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December 16, 2010

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BELL BEND NUCLEAR POWER PLANT
BBNPP PLOT PLAN CHANGE
COLA SUPPLEMENT, PART 3 (ER); SECTION 2.7.7 AND
COLA SUPPLEMENT, PART 11L (NOISE STUDIES)
BNP-2010-320 Docket No. 52-039

References: 1) BNP-2010-175, T. L. Harpster (PPL Bell Bend, LLC) to U.S. NRC, "July 2010 BBNPP Schedule Update", dated July 16, 2010

2) BNP-2010-231, R. R. Sgarro (PPL Bell Bend, LLC) to U.S. NRC, "Clarification of Schedule for COLA Part 11 Reports," dated September 10, 2010

3) BNP-2010-246, R. R. Sgarro (PPL Bell Bend, LLC) to U.S. NRC, "BBNPP Plot Plan Change Supplement Schedule Update," dated September 28, 2010

In References 1, 2, and 3, PPL Bell Bend, LLC (PPL) provided the NRC with schedule information related to the intended revision of the Bell Bend Nuclear Power Plant (BBNPP) footprint within the existing project boundary which has been characterized as the Plot Plan Change (PPC). As the NRC staff is aware, the plant footprint relocation will result in changes to the Combined License Application (COLA) and potentially to new and previously responded to Requests for Additional Information (RAIs). PPL declassified this docketed schedule information from regulatory commitment status in Reference 3, with an agreement to update the staff via weekly teleconferences as the project moves forward.

PPL has committed to provide the NRC with COLA supplements, consisting of revised COLA Sections and associated RAI responses/revisions, as they are developed. These COLA supplements will only include the changes related to that particular section of the COLA and will not include all conforming COLA changes. Conforming changes for each supplement necessary for other COLA sections will be integrated into the respective COLA supplements and provided in accordance with the schedule, unless the supplement has already been submitted. In the latter case, the COLA will be updated through the normal internal change process. The revised COLA supplements will also include all other approved changes since the submittal of Revision 2. All COLA supplements and other approved changes will ultimately be incorporated into the next full COLA revision.

PPL indicated in Reference 1 that ER Section 2.7 would be submitted as a whole and in Reference 2 that the associated Part 11L reports (noise impact studies) affected by the PPC would be included in the submittal. Since the process of updating radiological receptor locations and the associated atmospheric dispersion and deposition factors for the PPC in support of submitting ER Section 2.7 as a whole is not yet complete, PPL is providing an advance

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submittal of BBNPP COLA Supplement, Part 3 (Environmental Report), Section 2.7.7, Revision 2b and the supporting Part 11L noise studies.

Enclosure 1 provides the revised BBNPP COLA Supplement, Part 3 (Environmental Report), Section 2.7.7, Revision 2b. The revised BBNPP COLA section supersedes previously submitted information in its entirety. No departures and/or exemptions to this BBNPP COLA section have been revised as a result of the PPC.

Enclosure 2 provides an additional report for the BBNPP COLA Supplement, Part 11L that updates the baseline noise studies for the PPC.

Enclosure 3 provides a revision of the BBNPP COLA Supplement, Part 11L report that updates the cooling tower sound emission study for the PPC. The revised BBNPP COLA Part 11L report supersedes previously submitted information in its entirety.

There are no open RAIs that refer directly to the enclosed COLA Section.

There are no previously submitted NRC RAI responses that refer directly to the enclosed COLA section. The following previously submitted RAI responses were reviewed for impacts:

RAI No.	Response Impacted? (Yes/No)
NRHH 10.5-1	No
TE 4.3-5	No
5022 EIS 9.3-19b	No

The only new regulatory commitment is to include the revised COLA sections (Enclosures 1, 2, and 3) in the next COLA revision.

If you have any questions, please contact the undersigned at 570.802.8102.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 16, 2010

Respectfully,

Rocco R. Sgarro

RRS/kw

Enclosures 1) Revised BBNPP COLA Part 3 (ER); Section 2.7.7, Revision 2b

2) Revised BBNPP COLA Part 11L (Noise Studies), Revision 2b, "2010 Baseline Environmental Noise Survey, Supplement to HAI Reports 041808-1 & 06608-1, Bell Bend Nuclear Power Plant (BBNPP)"

3) Revised BBNPP COLA Part 11L (Noise Studies), Revision 2b, "Report Number 080108-1, Estimated Cooling Tower Sound Emissions for the Bell Bend Nuclear Power (BBNPP) Project, Revision A"

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Enclosure 1

Revised BBNPP COLA Part 3 (ER), Section 2.7.7, Revision 2b

values. The accident χ/Q values and the annual χ/Q value should be on a straight line when plotted on a log-log graph.

Analysis assumptions included:

- For ground level releases modeled using the computer code AEOLUS3, terrain heights are not used. (Per Reg. Guide 1.145 Section 1.3.2, release-point and receptor elevations are assumed to be the same.)
- Releases from the Stack for DBA analyses are at a height that is less than 2.5 times the height of adjacent solid structures and are therefore assumed to be ground level releases. (Per Reg. Guide 1.145, Section 1.3.2)
- For EAB/LPZ atmospheric dispersion factors for DBAs, all post-accident release points were based on the ground level release model with no dispersion credit for building wake effects. However, plume meander, which predominates building wake effects during short time intervals, is accounted for.

See Table 2.7-162 for design input used in the accident effluent analysis.

2.7.7 Noise

The principal noise sources associated with normal operation of BBNPP are the switchyard, transformers, and Circulating Water System cooling ~~tower. A survey was~~ towers. Surveys were conducted in February and March 2008 and June 2010 to measure ambient environmental community noise levels to establish a baseline noise level in the presence of the existing SSES Units 1 and 2.

2.7.7.1 Environmental Noise Survey

Environmental sound levels were measured continuously at ~~five~~various area-wide locations ~~over a 312-hour period~~ during leaf-off and leaf-on seasonal conditions. ~~As a result, any noise emissions from the existing SSES Units 1 and 2 would be highest due to the lack of tree leaf noise reduction.~~ Surveys were performed with continuous monitoring for 13-14 days at seven monitoring locations.

