Entergy

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

J.E. Pollock
Site Vice President
Administration

February 6, 2009

Re: Indian Point Unit 2
Docket No. 50-247

NL-09-010

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **Reply to Request for Additional Information Regarding Indian Point Unit 2 Proposed Changes to Technical Specifications Regarding Diesel Generator Endurance Test Surveillance (TAC NO.MD9214)**

References:
1. NRC Letter dated January 9, 2009 "Request for Additional Information Regarding Amendment Application for Revision to Diesel Generator Surveillance Test (TAC NO.MD9214)"
2. Entergy letter NL-08-101 dated July 9, 2008 regarding "Proposed Changes to Indian Point 2 Technical Specifications Regarding Diesel Generator Endurance Test Surveillance"

Dear Sir or Madam:

Entergy Nuclear Operations, Inc (Entergy) is providing the additional information requested in Reference 1 regarding the Proposed Changes to Indian Point 2 Technical Specifications Regarding Diesel Generator Endurance Test Surveillance submitted in Reference 2. The responses to questions are provided in Attachment 1.

There are no new commitments identified in this submittal. If you have any questions or require additional information, please contact Mr. R. Walpole, Manager, Licensing at (914) 734-6710.

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 6, 2009.

Sincerely,

J. E. Pollock
Site Vice President
Indian Point Energy Center

Attachment: 1. Reply to NRC Request for Additional Information Regarding Proposed Changes to Indian Point 2 Technical Specifications Regarding Diesel Generator Endurance Test Surveillance (TAC NO.MD9214)

Enclosure:
1. Copy of Calculation FEX-00083-00 Dynamic Loading of Emergency Diesel generators
2. Typical EDG & CCW Coordination Curves with Setting Details
3. Safety Injection (SI) with Automatic Loading Only
4. Safety Injection (SI) Automatic-Manual Loading
5. Loading for Various 480V Motor Control Centers
6. DAPPER Run for Safety Injection (SI) with Automatic Loading Only
7. DAPPER Run for Safety Injection (SI) Automatic-Manual Loading
8. Time Table of Events – Large LOCA with EDG-23 Failure

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR (with enclosure)
Mr. Samuel J. Collins, Regional Administrator, NRC Region I
NRC Senior Resident Inspectors Office
Mr. Paul Eddy, New York State Dept. of Public Service
Mr. Mr. Robert Callender, Vice President, NYSERDA

ATTACHMENT 1 TO NL-09-010

REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION

REGARDING

PROPOSED CHANGES TO INDIAN POINT 2 TECHNICAL SPECIFICATIONS

REGARDING DIESEL GENERATOR ENDURANCE TEST SURVEILLANCE

(TAC NO.MD9214)

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET No. 50-247

Response To Request For Additional Information

By letter dated July 9, 2008 (Accession No. ML0819800160), Entergy Nuclear Operations, Inc. (Entergy or the Licensee) requested an amendment to the Indian Point 2 Technical Specifications (TS), Appendix A of Facility Operating License No. DPR-26. The proposed change would revise the test acceptance criteria specified in TS Surveillance Requirement (SR) 3.8.1.10 for the diesel generator endurance test surveillance. The change proposed revising the load ranges and the power factors specified for the endurance test for consistency with the associated plant safety analyses. The Nuclear Regulatory Commission (NRC) is reviewing the submittal and had the following questions sent by Letter dated January 9, 2009:

Question 1

The following information request results from the NRC staff's review of your September 29, 2008, supplemental letter (specifically your response to staff question number 3). Provide a copy of the calculation FEX-00083-00, "Dynamic Loading of Emergency Diesel Generators." Provide details (e.g., model and settings) of the overcurrent protection provided on the emergency diesel generator breaker. Also, confirm that the protection settings are such that the breaker would not trip on overcurrent due to starting (i.e., inrush) current of the component cooling water pump motor when the emergency diesel generator is already loaded close to its short time rating (i.e, 2050-2100 kilowatts (kW)).

