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Shaw® Stone & Webster, Inc.

Mr. Craig Nichols
Entergy Nuclear Vermont Yankee
320 Governor Hunt Road
Vernon, VT 05354-9766

June 14, 2005
WBS: 23750
VY 2005-0313

SUBJECT: ENTERGY / VY EPU PROJECT – PURCHASE ORDER NO. 4500523764
SCN 59029-050
TRANSMITTAL OF FINAL COOLING TOWER PRE & POST MODIFICATION NOISE TEST REPORT
VERMONT YANKEE NUCLEAR POWER STATION

Dear Mr. Nichols;

Please find the attached FINAL Cooling Tower Pre & Post Modification Noise Test Report for Entergy acceptance. Entergy comments have been incorporated.

If you have any questions, please contact me at 617 589-1120.

Sincerely,

DE Yasi

Dan Yasi
Project Manager
enc
Cc: M. Powers
G. Thomas

Entergy

EXTENDED POWER UPRATE
COOLING TOWER PRE & POST MODIFICATION NOISE TEST REPORT

for

VERMONT YANKEE NUCLEAR POWER STATION

Prepared for
Entergy Nuclear Vermont Yankee, LLC

59029-RPT-05-001
VY P.O. 4500523764, SCN 59029-050

June 2005

Stephen T. Wilcox 8/11/05
Preparer Date

Wayne E Bradley 6/9/05
Reviewer Date

O E Yasi 6/14/05
Project Manager Date

Prepared by

Shaw™ Stone & Webster, Inc.

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1.0 PURPOSE & SCOPE

The Vermont Yankee Nuclear Power Station (VYNPS) is performing a thermal up-rate to approximately 120% of the original NRC licensed power level. As a condition of their approval of the up-rate, the Vermont Public Service Board required replacing 21 of the 22 - 125 HP cooling tower motor/fan units with 200 HP units and replacing the 8-bladed fans with a 10-bladed design. One of the design criteria is that the motor/fan changes cannot increase the cooling tower sound levels by more than 1 dBA. Baseline and post-modification sound measurements were required to document the cooling tower operational sound levels. These sound level tests have been completed and the data analyzed. This report summarizes the two tests and presents the results.

2.0 INSTRUMENTS

Baseline sound level measurements were made with a Svantek, model 949 (sn 6028) integrating sound level meter with a Larson Davis, model CAL-200, (sn 2425) acoustic calibrator. Post-modification sound level measurements used the same baseline instruments, with the addition of a Rion, model NA29E (sn 108810374) integrating sound level meter and a Bruel & Kjaer, model 4230, acoustic calibrator (sn 860801). All instruments meet the applicable American National Standards Institute (ANSI) or the International Electrotechnical Commission (IEC) requirements for Type 1 accuracy and have calibration certificates traceable to the National Institute of Standards and Technology (NIST).

The sound level meter was calibrated before and after the test periods with a 94 dB reference level at 1 kHz. Before, during and after each test all of the instruments functioned properly and required no adjustments. The sound level meter and microphone (with windscreen), mounted on a tripod, were positioned approximately 5-ft above the ground.

