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September 21, 2007

Andrew Feeney
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Building 22, Suite 101
Albany, NY 12226-2251

SUBJECT: Indian Point Energy Center Alert and Notification System

- References:
1. Entergy letter dated August 22, 2007; Michael Slobodien to Andrew Feeney, regarding technical data pertaining to proposed new ANS.
 2. FEMA letter dated August 29, 2007; Rebecca Thomson to Andrew Feeney, regarding status of FEMA technical assessment.
 3. FEMA letter dated September 12, 2007; Rebecca Thomson to Andrew Feeney, regarding FEMA detailed assessment of technical data for proposed new ANS.

Dear Mr. Feeney:

Entergy Nuclear Operations, Inc. (Entergy) has completed an initial evaluation of the conclusions reported in the Reference 3 technical assessment performed by FEMA pertaining to the newly installed Alert and Notification System (ANS) for the Indian Point Energy Center. Based on a review of data provided by Entergy in Reference 1, FEMA concluded that the newly installed ANS is inadequate with respect to several requirements established in applicable FEMA guidance. Entergy is providing, in Attachment 1, an outline of the steps taken, or proposed to address the results of the FEMA technical assessment. Entergy requests a meeting with FEMA to discuss the technical aspects of our proposed plans and determine a mutually acceptable schedule for resolving the open items.

The following summarizes the approach for the major issues identified in the Reference 1 letter:

- A. Capability of as-installed sirens to produce an alerting tone that is steady and capable of repetition.

Entergy recognizes that the ATI Model HPSS32 sirens are not providing an acoustic output of 122 dBC that is steady and repeatable in that units of peak measured values were used to describe the

siren output and that peak values are not appropriate units with respect to the steady and repeatable criteria. Entergy therefore performed acoustic output measurements at each siren using the more appropriate units of Leq. Entergy then input these actual measured values (which Entergy believed met a steady and repeatable standard) for each siren into the acoustic propagation model described in the design report. Entergy concluded that the sound levels predicted by the model (with the addition of five new sirens that were added to improve sound coverage in certain areas) met the fundamental acceptance criteria of FEMA-REP-10, although without the margin that would have existed if the output were 122 dBC Leq. Data that Entergy used to reach those conclusions were submitted in Reference 1. Since the FEMA technical review of that submittal concludes that the requirements of FEMA guidance are not being met, Entergy is committed to identifying and implementing appropriate corrective actions. Entergy is contracting with additional technical experts for support in this area. Entergy is planning to perform laboratory testing of the sirens and associated electronics to determine if adjustment or modification of the existing sirens is a viable option or if siren replacement or siren population changes will be required. Entergy would like to meet with FEMA technical reviewers to obtain feedback on the proposed approach and to determine schedule milestones for activities which FEMA may wish to witness or otherwise review.

Additional details regarding siren system acoustics are provided in Attachment 1.

B. Sound blocking from co-located sirens, tree limbs, and foliage

Upon receipt of Reference 3, Entergy reviewed the potential impact of the newly installed sirens on the functionality of the existing siren system. Based on this review, Entergy concluded that the minor physical interference caused by the new siren system does not prevent the existing siren system from successfully performing its intended function to alert the public. Entergy discussed this topic during a conference call with FEMA, NRC and other stakeholders on September 13, 2007. It is Entergy's understanding that FEMA concurs with our conclusion.

Attachment 1 discusses additional actions planned by Entergy regarding tree limbs and foliage.

C. Control System issues

Entergy conducted a series of 56 control system tests from August 1 to 14, 2007 and reported the results of that testing in the Reference 1 transmittal to FEMA. In Reference 2, FEMA suggested that additional tests be performed with other configurations that would test different combinations of control systems. Entergy conducted additional tests from September 6 to 17, 2007 and the results are provided in Attachment 2 for FEMA review. Additional information in response to FEMA conclusions regarding control system issues is provided in Attachment 1.