Response

A copy of calculation FEX-00083-00 is provided in Enclosure 1 to this letter.

Emergency diesel generator breakers are Westinghouse model DB-75, with Amptector trip devices, and all use the same setpoints. Settings and breaker coordination are documented in calculation SGX-00048-01, "IP2 480V Switchgear Coordination Calculation for Switchgears 21 and 22", and trip settings are as follows...

- 3750 amps (long time pickup), 36 seconds (time delay).
- 6450 amps (short time pickup), 0.33 seconds (time delay).
- no instantaneous trip.

A typical coordination curve with setting details, for Emergency Diesel Generator 23 is found in Enclosure 2 of this letter (pages 53, 54 and 55 of Calculation SGX-00048-01, Attach. 4).

Component cooling water pumps will start in under 2 seconds, and motor inrush current is in the range of 1535 amps to 1731 amps between the three pumps. Start time and inrush current values are provided at rated voltage. Amptector short time settings for diesel generator breakers are at 6450 amps, and have a manufacturer's tolerance of 10%. This provides a minimum trip band value of 5805 amps. Based on coordination curves provided in calculation SGX-00048-01, and the typical EDG curve provided above, this minimum trip value is constant from 0.2 seconds up thru approximately 240 seconds.

The diesel loading calculation shows pump load as 230 kW, and considering a maximum short time diesel rating of 2300 kW, loading just prior to starting a component cooling pump would not exceed 2070 kW. Using rated voltage and a power factor of 0.87, this load equates to approximately 2862 amps. Considering the highest motor inrush current between the three pumps, maximum current drawn during motor start would be 4593 amps (2862 + 1731). This current is significantly less than the breakers minimum trip band (4593 vs. 5805), therefore breaker tripping will not occur during starting of component cooling water pumps.

Variations in bus voltage will change motor starting time and inrush current values, but these changes are minor in comparison to the large difference between load current, starting time, and breaker tripping values. A typical coordination curve with setting details, for Component Cooling Water Pump 22, is attached, Enclosure 2, for information (pages 19, 20 and 21 of Calculation SGX-00048-01, Attach A1). Note that the upstream breaker is the main breaker from the station service transformer and not the diesel breaker. This combination was not plotted in calculation SGX-00048-01.

Question 2

Provide the technical basis for the emergency diesel generator loading criteria in TS SR 3.8.1.10 that you proposed in your September 29, 2008, supplemental letter.

Response

Electrical loading of the emergency diesel generators is based on calculation FEX-00039-02, "Emergency Diesel Generator Loading Study". Worst case values from this study were identified in our previous correspondence as 2268 kW, 2076 kW, and 2194 kW for EDG's 21, 22 and 23 respectively. The proposed TS SR peak values of 2270 kW to 2300 kW will bound these worst case accident values. Short time loading based on the diesel's 2-hour rating is generally less that the proposed TS SR range of 2050 kW to 2100 kW, with only a few minor excursions into the test range (peak of 2076 kW).

Surveillance testing at IP2 is normally performed at the upper end of the specified range, but a 50 kW tolerance is considered to allow for loading variations during test conditions. This range represents a band of approximately 3 percent based on the diesel generators continuous rating (1750 kW). This band is less than that allowed by industry guidance (RG 1.9, IEEE 387) which suggests 10% for testing at the continuous rating, and 5% for 2-hour testing. The proposed range is considered appropriate for the longer duration surveillance tests.

The load profile timing sequence at IP2 varies for each diesel generator based on the accident scenario being considered (e.g. large break LOCA, small break LOCA), and on the type of single failure being analyzed. Industry guidance suggests testing at the higher load first, followed by tests at lower load for the remainder of the duration, and this was the basis for the load sequence originally proposed by our letter dated July 09, 2008. The sequence identified in letter dated September 29, 2008 was established based on discussion with the NRC, and was intended to stress plant components at higher temperatures due to potentially worst case loading scenarios. This profile was not intended to be representative of all accident loading scenarios, but was agreed upon as a reasonable representation of worst case conditions.