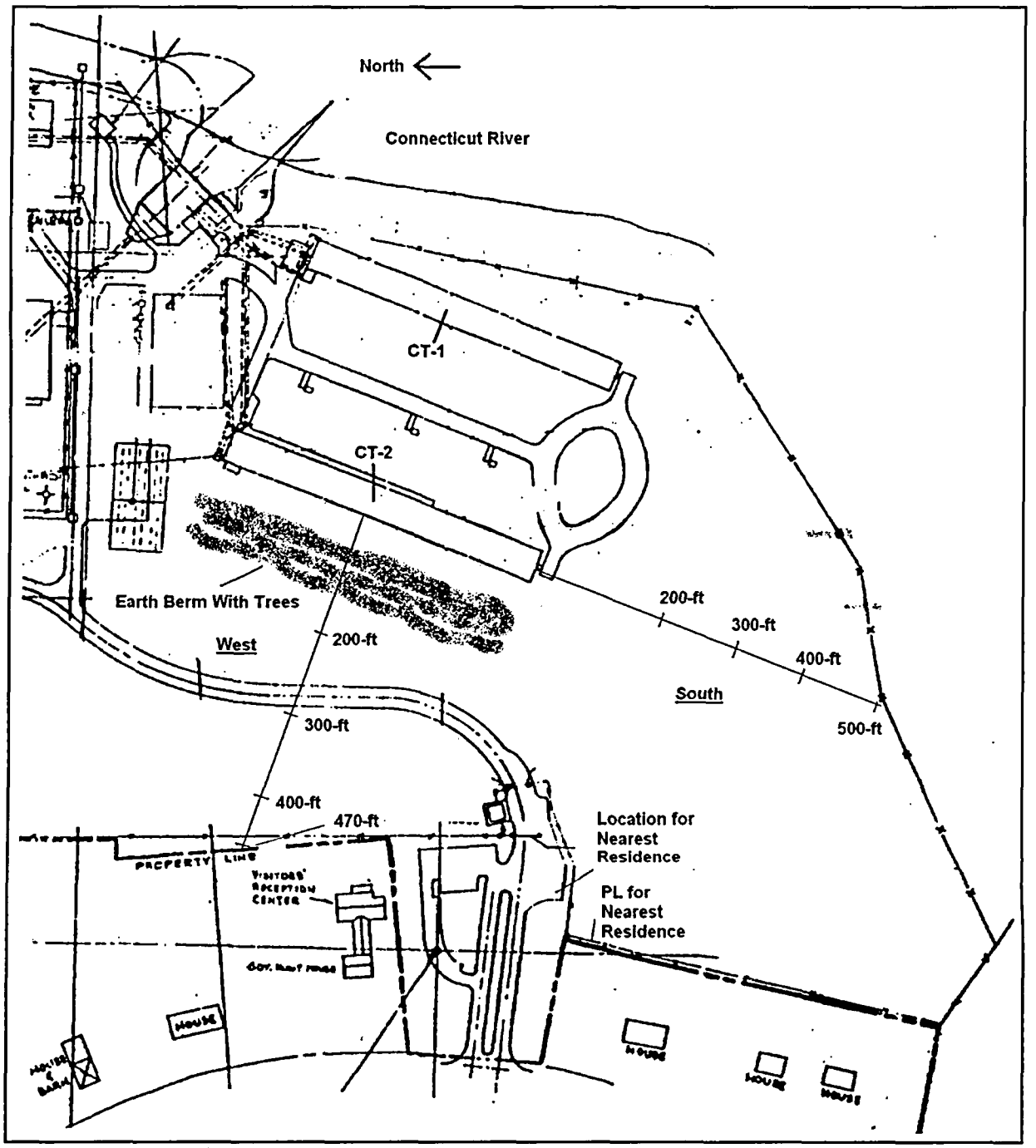
3.0 MEASUREMENTS

Both sound level measurement tests were performed by Stephen Ambrose, a Noise Specialist with Shaw Environmental. The baseline test was observed by Daniel Yasi of Stone & Webster and the post-modification afternoon test was observed by Shailendra Chivate, a coop student with Entergy.

Prior to performing the sound test, each measurement location was pre-marked at 100-ft intervals from 200 to 500-ft from the nearest point on Cooling Tower 2 (CT2). Measurement distances were referenced to the louver sidewall (west) or solid end wall (south). The distance was also measured to the nearest residential property line to the southwest. It was not possible to measure in other directions because of significant obstructions or interferences, which included restricted access to protected power station areas, other power station noise sources, property fences and the Connecticut River. The measurement locations and related fenced or site property lines are shown on Figure 1.

"A-weighted" Leq (dBA) sound levels for each test were measured over 5-minute intervals, [and the post modification included five 1-minute intervals (Rion) were measured to test for consistency] at each location. Because of the long Leq averaging time, the occasional influences of non-tower related noise sources were minimized. When a louder or longer duration intrusive sound was anticipated, the sound level meter's measurement interval was paused and then continued when the interfering sound ended. The measurement interval would be restarted if the measurement were contaminated by a loud noise.

Figure 1 – Cooling Tower Sound Level Measurement Locations



Note: The bases of the cooling towers are at least 20-feet lower than the elevation for the sound measurement. An earth berm is located about 100 to 200-ft from the cooling towers. This berm blocks the lower half of the air intakes and provides an effective acoustic barrier to the waterfall sound into the CT2 basin to the west.

3.1 Baseline

The baseline test was performed on October 12, 2004 from 5:00 am to 7:00 am with both cooling towers operating in the closed cycle mode. The ground level wind speed was less than 15 mph from the north with a clear sky and an air temperature of 51°F.