Based on review of the FEMA technical assessment and feedback from other stakeholders, Entergy's intent is to make the new siren system louder. Entergy will implement actions that will achieve acoustic coverage in the EPZ equivalent to that which would be achieved by a nominal 122 dBC (Leq) output at each siren location. This will be consistent with the system description provided in the January 2006 version of the design report reviewed and approved by FEMA. Entergy expects to achieve this objective by improving the acoustic output of the newly installed sirens, or by replacing the new sirens with louder sirens, or by increasing the number of sirens

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used in the system, or by some combination of these options. Entergy will also update the siren design report to include this new or additional information and provide it to FEMA as requested. Entergy looks forward to a technical meeting with FEMA to discuss our planned approach and to reach a mutually agreeable schedule for the planned activities.

Sincerely,

A handwritten signature in black ink that reads "Michael A. Balduzzi". The signature is written in a cursive style with a large, sweeping initial "M".

Michael Balduzzi
Senior Vice President

cc: R. Thomson, FEMA
V. Quinn, FEMA
S. Collins, NRC
J. Boska, NRC
M. Kansler, Entergy

ATTACHMENT 1

PROPOSED ACTIONS TO ADDRESS CONCLUSIONS FROM THE
SEPTEMBER 12, 2007 FEMA TECHNICAL REVIEW OF THE
NEWLY INSTALLED ALERT AND NOTIFICATION SYSTEM
AT INDIAN POINT ENERGY CENTER

Siren Signal Steadiness

Entergy understands that FEMA's concern with regard to the steadiness of the siren signal is that the measurements taken to date, particularly ground based measurements used to infer elevated sound output, demonstrate excessive variation in sound level output. FEMA suggested that the appropriate value for variation in sound level is +/- 2 dBC of average. The value of +/- 2 dBC is found in the Outdoor Warning Systems Guide, CPG 1-17 in the note to Figure 1 on page 10. The weighted average sound pressure level, Leq, is an appropriate parameter for evaluating siren signal steadiness.

There are several possible causes for this condition including the following:

- The siren is not capable of producing a steady signal as described in CPG 1-17 in the note to Figure 1 on page 10.
- Variability in ground measurements due to differences in local terrain. Such factors include the reflectivity of the surface, nature of vegetation and nearby structures.
- Variability in environmental conditions including wind speed, temperature and humidity, from one measurement to another.
- Measurement techniques that did not adequately account for near field constructive and destructive interference peculiar to the stacked horn design of the ATI HPSS32 siren and interference between the direct sound wave from the siren horn and sound waves reflected off the ground.

Entergy action with regard to signal steadiness is as follows:

- In order to isolate the cause(s) of the lack of steady signal, Entergy will conduct a series of tests and measurements with the objective of determining if the cause(s) are related to hardware, testing methods, or a combination of these. These tests and measurements will include but may not be limited to the following:
 - Tests of the amplifier and siren speaker drivers will be conducted in a suitable laboratory environment to determine if the power amplifier produces steady and repeatable output. Each siren horn utilizes four 100 watt speaker drivers. These will be analyzed and tested in the laboratory to determine if the speakers themselves are a source for the lack of steady output.
 - The sound output measurement techniques that were used during the period March – August 2007 in the field will be examined and modified as necessary to eliminate measurement methodology as a source for the lack of steadiness. The following actions will be taken with regard to measurements:
 - Future measurements for siren properties such as steadiness and repeatability will be performed in a controlled environment such as an anechoic chamber or other suitably controlled environment to eliminate or control factors noted above.
 - Measurements in anechoic chambers will be made on the centerline of the siren horn and will be taken at or corrected to a distance of 100 feet.

Entergy will request FEMA's review and approval of specific test procedures for signal steadiness prior to undertaking final qualification testing.

Siren Signal Repetitiveness

Entergy understands that FEMA's concern is that from one siren to another the sound output showed acceptable repetitiveness when measurements were made in a bucket truck at siren elevation but when ground level measurements were made the variability from one measurement to another was excessive.

