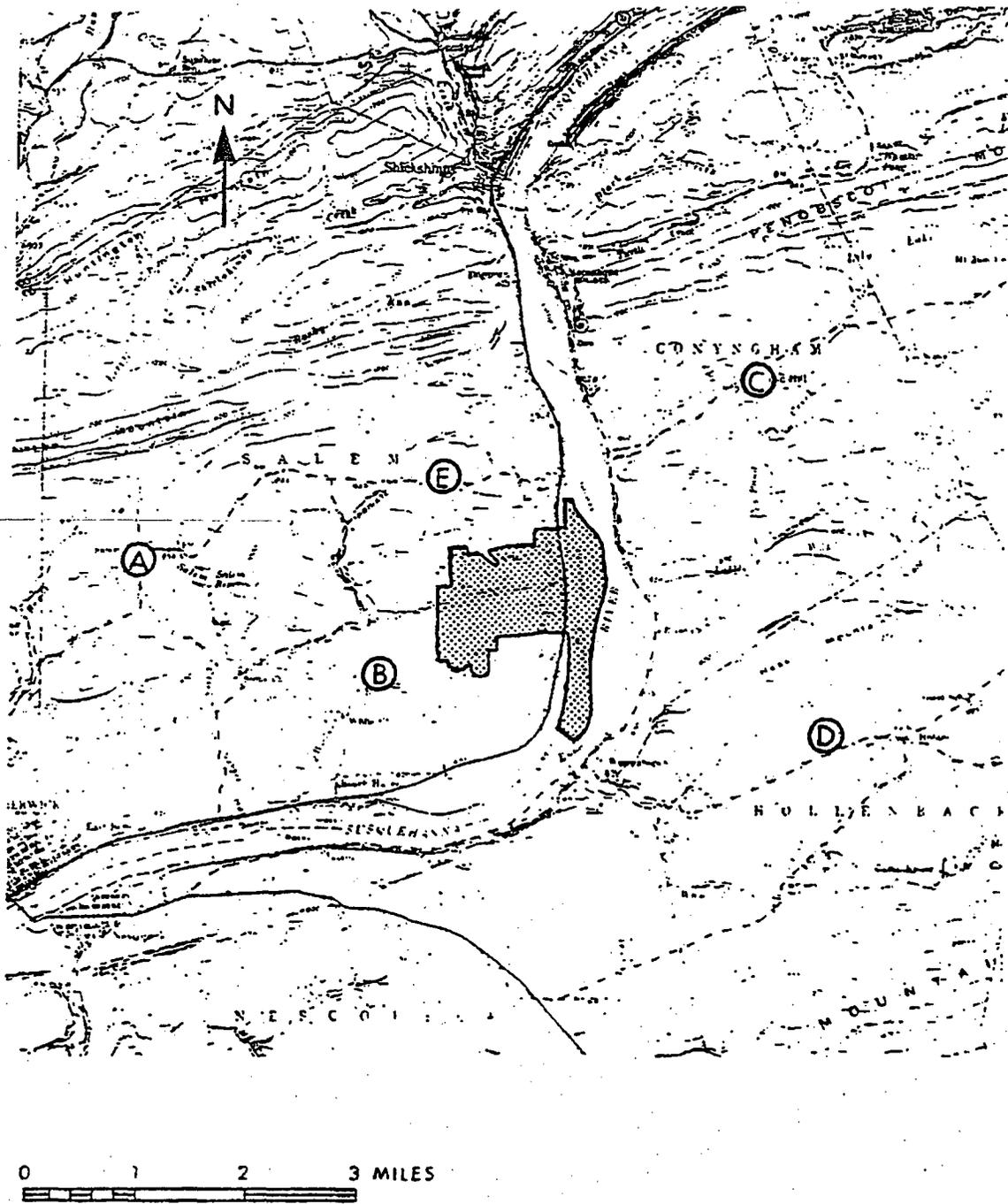


Figure Q. Map of Area Within Five Miles of Susquehanna SES Site Showing Distant Supplemental Sound Measurement Locations and Approximate Site Property Lines.