During this test, water was flowing through all cells with three booster pumps. The west-cooling tower (CT2) had all fans operating while the east-cooling tower had fans CT1-1, 3 & 5 off. The reduced capacity of CT1 had a no to a minimal effect on the sound levels at Locations from 200 to 470-ft to the west. Copies of the field recorded sound level measurement data sheets are included as Attachment 6.1.

Measurements to the west were representative of the sound levels toward the nearest neighbors. There was no direct line-of-sight view of CT2 air inlets due to an earth berm with tall leaf bearing trees obscuring the top of the tower. There are no south facing air inlets on CT2, however there was some audible waterfall noise from the more distant CT1 air inlets.

3.2 Post Modification

The post-modification sound test was performed on May 10, 2005 from 3:30 pm to 4:40 pm to the west and south. The west direction was repeated from 7:20 pm to 9:00 pm for confirming the afternoon measurements. During this test, the towers were configured to operate as close as possible to the baseline operation. The wind speed was less than 10 mph from the south with a clear sky, an ambient air temperature of 83°F for the afternoon measurements and about 68°F during the evening into the early night.

The west tower had the northern most fan (CT2-1) off. (Note: this is the non-modified fan). The east tower operated the same as during the baseline test with 3 fans off (CT1-1, 3 & 5) and water was flowing through all cells using 3 booster pumps. Copies of the field recorded sound level measurement data sheets are included as Attachment 6.2.

The post-modification sound level measurements to the west were made with a crosswind that was from the opposite direction for the baseline measurements. The trees had only early leaf foliage that only partially obscured the view of the CT2.

The Vernon Hydro Power Station was clearly audible at 400 and 500-ft distances south of the cooling towers. No measurements were made to the southwest, adjacent to the nearest residence property line. This was due to seeing a dog outside the house and the previous baseline experience of causing the dog to bark when near this residence.

4.0 ANALYSIS

An adjustment was made to the post modification measurements to account for the one fan cell in CT2 that was not operating. This adjustment took into consideration the number of operating cells and the adjustment required adding 0.4 dB to the west[1]. No corrections were made for the south direction since these measurements were not comparable (downwind versus upwind). This adjustment may be considered conservative because it does not include the sound contribution of water flowing thru CT2-1.

The sound level data for both tests is tabulated in Table 1. (The post modification data includes the sound level adjustment). The sound level difference column indicates that the post-

[1] Note: This correction is based on the following:
Fan Corr. (dB) = (10 x Log 10 fans) – (10 x Log 11 fans) = 0.4 dB west direction

modification measurements to the west were generally the same or up to 1.2 dB quieter than the baseline measurements.

Table 1 – Summary of Sound Level Measurements
Cooling Tower Baseline & Post Modification

Orientation/ Direction	Reference/ Distance	Wind Condition	12-Oct-04 Baseline dBA	10-May-05 Post Mod dBA (1)	Difference dB	Comment
West	200-ft	Cross/Cross	65.1	63.9 after 64.3 eve	-1.2 -0.8	Crosswind Comparable
West	300-ft	Cross/Cross	63.2	62.6 after 62.0 eve	-0.6 -1.2	Crosswind Comparable
West	400-ft	Cross/Cross	61.9	62.0 after 61.9 eve	0.1 0.0	Crosswind Comparable
West	470-ft	Cross/Cross	60.5	n/a 59.9 eve	n/a -0.6	Crosswind Comparable
Nearest Residence Southwest	525-ft	Cross/Cross	59.6	Omitted / Dog	n/a	n/a
South	200-ft	Down/Up	61.3	56.9	n/a	Opposite Wind Not Comparable
South	300-ft	Down/Up	58.8	53.3	n/a	Opposite Wind Not Comparable
South	400-ft	Down/Up	57.3	52.0	n/a	Opposite Wind Not Comparable
South	500-ft	Down/Up	55.7	52.5	n/a	Opposite Wind Not Comparable

Notes: 1) These dBA levels include the addition of 0.4 dB as the adjustment for the non-operating fan.
Abbreviations: Afternoon = after & Evening = eve

The west direction measurements, baseline and post-modification, were measured under similar wind conditions. The baseline test had a wind more from the north, whereas the post-modification was more from the south. Measurements made south of the cooling tower were not comparable since the wind directions were directly opposing.

5.0 CONCLUSION

The cooling tower baseline and post-modification sound level tests were conducted with comparable crosswind conditions for the west direction and toward the nearest neighbors. The results of these tests confirm that the cooling towers, after their fan modifications, comply with the requirement that the cooling tower shall not increase by more than 1 dBA.