~~Figure 2.7-97~~Figure 2.7-97 shows the location of the ~~five~~seven monitoring sites. Monitor location 1 was in the planned BBNPP plant area reasonably close to the existing SSES Units 1 and 2. Locations 2, 3 and 4 are at the closest residential receptors. Location 5 is on the power line right of way approximately 200 feet from U.S. Route 11. Locations 6 and 7 represent areas north and northwest of the BBNPP plant area and associated cooling towers. The closest potentially sensitive receptors represent existing conditions and can be used to assess potential noise impacts from the new plant.

The instantaneous sound level was measured at each location on a continuous and simultaneous basis over the ~~312-hour period~~ 312 to 366-hour periods using precision data loggers. In addition, attended 10-minute sampling measurements were carried out at each location during day and night periods using hand-held precision data loggers. The attended measurements were carried out to observe sources of environmental sounds and to record the frequency spectrum of the sound level.

2.7.7.2 Metrics for Noise Assessment

The universal measure of noise in decibels is the A-weighted sound level, abbreviated dB(A) or dBA. The overall sound level is defined as the summed level in decibels over the entire audible

frequency range of approximately 20 to 20,000 cycles/second (Hertz). The A-weighted sound level is a convenient single number to quantify the entire spectrum of a sound.

Percentile levels, or exceedence levels, designated L1, L10, L50 and L90 are statistically derived units over the sampling period. They are the levels exceeded for 1%, 10%, 50% and 90% of the sampling time. The L90 percentile level is the most common for evaluating community noise in residential environments. L90 is the "residual" sound level, which is the quasi-steady level that occurs in the absence of all identifiable sporadic sound levels occurring over the interval. The vast majority of all residual sound levels found in communities come from far away, unidentifiable steady levels from traffic or industrial sources.

The average, designated Leq, is the equivalent steady sound level that has the same acoustic energy as the actual time varying signal. It is the energy average, not the arithmetic average over the period. The 24 hour day-night sound level, or Ldn, is calculated from the average hourly Leq sound level over a 24 hour period, with a 10 dBA weighting factor added to all levels during the nighttime period from 10 PM to 7 AM to account for greater sensitivity to noise at night. There were no State or county noise ordinances found for the BBNPP site area. Salem Township has a qualitative noise standard in Section 318 of the Zoning Ordinance. The Standard states "Noise which is determined to be objectionable because of volume, frequency or beat shall be muffled or otherwise controlled."

EPA developed day-night sound levels as guidelines to protect public health and welfare from the effects of environmental noise. The yearly Ldn value to protect against outdoor activity interference and annoyance is 55 dBA (USEPA, 1974). The Department of Housing and Urban Development (HUD) adopted the EPA guidelines in the noise abatement and control regulations as a goal for outdoors in residential areas. However, for the purposes of the HUD regulation, sites with a Ldn value of 65 dBA and below are acceptable and allowable. (CFR, 2007)

2.7.7.3 Results

~~Figure 2.7-98~~Figure 2.7-98 plots the hourly residual (L90) sound levels at the residential locations for the survey period. Specifically, the minimum hourly residual LA_{90} sound levels at the residential locations for the survey period are plotted. The plot illustrates consistent trends in the five community locations except at location 5 (dotted line) that contains nearly constant noise from U.S. Route 11 only 200 ft (61 m) away. The levels for location 2 are calculated from the average of results at locations 1, 3 and 4. The residual ambient is essentially constant for all practical purposes at any of the locations 1, 3 and 4. This occurs in areas where the environmental sound sources are far off in distance relative to the distance between monitoring points and the natural sources are similar at all locations. The sound of rain and high wind are indicated on the plot. The major source of environmental noise in the project area is from far-off unidentifiable traffic. Absolutely no sounds were detectable during attended measurement for normal operation on February 29, 2008. SSES Unit 1 was shut down on March 3, 2008. Noise from the plant, presumed to be construction or maintenance sources, was readily audible during the March 14, 2008 attended measurement survey. Therefore, in the absence of construction and maintenance activities, all measured ambient sound levels can be attributed to normal, current environmental sources, such as traffic noise, high wind and rain and are not related to the existing SSES Units 1 and 2 plant.

Table 2.7-167 tabulates the major survey results at ~~all locations~~ Locations 1 through 5 for some commonly used sound level metrics to assess noise impact. Table 2.7-168 tabulates the calculated 24-hour daily logarithmic average Ldn sound ~~levels.~~ levels for Locations 1 through

5. Location 1 is at the plant and can be considered the control point. Locations 2, 3 and 4 are at the closest residential receptors, while location 5 is on the power line right of way approximately 200 ft (61 m) from U.S. Route 11. Table 2.7-169 tabulates the major survey results at Locations 2, 6, and 7 during leaf-on conditions. Locations 6 and 7 are north and northwest of the plant area and associated cooling towers. The 24-hour logarithmic average day-night sound levels at Locations 2, 3 and 4 are 57 dBA, 59 dBA and 59 dBA respectively. Locations 6 and 7 had 24-hour logarithmic average Ldn values of 49 and 52, respectively. These Ldn values are below the HUD environmental goal of 65 dBA. Conversely, location 5 is near a noise source, U.S. Route 11, and the 24-hour logarithmic average Ldn was 65 dBA with a standard deviation of 2.1 dBA for the duration of the study. Wind conditions also have an effect, as the Ldn increases with increased wind speed. Apart from these effects, Ldn noise levels of below 60 to 65 dBA are considered to be of small significance, as noted in NUREG-1437 (NRC, 1996). All measurements taken at locations 2, ~~3~~ 3, 4, 6, and 47 had logarithmic average Ldn values below 60 dBA while at location 5 the logarithmic average Ldn value was 65 dBA.

