Entergy

Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, N.Y. 10511-0249
Tel (914) 734-6700

Fred Dacimo
Vice President License Renewal

February 7, 2008
Indian Point Unit Nos. 2 and 3
NL-08-026

Mr. Andrew Feeney
First Deputy Director
New York State Emergency Management Office
1220 Washington Avenue
Public Security Building 22
Albany, New York 12226-2251

Subject: Indian Point Energy Center Alert and Notification System Far Field Measurements Methodology

Reference: Entergy letter, "Indian Point Energy Center Alert and Notification System Conclusions from November 9, 2007 Technical Review Meeting," Mr. John McCann to Ms. Rebecca Thomson, FEMA, dated January 18, 2008

Dear Mr. Feeney:

Entergy Nuclear Operations, Inc. (Entergy) hereby submits for your review and comment the enclosed proposed Indian Point Energy Center (IPEC) Alert and Notification System Far Field Measurements Methodology. This submittal is being provided in accordance with an action in the referenced letter to provide FEMA with a proposal for the analysis of far field measurements including techniques and data analysis methodology. Entergy requests agreement by applicable stakeholders on the approach for far field measurements and data analysis. Our plan is to contact FEMA shortly to meet on the Far Field Measurement technique and obtain their concurrence.

Should you have any questions regarding this matter, please contact Mr. Michael J. Slobodien, Director Emergency Planning, Entergy at (914) 272-3352.

Sincerely yours,

Fred R. Dacimo
Vice President License Renewal
Indian Point Energy Center

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Enclosure: 1. Indian Point Energy Center Alert and Notification System Far Field Measurements Methodology

cc: Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Mr. Samuel J. Collins
Regional Administrator
Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Resident Inspector's Office
Indian Point Unit Nos. 2 and 3
U.S. Nuclear Regulatory Commission

Mr. Robert Kahler
Office of Nuclear Security and Incident Response
Division of Preparedness and Response
Licensing and Inspection Branch
Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Ms. Rebecca S. Thompson
REP Branch Chief
Federal Emergency Management Agency
Region II
26 Federal Plaza, 13th Floor, Suite 1337
New York, NY 10278-0002

Mr. Stephen Kempf, Jr.
Regional Administrator
Federal Emergency Management Agency
Region II
26 Federal Plaza
New York, NY 10278

Mr. Daniel Greeley
Deputy Director
Rockland County Fire and Emergency Services
35 Fireman's Memorial Drive
Pomona, New York 10970

Mr. Anthony Sutton
Commissioner
Westchester County
Department of Emergency Services
4 Dana Road
Valhalla, New York 10595

Mr. Seamus Leary
Deputy Commissioner
Orange County
Department of Emergency Services
225 Main Street
Goshen, New York 10924

Mr. Adam Stiebeling
Deputy Commissioner
Putnam County
Bureau of Emergency Services
112 Old Route 6
Carmel, New York 10512

Indian Point Energy Center Alert and Notification System
Far Field Measurements Methodology

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Far Field Measurements Methodology

Indian Point Energy Center

ATI Siren System

February 7, 2008

The purpose of the measurements described herein is to characterize the amplitude of sound produced by the complete siren system around the Indian Point Energy Center. The results from these measurements will be compared with the results from the model developed by ATI to confirm the quality of the prediction reflected in the ATI model.

Equipment

ANSI certified Type 1 Sound Level Meters (SLMs) will be used in the measurements as per ANSI S12.18-1994. Before and after each measurement the calibration of each sound level meter will be checked, and the calibration tone will be recorded for at least 30 seconds. Each sound level meter will be capable of recording noise data at one-second intervals. The SLMs will be set to record the C-Weighted values. The 1 second Leq and the 1 second third octave band data will be recorded wherever possible based on equipment availability. Each SLM microphone will be fitted with a wind screen and will be mounted on a tripod or other suitable firm mounting device at a height of approximately 5 feet above ground level. The SLM operator will synchronize the SLM and his time piece with the clock used to initiate the siren test. In addition, meteorological data will be collected including wind speed and direction, temperature and humidity within the EPZ.

Measurement Locations

Twenty (20) measurement locations will be selected within the EPZ. Locations of interest will include high population density areas and those locations previously identified with potentially lower projected sound levels, where additional sirens were added. Measurement locations will be identified at least three weeks prior to the test and provided to FEMA for its review. FEMA concurrence received one week prior to testing will enable training and logistics preparation for the test to proceed. Each measurement position should be approximately 50 feet from the nearest reflecting surface such as buildings, boulders, walls, and other obstacles. The precise location of each measurement location with GPS coordinates will be determined and recorded, together with any additional details about the measurement location.