6.0 Attachments

6.1 Baseline Data Sound Level Measurement Data

6.2 Post Modification Sound Level Measurement Data

6.1 Baseline Data Sound Level Measurement Data

Sheet 1 of 1

Vermont Yankee Nuclear Power Station — Sound Measurement Test Procedure

Cooling Tower Sound Level Measurement Data Sheet

Test Date: 12 OCT 04 Description: Baseline Page 1 of 1

Test Engineer / Technician: Stephen Ambrose / Daniel Yasi

Sound Level Meter: SvanTek Model: 949 SN: 6028

Acoustic Calibrator: Larson Davis Model CAL200 SN 2425

Calibration Check: SLM Pre-test: 94.0 dBA at 1 kHz SLM Post-test: 94.0 dBA at 1 kHz

Calibration Certificate Due Dates: SLM: 11 Dec 2004 Acoustic Cal.: 9 Apr 2005

CT Operating Conditions: Closed Cycle, Twr's 1&2, CT 1-4, 3, 5 off

Start Time: 0500 Wx: Clear, Wnd N 12-15 steady, 51°F

End Time: 0700 Wx: Clear, Wnd N 12-15 steady, 51°F

Item	Time	Loc ID	Direction	Dist (ft)	Leq	Comment
1	0509	W1	West	200	65.1	Cooling Tower, Some leaves, Crosswind
2	0520	W2	West	300	63.2	" " "
3	0531	W3	West	400	61.9	" " "
4	0539	W4	West	470	60.5	" " "
5	0534	S1	South	200	61.3	Cooling Tower Some leaves Downwind
6	0607	SW2	Southwest	600 CTR 525 CNR	59.6	Cooling Tower Some leaves Cross / Downwind
7	0640	S2	South	300	58.8	Cooling Tower Some leaves Downwind
8	0646	S3	South	400	57.3	" " "
9	0654	S4	South	500	55.7	" " "
10						
11						
12						
13						
14						
15						

Signature: Stephen Ambrose Date: 12 Oct 04

Stone & Webster — October 2004

6.2 Post Modification Sound Level Measurement Data

Sheet 1 of 4

Afternoon

Vermont Yankee Nuclear Power Station — Sound Measurement Test Procedure

Cooling Tower Sound Level Measurement Data Sheet Afternoon

Test Date: 10 May 2005 Description: CT Post Mod Page 1 of 2

Test Engineer / Technician: Stephen Ambrose / Shailendra Chivate

Sound Level Meter: SvanTek Model: 949 SN: 6028

Acoustic Calibrator: Larson Davis Model CA 200 SN 2425

Calibration Check: SLM Pre-test: 93.8 dBA at 1 kHz SLM Post-test: 93.8 dBA at 1 kHz

Calibration Certificate Dates: SLM: Dec 2005 Acoustic Cal.: Apr 2005

CT Operating Conditions: CT2, 10 fans on, North (MDS) off, CT1 3 off

Start Time: 15:30 Wx: Clear, South 3-10 mph ground, 83°F

End Time: 16:40 Wx: clear, South 3-10 mph ground 82°F

Item	Time	Loc ID	Direction	Dist (ft)	Leq	Comment
1	1535	W1	West	200	63.5	CT water, fans, birds
2	1542	W2	West	300	62.8	CT water, fans, birds
3	1555	W3	West	420	61.6	CT fans, birds
4	1601	W4	West	470	—	Stopped - Traffic, shift
5	1610	S1	South	200	56.8	CT1 WTR, fans, birds
6	1619	S2	South	300	53.3	CT1 WTR, fans, birds
7	1626	S3	South	400	52.0	CT1 WTR, fans, birds, Dam
8	16:33	S4	South	500	52.5	CT1 WTR, birds, Dam
9						
10						
11						
12						
13						
14						
15						

Signature: [signature] Date: 10 May 05

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Afternoon

Sheet 2 of 4

Cooling Tower Sound Level Measurement Data Sheet Afternoon

Test Date: 10 May 2005 Description: CT Post Mod Page 2 of 2

Test Engineer / Technician: Stephen Ambrose/Shailendra Chinte

Sound Level Meter: Rion Model: NA29E SN: 10810374

Acoustic Calibrator: Brüel & Kjaer Model 4230 SN 860801

Calibration Check: SLM Pre-test: 93.8 dBA at 1 kHz SLM Post-test: 93.8 dBA at 1 kHz