~~The survey results document existing conditions for a typical and representative period during the leaf-off season. During leaf-on season, fully leafed trees would attenuate or reduce traffic noise from U.S. Route 11 and any existing plant emissions, both factors tending to decrease residual sound levels.~~ A baseline environmental noise survey performed during leaf-on season for Locations 1 through 5 supports this conclusion. The 24-hour logarithmic average day-night sound levels at Locations 2, 3, 4 and 5 are 56 dBA, 58 dBA, 53 dBA and 57 dBA, respectively. These average Ldn values are all less than 60 dBA and the HUD environmental goal of 65 dBA.

2.7.8 References

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Table 2.7-167— Summary of Ambient Environmental (dBA) for Commonly Used Metrics to Assess Noise Impacts

(Locations 1 though 5)

LOCATION	DATE AND DAY OF WEEK													AVERAGE DAILY MINIMUM HOURLY LEVEL
	3/1 SAT	3/2 SUN	3/3 MON	3/4 TUE	3/5 WED	3/6 THU	3/7 FRI	3/8 SAT	3/9 SUN	3/10 MON	3/11 TUE	3/12 WED	3/13 THU	
	LA50 METRIC MINIMUM HOUR MEASUREMENT													
1	28	27	34	32	33	32	36	36	28	28	32	28	31	31
2*	30	27	35	34	37	34	36	35	29	29	34	30	32	33
3	32	28	34	36	38	37	34	32	32	32	34	30	31	33
4	31	27	37	34	39	33	38	37	27	26	36	33	35	33
5	39	34	36	52	43	36	48	46	32	28	40	39	34	39
	LA90 METRIC MINIMUM HOUR MEASUREMENT													
1	25	25	32	31	32	30	34	33	27	27	29	26	28	29
2*	29	26	33	33	35	32	34	32	27	28	31	28	30	31
3	30	27	33	36	38	34	33	31	30	31	32	29	30	32
4	29	26	33	32	36	31	36	33	25	25	33	30	32	31
5	33	31	34	39	35	33	39	42	27	26	26	33	29	34
	LAeq METRIC MINIMUM HOUR MEASUREMENT													
1	31	28	35	32	34	33	38	37	28	28	34	30	32	32
2*	35	28	37	35	40	38	38	36	32	29	36	35	34	35
3	40	29	37	37	40	37	37	33	38	32	35	38	32	36
4	33	28	39	36	46	44	38	38	30	28	38	37	37	36
5	51	47	51	55	56	55	54	53	53	51	53	53	52	53

AVERAGE WIND SPEED, MPH	8	6	5	7	8	3	6	8	10	5	3	8	5
AVERAGE WIND DIRECTION	NW	NNW	S	ESE	WNW	WNW	SE	WSW	NW	NW	NNW	NW	SSE
PRECIPITATION, INCHES	0	0	0	1.2	0.9	0	0.6	0.4	0	0	0	0	0

* EST FROM MACRO DATA RESULTS AT LOCATIONS 1, 3 & 4)
WEATHER DATA FROM TOP OF SHICKSHINNY MOUNTAIN, APPROX. 7 MILES NORTH OF SITE

Table 2.7-168— 24-Hour Day/Night Sound Levels for a 13 Day Sampling Period ~~during Leaf-Off Seasonal~~ during Leaf-off Seasonal Conditions at the BBNPP Site

(Locations 1 through 5)

BBNPP LEAF OFF	24-HOUR DAILY DAY/NIGHT SOUND LEVEL (DNL OR Ldn), dBA				
	LOCATION				
DATE	1 (ONSITE)	2	3	4	5
3/1/2008	66	55	60	57	62
3/2/2008	42	46	52	49	60
3/3/2008	48	52	58	61	64
3/4/2008	53	55	57	62	66
3/5/2008	61	60	60	63	68
3/6/2008	50	53	57	61	67
3/7/2008	54	55	58	59	66
3/8/2008	61	61	62	59	66
3/9/2008	61	62	63	58	65
3/10/2008	45	51	59	57	66
3/11/2008	55	55	58	58	65
3/12/2008	52	53	56	58	65
3/13/2008	52	55	60	58	66
ARITH. AVERAGE	N/A	55	58	58	65
LOG AVERAGE	N/A	57	59	59	65
STD DEV	N/A	4.3	2.8	3.4	2.1

Table 2.7-169— Summary of Ambient Environmental Sound Levels (dBA) for Commonly Used Metrics to Assess Noise Impacts

(Locations 2', 6', and 7')

2010 LEAF-ON SURVEY															
Location	DATE AND DAY OF WEEK														AVERAGE DAILY MINIMUM HOURLY LEVEL
	15-Jun TUE	16-Jun WED	17-Jun THU	18-Jun FRI	19-Jun SAT	20-Jun SUN	21-Jun MON	22-Jun TUE	23-Jun WED	24-Jun THU	25-Jun FRI	26-Jun SAT	27-Jun SUN	28-Jun MON	
-	LA50 METRIC MINIMUM HOUR MEASUREMENT														-
2'	27.5	29.1	26.3	27.1	28.8	26.7	29.8	31.8	26.7	29.4	25.1	31.7	-	-	28
6'	24.9	28.2	25.2	27.3	29.3	23.3	25.0	26.9	22.7	24.5	21.9	27.2	26.9	24.8	26
7'	24.0	31.8	25.4	25.1	28.3	24.4	23.8	25.0	23.0	26.8	21.1	27.3	22.3	28.9	26
-	LA90 METRIC MINIMUM HOUR MEASUREMENT														-
2'	25.5	29.1	26.3	25.2	27.1	23.6	26.6	30.1	23.5	26.7	21.4	29.1	-	-	26
6'	23.6	26.9	23.5	25.2	26.3	22.2	23.9	24.2	21.5	22.3	20.5	24.7	25.6	23.3	24
7'	22.0	26.5	24.1	22.6	25.9	22.3	20.8	22.8	21.3	25.2	19.4	24.5	21.2	24.9	23
-	LAeq METRIC MINIMUM HOUR MEASUREMENT														-
2'	29.2	29.8	28.0	28.3	31.3	30.6	30.4	33.6	27.5	31.1	27.1	33.6	-	-	30
6'	25.8	28.7	33.2	27.5	32.0	24.4	25.2	28.4	23.5	25.4	22.7	29.0	36.4	28.1	28
7'	25.9	32.9	28.4	26.4	28.8	30.0	24.9	25.8	23.9	30.0	22.3	28.6	27.2	30	28
-	Ldn OR DNL 24 HOUR MEASURE														-
2'	49.2	48.3	48.0	48.1	48.8	46.7	48.4	48.3	46.8	48.3	47.8	47.8	-	-	48
6'	49.0	49.4	47.6	48.8	49.2	47.7	46.6	47.3	47.4	49.0	49.0	54.2	54.2	50.1	49
7'	59.8	53.7	55.9	50.7	58.6	60.0	54.8	55.8	47.8	46.0	42.0	44.4	46.6	52.0	52
AVG. WIND, MPH	1.8	1.4	3.5	0.8	1.4	2.1	1.5	0.5	1.6	3	1.7	1.1	1.1	1.9	-
PRECIPITATION, IN	0	0.5	0	0	0	0	0	0.03	0.02	0.02	0	0	0.16	0.38	-