Possible causes for this condition are similar to those noted above for siren signal steadiness and the actions taken to resolve this concern will, in large measure, be the same as those for signal steadiness. The actions will be designed to isolate cause(s) to the device itself, limitations associated with the field measurement techniques used during the period March – August 2007, or combinations of device and measurement methodology. Whereas FEMA has provided guidance from CPG 1-17 as to what constitutes an acceptable variation for steadiness of signal, Entergy is not aware of any similar quantitative guidance in the matter of signal repetitiveness. Thus, one additional action will be to work with FEMA to obtain an operational definition of repetitiveness that can be applied to future testing and qualification of siren devices.

Once sources of repetitiveness concerns have been identified, suitable corrective actions can be developed and implemented. With regard to any such actions, Entergy will work with FEMA to seek approval of a mutually agreeable acceptance/qualification protocol which can be applied to the existing sirens, refurbished or modified sirens, or new siren devices.

Sound Propagation Modeling

Entergy understands FEMA concerns in this matter to include the following:

- In general the sound pressure levels measured and/or inferred are less than the value upon which FEMA's design approval was based. That value is an average (Leq) 122 dBC at siren height and 100 feet from the horn when measured in accordance with ANSI S12.14. The FEMA approval of the design is predicated on the 70 dBC and 60 dBC contours that were associated with an array of 150 sirens each producing an average sound pressure level of 122 dBC at 100 feet.
- Field measurements made at ground level demonstrate that the overall average acoustic output is less than 122 dBC and variability from one siren to another is relatively large. Thus, any design should use a conservative value such as the lowest acoustic output rather than an average.
- FEMA is also concerned about using individual siren specific output values in a sound propagation model because under such a method any future maintenance or siren replacements would have to ensure that the replacement produced at least the same acoustic output as the siren it replaced.
- FEMA expressed a concern that Entergy had declined to perform sound propagation model validation.

With regard to sound propagation modeling, Entergy is taking the following actions:

- Entergy has initiated contracting with Wyle Laboratories, an independent acoustic engineering firm, to perform a sound propagation model validation based on several input

assumptions. In addition, the Wyle efforts will compare the predicted sound output using the individual siren sound outputs to the measurements taken by Blue Ridge Research and Consulting during full system soundings on August 11 and 14, 2007.

- Since the fundamental concern is that the ATI HPSS32 sirens do not achieve the 122 dBC (Leq) sound output, the following steps are being taken:
 - Entergy has engaged a siren/speaker electronics expert to examine the options for increasing the sound output of the existing sirens. These options may include but may not be limited to reconfiguration of the siren horn, speaker drivers and/or amplifiers. A parallel effort is being pursued by the siren system manufacturer
 - Entergy will explore other options for other sounding devices with at least one other siren manufacturer
 - Entergy will examine the efficacy of adding more sirens using a conservative acoustic output assumption of the lowest consistently obtained measured average sound output so as to produce the sound pressure levels consistent with the guidance in FEMA REP-10 section E.6.2.1. This approach is intended to be responsive to the FEMA concern that “in order to have a model that consistently and conservatively predicts coverage for the measured output, the sound level used for each siren would need to be representative of the lowest measured output of any functional (meaning that the siren would not show up as “red” on the siren control panel) siren.”
 - Entergy is also pursuing additional acoustics expertise from independent sources to advise on the feasibility of using other approaches for determining the adequacy of the alerting signal strength. Any approaches other than those in existing FEMA guidance will be reviewed with FEMA to obtain approval before taking action. An example of such an approach is using the one third octave band to demonstrate adequacy of alerting signal in high population areas.

Interference from Co-located Sirens

Entergy understands that FEMA was concerned that co-located sirens (places where a new siren is in close proximity to a rotating siren and visa versa) might interfere with the sound propagation.