Calibration Certificate Dates: SLM: Jun 04 Acoustic Cal.: Mar 05

CT Operating Conditions: CT2, 10 Fans MOST North off, CT1 3 off

Start Time: 1530 Wx: Clear, South 3-10 mph ground

End Time: 1640 Wx: Clear, South 3-10 mph ground

Item	Time	Loc ID	Direction	Dist (ft)	Leq	Comment
1	1535	W1	West	200		63.5, 63.5, 63.5, 63.7, 63.7
2	1542	W2	West	300		62.2, 62.2, 62.2, 61.4, 61.4
3	1555	W3	West	400		60.9, 61.5, 61.4, 61.6, 62.1
4	1601	W4	West	470		Stopped – Traffic, Shift
5	1610	S1	South	200		57.2, 57.2, 56.9, 57.1, 57.1
6	1619	S2	South	300		53.3, 53.0, 53.1, 53.3, 54.4
7	1626	S3	South	400		52.3, 51.7, 52.6, 52.2, 51.7
8	1633	S4	South	500		54.3, 52.4, 51.6, 52.2
9						
10						
11						
12						
13						
14						
15						

Signature: Stephen Ambrose Date: 10 May 05

Evening

Sheet 3 of 4

Vermont Yankee Nuclear Power Station — Sound Measurement Test Procedure

Cooling Tower Sound Level Measurement Data Sheet Evening

Test Date: 10 May 2005 Description: CT Post Mod Page 1 of 2

Test Engineer / Technician: Stephen Ambrose

Sound Level Meter: SvanTek Model: 949 SN: 6008

Acoustic Calibrator: Larson Davis Model CA200 SN 2425

Calibration Check: SLM Pre-test: 93.8 dBA at 1 kHz SLM Post-test: 93.8 dBA at 1 kHz

Calibration Certificate Dates: SLM: Dec 2005 Acoustic Cal.: Apr 2005

CT Operating Conditions: CT2, 10 Fans, North off, CT1, 3 off

Start Time: 1920 Wx: Clear, South < 10mph, 68°F

End Time: 2100 Wx: Clear, South < 10 mph < 68°F

Item	Time	Loc ID	Direction	Dist (ft)	Leq	Comment
1	1921	W4	West	470	60.6	mic height 5.5ft
2	1928	W4	West	470	59.5	mic height 1.5ft See Note
3	1935		West	500	57.5	
4	1943		West	600	55.5	
5	2003		West	700	54.2	
6	2022		West	446	61.0	
7	2029	W3	West	400	61.5	
8	2038	W2	West	300	61.6	
9	2049	W1	West	200	63.9	
10						
11						
12						
13						
14	Note: Baseline position was on otherside of					
15	fence which was at a Lower grade. This height is the same, while the Distance difference is					

Signature: [signature] Date: 11 May 05

Evening

Sheet 4 of 4

Vermont Yankee Nuclear Power Station — Sound Measurement Test Procedure

Cooling Tower Sound Level Measurement Data Sheet Evening

Test Date: 10 May 2005 Description: CT Post Mit Page 2 of 2

Test Engineer / Technician: Stephen Ambrose

Sound Level Meter: Rion Model: NA29E SN: 10810374

Acoustic Calibrator: Bruel & Kjaer Model 4230 SN 860801

Calibration Check: SLM Pre-test: 93.8 dBA at 1 kHz SLM Post-test: 93.8 dBA at 1 kHz

Calibration Certificate Dates: SLM: Jun 04 Acoustic Cal.: Mar 05

CT Operating Conditions: CT2, 10 Fans North off, CT1 3 off

Start Time: 1920 Wx: Clear, South, <10mph, 68°F

End Time: 2100 Wx: Clear, South <10mph, <68°F

Item	Time	Loc ID	Direction	Dist (ft)	Leq Avg	Comment
1	—					
2	—					
3	1935		West	500	57.7	57.7, 57.7, 57.8, 57.6, 57.8
4	1943		West	600	55.8	55.7, 55.8, 55.7, 56.1, 55.7
5	2023		West	700	53.8	53.7, 53.8, 53.8, 54.0, 54.0
6	2032		West	446	61.1	61.2, 61.2, 61.2, 61.1, 61.0
7	2030	W3	West	400	61.6	61.7, 61.6, 61.5, 61.6, 61.5
8	2038	W2	West	300	61.6	61.5, 61.6, 61.6
9	2044	W1	West	200	64.0	64.0, 64.0, 63.9, 64.0, 64.0
10						
11						
12						
13						
14						
15						

Signature: Stephen Ambrose Date: 10 May 05

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