Figure 2.7-97— Baseline BBNPP Leaf-Off Sound Survey Measurement Locations

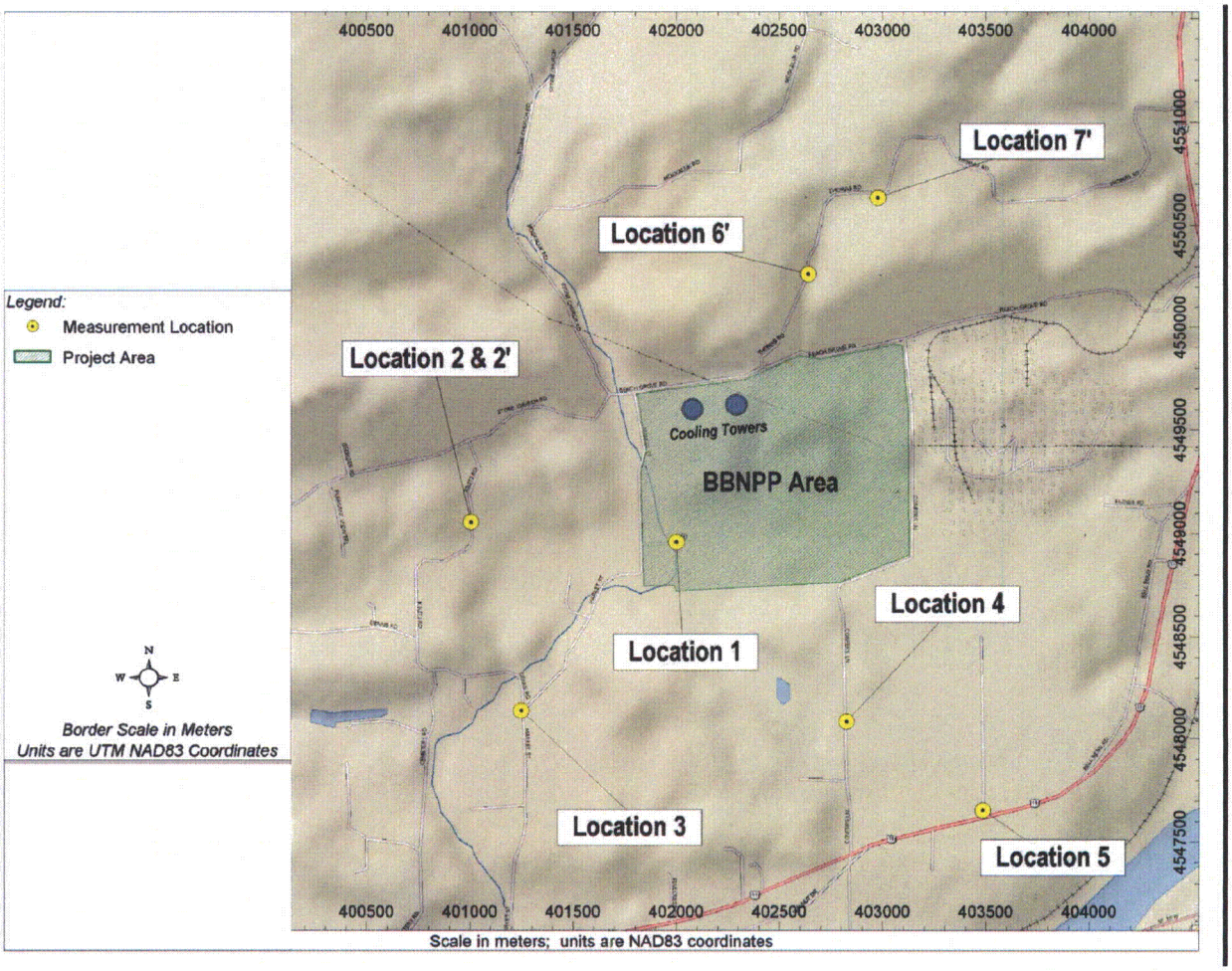
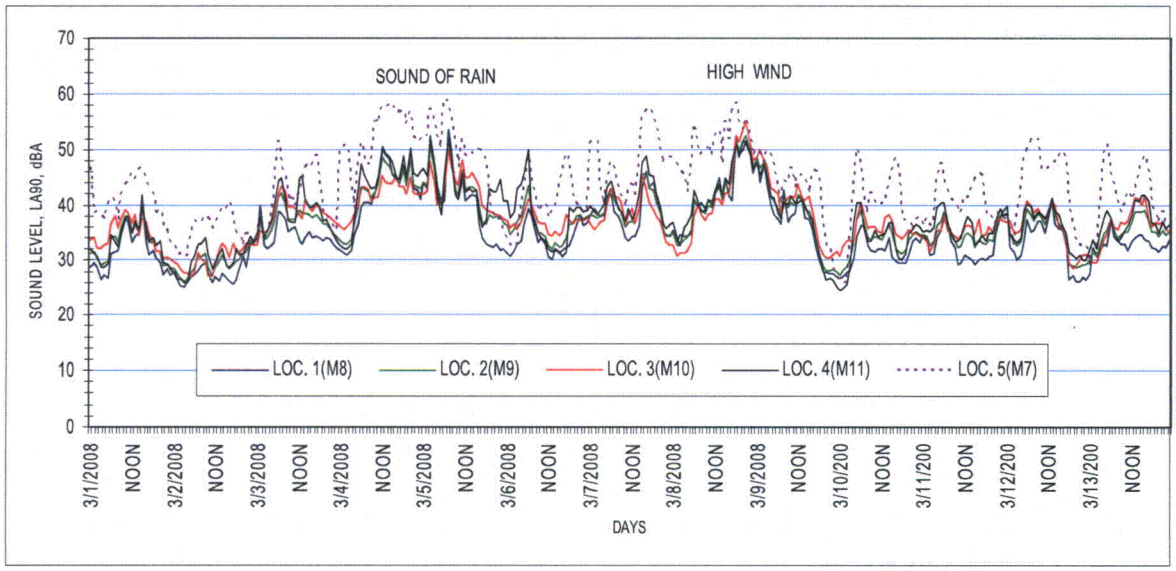