**SOUND SOURCE LEGEND FOR  
SUPPLEMENTAL SOUND LEVEL SAMPLES IN TABLE Q**

a	aircraft
b	birds
c	cow
ch	children
d	dog barking
i	insects
t	local traffic
m	lawn mowing
r	rooster
t(a)	traffic on plant access road
t(d)	distant traffic
t(11)	traffic on Route 11
tra	tractor
trn	train
s	shooting
w	wind in brush/trees

99%	
95%	
90%	percent of sample period
50%	sound level was exceeded
10%	
5%	
1%	
Leq	energy average sound level
OA	overall sound level
dBA	A-weighted sound level

Note that the sound produced by insects during the June 1995 monitoring survey continues to be a major contributor to the A-weighted sound level data measured in the vicinity of the Susquehanna SES.

**Table Q. Supplemental Data - June 1995 Operation**  
**(Sound Pressure Levels in dB re: 20 Micropascals)**

LOCATION A SSES-A 17:30 hours 13 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	43	39	27	20	22	23	19	16	51	30
95%	49	45	43	30	20	23	24	20	17	51	32
90%	49	46	44	31	21	24	25	21	17	52	33
50%	49	48	48	35	27	31	31	29	25	54	39
10%	52	52	52	41	34	38	45	49	39	58	52
5%	54	54	53	44	38	44	47	51	42	60	54
1%	58	62	61	55	49	54	51	54	46	67	58
Leq	51	51	51	43	38	40	41	44	35	56	49

Sound Sources: i, eng, t, b

LOCATION B SSES-B 16:50 hours 13 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	41	37	27	25	24	24	26	22	50	34
95%	49	42	38	28	26	25	25	27	23	50	35
90%	49	43	39	28	27	26	26	28	23	51	35
50%	49	49	43	32	29	28	32	30	25	53	38
10%	56	55	49	39	33	32	38	35	27	59	42
5%	57	57	51	42	33	34	40	37	28	61	44
1%	59	63	55	49	47	47	45	40	32	65	52
Leq	53	56	48	41	40	38	37	33	26	58	39

Sound Sources: i, b, t, a, t(11)

LOCATION C SSES-C 12:30 hours 13 June 1995

	Octave Band Center Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	OA	dBA
99%	49	49	43	35	31	32	33	32	27	53	41
95%	49	52	45	36	32	33	34	35	28	55	42
90%	52	53	46	37	34	34	35	36	29	56	43
50%	61	61	54	42	37	37	38	38	32	64	46
10%	66	69	62	50	44	45	43	42	36	71	53
5%	69	74	65	54	47	47	45	44	39	75	55
1%	72	76	69	60	54	54	50	48	49	78	60
Leq	63	66	59	49	42	42	41	40	36	68	47

Sound Sources: i, w, eng, t, b

**Table Q. (Cont'd) Supplemental Data - June 1995 Operation**  
 (Sound Pressure Levels in dB re: 20 Micropascals)

LOCATION D SSES-D 14:00 hours 13 June 1995

	Octave Band Center Frequency (Hz)									OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000		
99%	49	37	30	24	24	23	25	25	19	50	31
95%	49	38	31	25	25	24	26	26	20	50	32
90%	49	38	32	26	25	24	27	28	20	50	34
50%	49	40	35	28	29	28	35	36	26	50	41
10%	49	44	37	34	34	34	40	42	36	52	46
5%	49	46	38	35	35	35	41	44	39	53	47
1%	52	51	39	37	37	36	44	49	44	56	52
Leq	49	42	35	31	31	30	37	39	33	51	40

Sound Sources: i, b, w, t

LOCATION E SSES-E 18:00 hours 13 June 1995

	Octave Band Center Frequency (Hz)									OA	dBA
	31.5	63	125	250	500	1000	2000	4000	8000		
99%	49	36	28	22	19	18	23	33	29	50	37
95%	49	36	29	23	20	19	25	34	31	50	38
90%	49	36	29	23	21	20	25	35	32	50	39
50%	49	37	34	27	25	24	30	38	34	50	42
10%	51	49	45	40	38	42	42	47	38	55	50
5%	54	52	52	46	41	48	45	48	39	59	52
1%	57	57	59	53	52	58	55	51	43	65	61
Leq	51	47	46	41	41	45	42	42	35	55	43

Sound Sources: i, t, b, a

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