Entergy has taken action to evaluate the potential interference. The evaluation was documented in the Indian Point condition reporting system and concluded that there is not a significant degradation in sound propagation from co-located sirens such that the function to alert the public is impaired. This analysis was discussed during a stakeholder conference call with Entergy, FEMA, NRC, NY SEMO, and the counties of Orange, Putnam, Rockland, and Westchester on September 13, 2007. It is our understanding that FEMA concurs with Entergy’s conclusion that the existing rotating siren system remains capable of performing its intended function in this regard.

Vegetation / Foliage Interference with Siren Sound Propagation

Entergy understands that FEMA has provided explicit guidance on the extent to which foliage must be removed from within the area of siren. That guidance is that no large tree limbs or other interfering foliage may be within 25 feet of a siren or if such does exist an analytical evaluation must demonstrate that such foliage does not impair the sound propagation.

Entergy is currently taking action to perform an evaluation of the potential impact of foliage in the vicinity of all sirens. Entergy will undertake the necessary foliage removal and where such removal

is not feasible will have an independent acoustic analysis performed to evaluate the impact. Actions will be documented in a report that will include photographs that will be provided to FEMA.

Communication and Control System Reliability

Entergy has continued to conduct communication and control system reliability testing that expanded on the statistically based testing that was conducted in July and August 2007 and was described in our submission dated August 22, 2007. The latest round of such reliability testing concluded on September 17, 2007. The test results for the complete testing are included in Attachment 2. The testing regime demonstrates that overall system reliability is well above 90% as set forth in applicable FEMA guidance. As FEMA correctly pointed out, given the configuration of the communication and control system, there are many combinations of activation and communication control. The testing regime tested those that are most likely to be used including individual county activations from emergency operations centers and warning points in various combinations and the ability of both Westchester County and Rockland County to activate sirens on behalf of all four counties. The testing provides reasonable assurance that the installed communication and control system will function in all modes as designed. As suggested by FEMA testing concentrated on but was not limited to the microwave synchronized simulcast radio communication and control mode. In that mode overall reliability is in the range of 97-98 percent.

Action Plan

Entergy's actions will take place in the phases described below:

Phase 1

Phase 1 involves immediate actions. These include the following:

- Perform an evaluation of the potential impact of foliage in the vicinity of all sirens. Subsequently, Entergy will undertake the necessary foliage removal and where such removal is not feasible will have an independent acoustic analysis performed to evaluate the impact. Actions will be documented in a report that will include photographs that will be provided to FEMA.
- Specification of the methods for examination of existing siren amplifiers to determine if they are capable of producing steady and repeatable output. This action will include engineering analyses and controlled environment testing as appropriate.
- Specification of methods for examination of siren amplifiers to determine if they are a limiting factor in acoustic output of the speaker drivers and if so, whether modifications to the amplifiers are capable of increasing speaker driver output sufficiently. This action will include engineering analyses and laboratory testing as appropriate.
- Specification of methods for examination of the existing siren speaker drivers to determine if they are limiting factors in siren acoustic output including engineering analyses and controlled environment testing as appropriate.
- Specification of methods for engineering analyses to determine if the siren horn assembly can be outfitted with more powerful speaker driver assemblies that would provide suitable acoustic output with existing or upgraded amplifiers.
- Conduct of sound propagation model validation studies by Wyle Laboratories

- Evaluation of the speaker drivers and amplifiers by an independent electronics/speaker expert
- Exploration of possibility of using different siren devices from one or more manufacturers other than ATI
- Evaluation of the efficacy of adding additional sirens to those already deployed to achieve the desired sound contours (this assumes that there are resolutions to the steadiness and repeatability concerns that allow for this action).

Phase 2

Phase 2 involves taking the actions that result from the analyses and tests described in Phase 1 above, plus preparation of a revised design report. A complete action plan can not be developed until the results from the evaluations and analyses described in Phase 1 have been completed.

Phase 3

Phase 3 involves submission of protocols, procedures, test methods for FEMA review and approval. This effort depends upon reaching a mutually acceptable understanding and agreement between Entergy and FEMA regarding the specific nature of the tests and their protocols including acceptance criteria prior to their conduct.