Question 3

Question number 6 of NRC letter dated September 5, 2008, was related to kilovolt ampere reactive (kVAR) losses in the electrical system and the impact on the emergency diesel generator and the switchgear as a consequence of higher current required for kVAR (including losses) production from the emergency diesel generator. The Indian Point Unit 2 emergency diesel generator loading calculation indicates that the equivalent power factor, derived from load studies, is 0.87-0.88. Since the emergency diesel generator is rated for a 0.8 power factor, the licensee concluded that this criteria was acceptable.

The licensee's October 8, 2008, supplemental response indicates that the equivalent power factor for the emergency diesel generator load is based on a calculation using offsite power. The licensee performed the load flow studies using SKM Power Tools software (DAPPER). The licensee stated that the load flow analyses are performed in an iterative process that considers both kW and kVAR losses throughout the electrical system. It is not clear from the licensee's responses as to how the losses in the Indian Point Unit 2 electrical system that would be powered from the emergency diesel generator were evaluated. Given that, the load flow analyses provide total losses in the electrical system and depending on the loads that were simulated with the auxiliaries powered from the offsite source, the power factor and system losses may not accurately reflect the accident load profile.

a) Describe, in detail, the loads that were simulated with offsite power available, to evaluate the power factor for the worst case loss of offsite power/loss-of-coolant accident loading of the emergency diesel generator. Include load flow printouts from DAPPER to supplement the explanation.

b) Confirm that you have reviewed both the kW and kVAR losses at the emergency diesel generator bus and selected the emergency diesel generator power factor based on this review.

Response

Some clarification is needed for the first two paragraphs above in relation to Indian Point's response.

Our diesel generator loading calculation is limited to calculating kW loads and losses, and does not determine the equivalent power factor. This was determined in a separate evaluation that reviewed major loads greater than 50 kW powered from the diesel, and determined the equivalent power factor of combined loading. The diesel generator itself was considered acceptable when comparing margin between rated power factor of 0.8, and equivalent load power factor of 0.87-0.88. Bus and switchgear current carrying capability was considered acceptable when comparing worst case load current of 3180 amps (2300 kW), and actual testing with currents up to 3400 amps. Margin between these compared values was considered to be enough to account for the kVAR losses in question (See the response in our letter NL-08-139 dated September 29, 2008).

Equivalent power factor for the emergency diesel generator was based on a separate evaluation considering loads greater that 50 kW, as indicated above, and not the calculation with offsite power. Since this evaluation was limited to larger loads, the offsite power calculation was provided as an alternate method of checking equivalent power factor since similar loads are being powered. All kW and kVAR losses associated with cables and transformers in the computer model are considered in the DAPPER analysis (see the response in our letter NL-08-157 dated October 8, 2008).

Detailed loading information from the offsite power study for 480V Buses is provided in Enclosures 3 through 5 of this letter. These enclosures are summary tables extracted from calculation FEX-00143-01, "IP2 Load Flow Analysis of the Electrical Distribution System". Enclosure 3 is for the safety injection (SI) with automatic loading only; Enclosure 4 is for SI with automatic and manual loading; and Enclosure 5 is for loading for various 480V motor control centers. Load flow printouts from DAPPER for these two loading scenarios in Enclosure 3 and 4 and the MCC loading in Enclosure 5 are provided in Enclosures 6 and 7.

Losses at the emergency diesel generator bus for both kW and kVAR have been reviewed for the appropriate equivalent power factors. This evaluation considered major loads greater than 50 kW, and considered smaller loads as having a negligible impact on overall power factor. This impact was also confirmed by review of offsite power studies, which show that power factor increases slightly as the smaller MCC loads are applied. Use of lower power factors is considered conservative for determining the diesel generators kVAR capability.