General guidelines for selecting measurement locations are that the measurements should be roughly 1,000 feet or more from the nearest siren.

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Measurement Procedure

The SLMs will start recording data approximately 2 minutes or more prior to the full system sounding and will continue to record data for at approximately 2 minutes or more after the siren sounding has concluded. The "prior to" and "after" readings, provide a measure of the ambient conditions. The testing personnel should be careful not to make any noise during the period while the SLM is running including the periods prior to and after siren sounding while the SLM is operating.

Each team operating an SLM will be given a data sheet (as shown in Figure 1) that will be filled out completely. Each data sheet will have all of the information about the test including the date, time, location, SLM serial number, and calibration. In addition, the team will record the local ambient noise level before and after the siren system sounding. Each team will note on the data sheet any significant intruding noise sources that occur during the test. This is intermittent noise that is above background. The team will record the source and time of the intrusion on the data sheet.

Testing will not be conducted if meteorological conditions such as precipitation and elevated wind conditions are not appropriate. Disqualifying conditions are stated in ANSI S12.18-1994. That determination should be made by the Test Director on the day of the test

Data Analysis

The data from the SLMs will be analyzed to determine the sound level produced during the full siren system activation. The third-octave band with the majority of the siren energy will be identified and used for part of the analysis, including the difference above ambient. To avoid the problems of determining the precise start and stop times, the middle three minutes of the siren sounding will be used. From this portion of the data the following metrics should be determined:

- 3 minute C-Weighted Leq
- Maximum 1 second C-Weighted Leq
- 3 minute Leq in the third octave band with the majority of the siren energy*
- Maximum 1 second LEQ in the third octave band with the majority of the siren energy*
- L10, L50, and L90 for the C-Weighted data during the 3 minutes identified
- L10, L50, and L90 in the third octave band with the majority of the siren energy* during the 3 minutes identified

* Depending on equipment availability

The 3 minute C-Weighted Leq will be used as the measurement for comparison with the ATI sound contour model prediction.

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Comparison with Model Predictions

The measured metrics will be compared to the output from ATI's sound propagation model. The metric to be used for this analysis is the 3 minute Leq. Lmax will be reviewed for a more complete understanding of additional margin. For this analysis the Leq sound level predicted by the model will be compared with the measured sound pressure level at each location. To evaluate the quality of the sound propagation model, the data will be analyzed by a bulk average deviation method as shown in Eq. 1 below. Any significant outlier will be identified and considered. If there are extenuating circumstances that are identified and justify exclusion, these outliers will be removed from the bulk average calculation. An outlier is defined as a measurement greater than 3 standard deviations of the difference in predicted and measured sound pressure level data. Any exclusion will be documented.

$$\text{(Eq. 1)} \quad Q = \frac{\sum (P_i - M_i)}{N}$$

Where:

Q is the measure of model quality
P_i is the predicted Leq sound pressure level at the i^{th} location
M_i is the measured Leq sound pressure level at the i^{th} location
N is the total number of measurements

A value for Q of positive 3 dBC or less is indicative of a high level of model quality. Since this is a one-sided test any negative value of Q is acceptable, since that means the measured values are predominately higher than the predicted and thus the model would be conservative.

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Figure 1

Indian Point Siren Test Sheet

Date:_____ Time: _____

SLM Model: _____ SLM Serial Number:_____

Tester's Name: _____

Measurement Location: _____

GPS Coordinates:_____ West _____North

Plan Sketch of Site **Show all structures within 300 feet**	**Elevation Sketch of Site**

Location Drawing:

Microphone height:_____ ft. Temperature: _____ °F

Checked Battery? Yes No Rel. Humidity: _____%

Checked Clock? Yes No Wind Speed: _____ mph

Taken Photo? Yes No Wind Direction: _____

Calibration level before test:_____ dBC

30 second calibration tone recorded before test? Yes No

Ambient noise level before test: _____ dBC

Maximum level observed during the test: _____dBC

Calibration level after test: _____ dBC

30 second calibration tone recorded after test? Yes No

Ambient noise level after test: _____ dBC

Notes about test (including noise intrusions):

Tester's Signature: _____