Figure 2.7-98— Measured Hourly Residual (L90) Sound Levels at Survey



Enclosure 2

Revised BBNPP COLA Part 11L (Noise Studies), Revision 2b,
"2010 Baseline Environmental Noise Survey, Supplement to HAI Reports 041808-1 & 06608-1,
Bell Bend Nuclear Power Plant (BBNPP)"

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TECHNICAL MEMO

Title:	**2010 BASELINE ENVIRONMENTAL NOISE SURVEY, SUPPLEMENT TO HAI REPORTS 041808-1 & 062608-1**
Project:	**BELL BEND NUCLEAR POWER PLANT (BBNPP)**
Location:	**Berwick, PA**
Prepared For:	**AREVA NP, Inc.**
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Attachments:	**None**

Attn. Mr. P. Gluckler

Introduction

This suplement adds additional measured data to the subject reports and forms an integral addition to each report. Since the ambient or existing noise surveys were completed in 2008, the plant design has shifted the hyperbolic cooling towers approximately 900 feet northwards. The 2008 survey had no receptor measurement points to the north, so for due diligence, two new receptor locations were measured north of the plant. Additionally, measurements were repeated at location 2 of the existing survey. The survey locations are shown in Figure 1 and results are given herein.

Test Methodology

All methods, instrumentation, calibration, etc. were repeated as described in the original surveys, except larger 7 inch diameter windscreens were utilized in lieu of smaller standard manufacturers units. Larger wind screens improve two areas[1] for more accurate results. One, there is less false wind induced signal input, and two, the larger screens have significant attenuation at the very high frequencies where insect noise is prevalent and act as a filter. It can be shown that use of larger windscreens can lower measured results at any given location in the range of 0 to 4 dBA as opposed to smaller windscreens.

Meteorological conditions

[1] Hessler, et al, "Experimental study to determine wind-induced noise and windscreen attenuation effects on microphone response for environmental wind turbine and other applications", Noise Control Engineering Journal, 56(4), July-Aug 2008

Meteorological conditions for environmental noise measurements were stable and ideal with essentially no rainfall or high winds during the two week "hot summer" survey period. There were no observed construction activities and PPL SSES plants 1 and 2 were operating. Such ideal conditions lead to minimum measured levels.

Test locations for all measurements are shown on the following Figure 1. The original survey locations in 2008 are labeled 1 thru 5 and 2', 6' and 7' for this survey in 2010.