Question 4

WCAP-12665, Revision 2, "Emergency Diesel Generator Loading Study," analyzes the diesel loads for both large and small Loss of Coolant Accidents (LOCAs). Chapter 5 for the large LOCA and chapter 6 for the small LOCA assumes operator actions are taken at certain times, which affects the diesel loads. A statement is made that "The times used for manual actions are based on times that should be typical for performing the actions in the EOPs [emergency operating procedures]. These times can be confirmed by the operations staff .... " Please describe how the timing assumed for manual actions were confirmed to be appropriate for IP2.

Response

In 1989 time frame the EDG's were updated to higher load values. The update used the EOPs to verify loads for the Westinghouse load study. Westinghouse used assumptions for starting and stopping equipment. WCAP-12655 says: "The times used for manual actions are based on times that should be typical for performing the actions in the EOPs. These times can be confirmed by the operations staff and /or with Indian Point 2 specific simulations for large LOCA. The exact timing of the manual actions is not critical. The order in which the recirculation switches are performed is important, so this relative timing must be preserved." Operations verified the times in the WCAP by walkdown which were captured and entered into a timer in the simulator when the steps were performed there.

Since that time frame the times needed for manual actions have not been re-verified even though the load study has changed (e.g., 2002 update) and the EOPs have been changed. EOP revisions that contain new/revised electrical lineups or motor starts are submitted to Design Electrical Engineering for review to assure consistency with the load study. An additional factor affecting the implementation of EOPs is three way communication which extends the times to perform tasks. Changes to EOPs were also evaluated by Westinghouse under the stretch power uprate project in 2003. The impact on EDG loading and WCAP-12655 was reviewed, and diesel loading was considered acceptable for all loading scenarios.

In December 2008 a LOCA scenario, Enclosure 8, was run on the Unit 2 simulator and consisted of the following;

- large LOCA,
- loss of off-site power,
- safety injection,
- containment spray actuation,
- loss of EDG-23.

Timing for manual operator actions was monitored. They were consistent with those assumed in the diesel loading study, and were generally performed 2-3 minutes faster, which is conservative for diesel loading. A significant change, MCC's (24A, 27A, 29A) are not reset as early in the sequence as before, was a result of changes in EOP E-0. MCC's are reset at approximately 24 minutes, rather than 4 minutes assumed in the diesel study. A review of the diesel loading study for the various scenarios analyzed, indicates this sequence change is not significant to diesel loading. Similarly, the AFW flow is reduced to 85 gpm at 21 minutes in the diesel study. In the simulator run, flow was reduced in 10 minutes since AFW is not required for the LOCA. No new loads are being added, and all loads will remain within the diesel generator ratings.

References

1. Entergy letter NL-08-101 dated July 9, 2008 regarding "Proposed Changes to Indian Point 2 Technical Specifications Regarding Diesel Generator Endurance Test Surveillance"

2. NRC letter dated January 9, 2009 "Request for Additional Information Regarding Amendment Application for Revision to Diesel Generator Surveillance Test (TAC NO.MD9214)"

3. Entergy letter NL-08-139 dated September 29, 2008 regarding "Reply to Request for Additional Information Regarding Indian Point Unit 2 Proposed Changes to Technical Specifications Regarding Diesel Generator Endurance Test Surveillance (TAC NO.MD9214)"

4. NRC letter dated September 5, 2008 "Request for Additional Information Regarding Amendment Application for Revision to Diesel Generator Surveillance Test (TAC NO.MD9214)"

5. Entergy letter NL-08-157 dated October 8, 2008 regarding "Supplement to Reply to Request for Additional Information Regarding Indian Point Unit 2 Proposed Changes to Technical Specifications Regarding Diesel Generator Endurance Test Surveillance (TAC NO.MD9214)"