Phase 4

Phase 4 involves the construction of physical modifications indicated by the work products in Phases 1 and 2 as may be modified by the approval review process in Phase 3.

Entergy looks forward to the opportunity to convene a technical meeting with FEMA to describe the initiatives to be undertaken and to determine a mutually acceptable schedule for completion.

ATTACHMENT 2

RESULTS OF CONTROL SYSTEM TESTING PERFORMED
SEPTEMBER 6 – 17 2007

CONTROL SYSTEM TEST RESULTS FOR TESTING PERFORMED SEPTEMBER 6 – 17, 2007
(in response to FEMA letter dated August 29, 2007)

- Four tests conducted on each of 5 days (September 6, 7, 10, 11, and 17) for a total of 20 tests
- Test Method: Tests 1 through 16: Microwave Tests 17 through 20: TCP/IP
- Activation Location: See following Table

TEST	Westchester	Putnam	Orange	Rockland
1	WP	WP	WP	EOC
2	WP	WP	WP	EOC
3	WP	EOC	EOC	WP
4	WP	EOC	EOC	WP
5	WP	WP	WP	WP
6	WP	WP	WP	WP
7	WP	EOC	EOC	EOC
8	WP	EOC	EOC	EOC
9	EOC	EOC	WP	WP
10	EOC	EOC	WP	WP
11	EOC	WP	EOC	EOC
12	EOC	WP	EOC	EOC
13	EOC	WP	EOC	EOC
14	EOC	WP	EOC	EOC
15	EOC	EOC	WP	WP
16	EOC	EOC	WP	WP
17	Both tests performed by activating sirens in all four counties from the Rockland EOC			
18				
19	Both tests performed by activating sirens in all four counties from the Rockland WP			
20				

Activation Results:

All 20 tests involved activation of all 155 installed sirens
(Westchester: 71, Putnam: 14, Orange: 22, and Rockland 48)

TEST	Westchester		Putnam		Orange		Rockland		All Counties	
	Fail	% Success	Fail	% Success	Fail	% Success	Fail	% Success	Fail	% Success
1	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
2	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
3	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
4	0	100%	0	100%	1	95.4%	6	87.5%	7	95.4%
5	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
6	0	100%	0	100%	1	95.4%	1	97.9%	2	98.7%
7	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
8	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
9	0	100%	0	100%	2	90.9%	0	100%	2	98.7%
10	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
11	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
12	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
13	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
14	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
15	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
16	0	100%	0	100%	1	95.4%	0	100%	1	99.3%
17	1	98.5	0	100%	1	95.4%	0	100%	2	98.7%
18	1	98.5	0	100%	1	95.4%	0	100%	2	98.7%
19	1	98.5	0	100%	2	90.9	0	100%	3	98.0%
20	1	98.5	0	100%	2	90.9	0	100%	3	98.0%

Total success rate: 98.9%

- Evaluation of Results

Siren 122 in Orange County had been placed in a maintenance mode. It is a siren that was in the process of being converted from solar-battery power to A/C - battery power and was unavailable for testing. It was recorded as a failure for the purposes of these tests.

In one test on September 6, 2007 (Test 4) six failures were recorded in Rockland County. Entergy consulted with SAIC to determine that the most likely cause of this condition was sporadic radio interference due the close proximity and orientation of several antennas on the roof the Rockland County emergency services building in Pomona, NY. Entergy has arranged with Rockland County to access the roof area tower for the purpose of making antenna adjustments to reduce such sources of interference. These actions are scheduled for the week of September 24, 2007.

- Conclusion

The testing performed in July, August, and September has been sufficient to provide a greater than 95% confidence level regarding the results of the microwave synchronized simulcast radio activation and control mode. Those results have demonstrated high reliability (greater than 97%) for that activation and control mode. Furthermore, the testing has not revealed any unanticipated failure modes. Overall success rates for all activation modes have been greater than 97 percent.