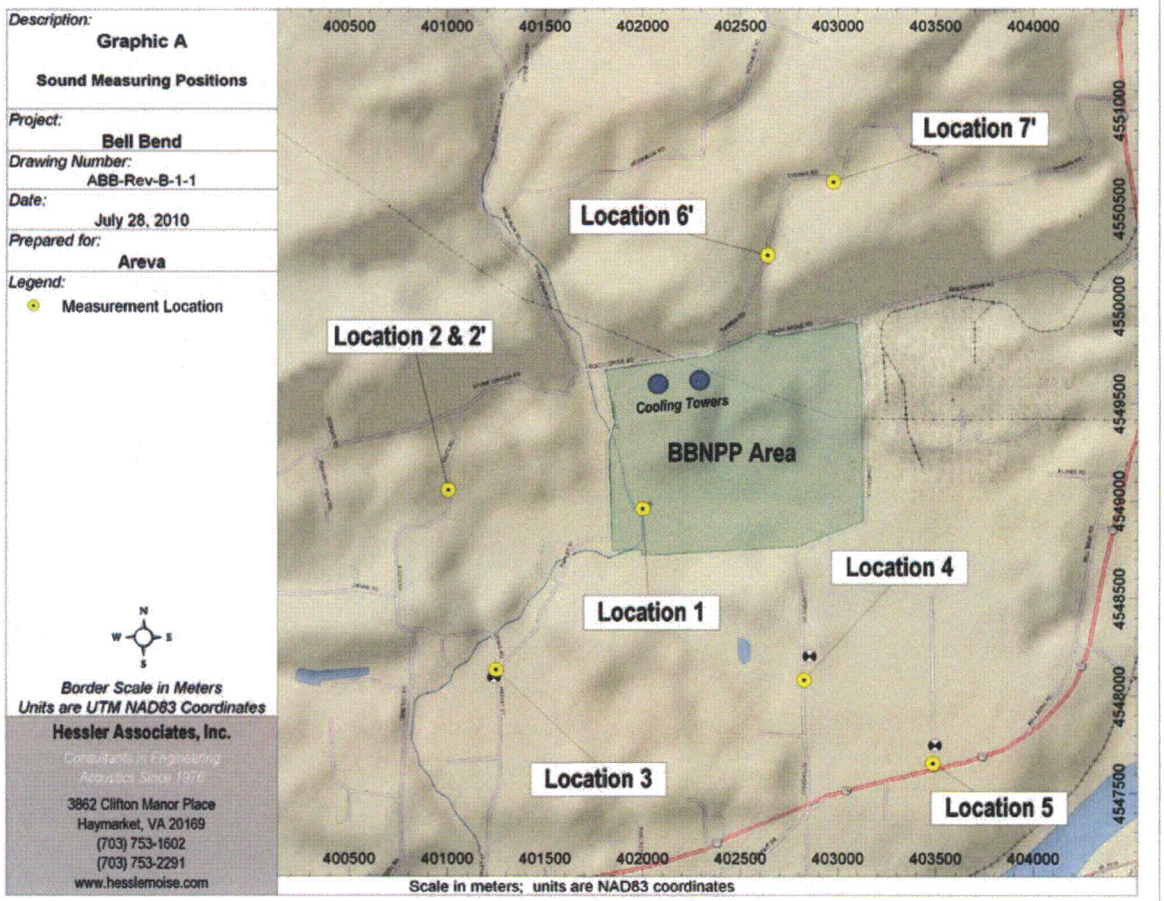

Figure 1: *Site plan with road network showing noise measurement locations.*

Results

The following Table tabulates the principle results at the three locations.

2010 LEAF-ON SURVEY															
	DATE AND DAY OF WEEK														AVERAGE
LOCATION	15-Jun TUE	16-Jun WEB	17-Jun THU	18-Jun FRI	19-Jun SAT	20-Jun SUN	21-Jun MON	22-Jun TUE	23-Jun WEB	24-Jun THU	25-Jun FRI	26-Jun SAT	27-Jun SUN	28-Jun MON	DAILY MINIMUM HOURLY LEVEL
	LA50 METRIC MINIMUM HOUR MEASUREMENT														
2'	27.5	29.1	26.3	27.1	28.8	26.7	29.8	31.8	26.7	29.4	25.1	31.7			**28**
6'	24.9	28.2	25.2	27.3	29.3	23.3	25.0	26.9	22.7	24.5	21.9	27.2	26.9	24.8	**26**
7'	24.0	31.8	25.4	25.1	28.3	24.4	23.8	25.0	23.0	26.8	21.1	27.3	22.3	28.9	**26**
	LA90 METRIC MINIMUM HOUR MEASUREMENT														
2'	25.5	29.1	26.3	25.2	27.1	23.6	26.6	30.1	23.5	26.7	21.4	29.1			**26**
6'	23.6	26.9	23.5	25.2	26.3	22.2	23.9	24.2	21.5	22.3	20.5	24.7	25.6	23.3	**24**
7'	22.0	26.5	24.1	22.6	25.9	22.3	20.8	22.8	21.3	25.2	19.4	24.5	21.2	24.9	**23**
	LAeq METRIC MINIMUM HOUR MEASUREMENT														
2'	29.2	29.8	28.0	28.3	31.3	30.6	30.4	33.6	27.5	31.1	27.1	33.6			**30**
6'	25.8	28.7	33.2	27.5	32.0	24.4	25.2	28.4	23.5	25.4	22.7	29.0	36.4	28.1	**28**
7'	25.9	32.9	28.4	26.4	28.8	30.0	24.9	25.8	23.9	30.0	22.3	28.6	27.2	30.3	**28**
	Ldn OR DNL 24 HOUR MEASURE														
2'	49.2	48.3	48.0	48.1	48.8	46.7	48.4	48.3	46.8	48.3	47.8	47.8			**48**
6'	49.0	49.4	47.6	48.8	49.2	47.7	46.6	47.3	47.4	49.0	49.0	54.2	54.2	50.1	**49**
7'	59.8	53.7	55.9	50.7	58.6	60.0	54.8	55.8	47.8	46.0	42.0	44.4	46.6	52.0	**52**

AVG. WIND, MPH	1.8	1.4	3.5	0.8	1.4	2.1	1.5	0.5	1.6	3	1.7	1.1	1.1	1.9
PERCIPITATION, IN.	0	0.5	0	0	0	0	0	0.03	0.02	0.02	0	0	0.16	0.38

Table 1: *Minimum hourly and 24-hour Day/Night Sound Levels for a 14 Day Sampling Period during Leaf-on Seasonal Conditions at the Proposed Bell Bend BBNPP3 Project*

Graphic displays of the various measured metrics are given in the following plots. The meaning of each metric is explained in detail in the basic reports.

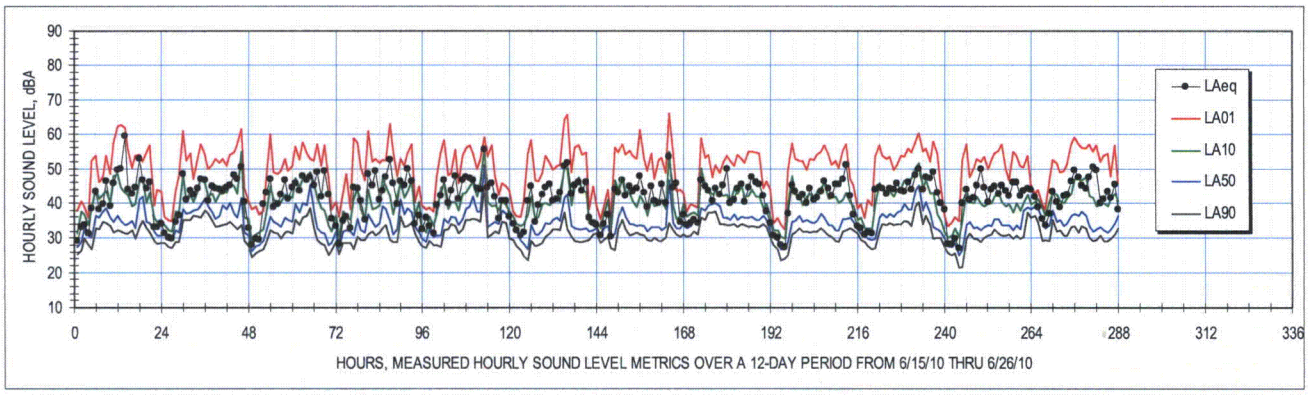

Figure 2: *Measured hourly noise metrics over a 12 day period at location 2'.*

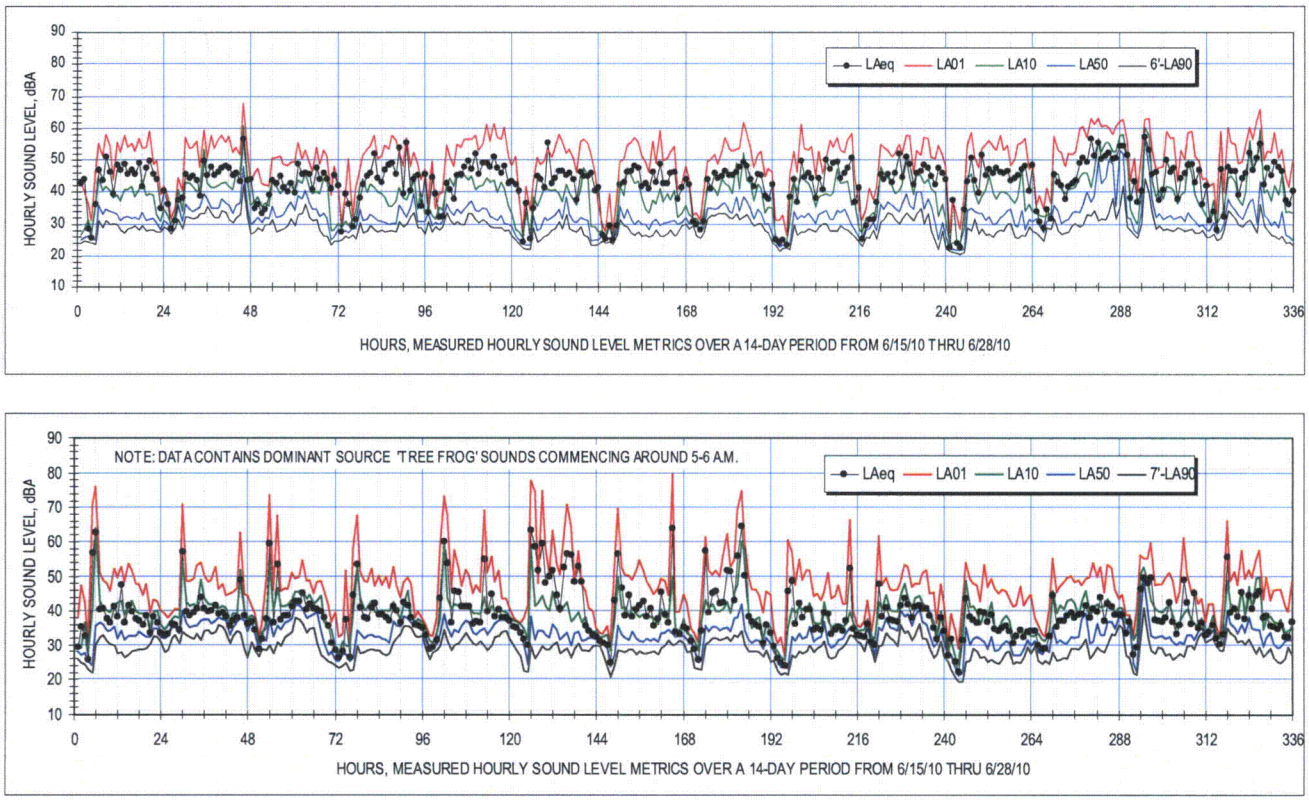

Figure 3: *Measured hourly noise metrics over a 14 day period at locations 6'above and 7'below.*

Discussion

The measured results in Table 1 are summarized in terms of the arithmetic average of the daily minimum hour metrics LA50, LA90 and LAeq. In addition, the 24 hour metric, Ldn or DNL (Level, day/night or Day Night Level) is averaged over the survey period. These four metrics are the most commonly used for environmental noise assessments to define "Existing Conditions".

Comparison of the graphic hourly plot shows an unusual pattern at location 7'. At first glance, the spikes or sharp peaks at 5 or 6 a.m. could be attributed to commuter traffic, except location 6' on the same road does not exhibit the early morning peaks and the peaks occur every day including weekends. It turns out to be the nocturnal pattern of tree frogs and insects at this location as can be illustrated by frequency analysis of the data.

Figure 4 below plots the hourly frequency spectra (Leq energy average) for the hours from 2 a.m. thru 8 a.m. at location 7'. Note there was no significant insect activity until the 5-6 a.m. hour. Notice the A-weighted level increases over 25 dBA when tree frogs become active! This occurs because high frequencies control the A-weighted sound level. While the spectra are true, the high A-weighted levels provide no sound masking of power plant noise.

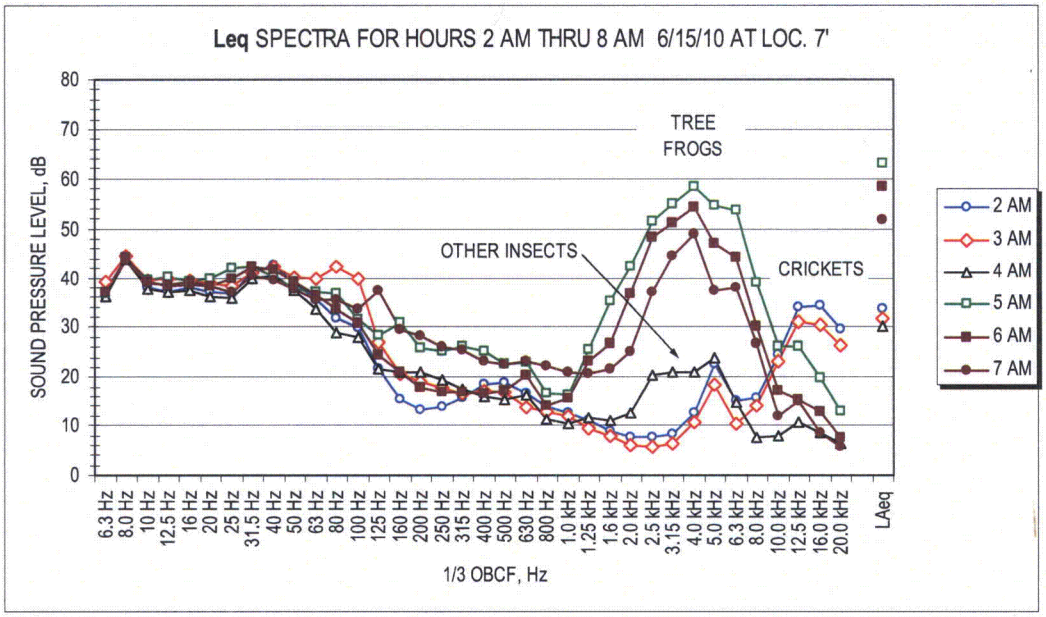

Figure 4: *Measured hourly spectra at Location 7'Leq metric.*

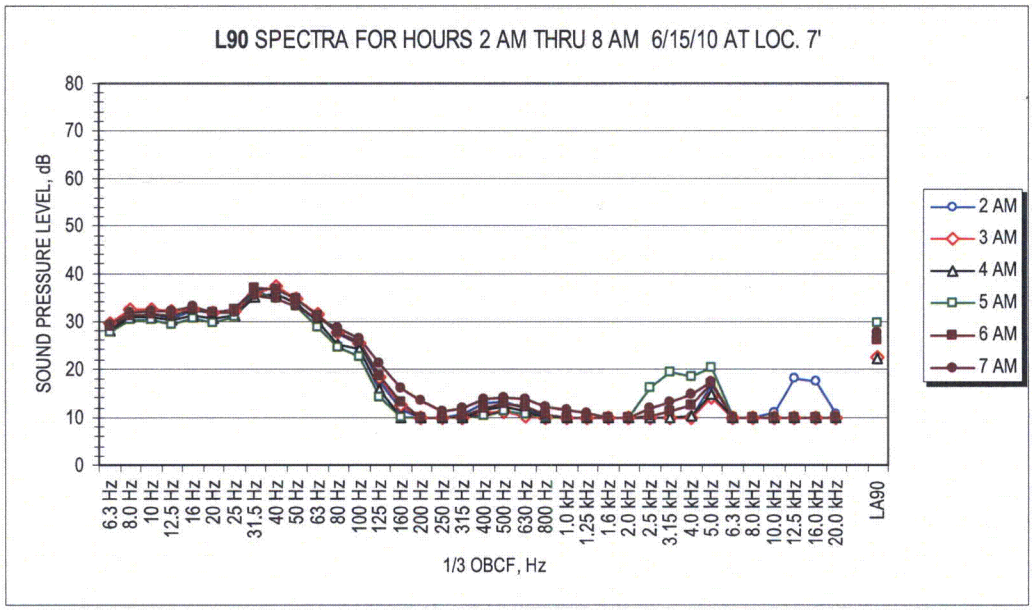

Figure 5: *Measured hourly spectra at Location 7'L90 metric.*

The next plot, Figure 5, shows the hourly sound levels for the L90 (residual) sound level metric for the same hours and it is clear by the repeatability from hour to hour that the L90 metric is a much truer representative for environmental noise. The Leq metric is 63 dBA for the 5-6 hour whereas the true level capable of masking power plant noise is only 30 dBA (L90) for this hour.

Insect 'contamination' of LAeq and Ldn noise measurements has existed since the metrics were developed by EPA in the early 1970s. Hessler[2] and Schomer, et al[3] have shown that a simple new sound level meter (SLM) weighting called Ai could be incorporated into a SLM that would eliminate insect noise. Current members of the ISO standards body working group S12 WG15 are considering it for standardization, but until then we report the actual measured levels including the tree frog 'contamination'.

It should be stated that the daily minimum LA50, LA90 and LAeq results given in Table 1 are not greatly influenced by insect noise and are eminently valid for environmental assessment purposes. Only the Ldn metric is affected.

Summary

As mentioned in the Test Methodology section, conditions for the survey were ideal to record minimum or very quiet levels. If one examines the plots in Figures 2 and 3 it is observed that the day time residual level, LA90 varies from 30 to 35 dBA at all measured locations. This is termed a "macro area ambient" and is typically found in very quiet suburban or rural areas as shown below:

Typical Residential Area Sound Levels (Source, EPA Community Noise Study)

Daytime Residual Level, dBA, Level Exceeded 90% of the Time, LA90

Description	Typical Range	Average
Very Quiet Rural or Remote Area	*26 to 30 inclusive*	*28 (New, HAI Study)*
Very Quiet Suburban or Rural Area	*31 to 35 inclusive*	*33 (ANSI B133.8)*
Quiet Suburban Residential	36 to 40 inclusive	38
Normal Suburban Residential	41 to 45 inclusive	43
Urban Residential	46 to 50 inclusive	48
Noisy Urban Residential	51 to 55 inclusive	53
Very Noisy Urban Residential	56 to 60 Inclusive	58

In essence, there is little steady ambient sound to mask plant noise emissions. This fact must be considered in the design of noise abatement for BBNPP and apparently it was for the design of SSES 1 & 2 as evidenced by fact there was no discernible operational plant noise observed from the existing facilities during the six visits to the site for these surveys.

Advise if I can assist in any other way or answer any questions.

George F. Hessler Jr., Bd. Cert. INCE

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[2] Hessler, G.F., "Measuring ambient sound levels in quiet environments", Inter-Noise 2009, Ottawa, Canada, 23-26 August, 2009

[3] Schomer, Slauch,& Hessler , "Proposed 'Ai'-Weighting: a weighting to remove insect noise from field measurements", Inter-Noise 2010, Lisbon, Spain, 15-16 June, 2010