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Bradford Houston
Director, Nuclear Safety Assurance
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W3F1-2004-0027

April 22, 2004

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Supplement to Amendment Request NPF-38-248
Relaxation of Ventilation System Heater Surveillance Acceptance Criteria
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
NPF-38

REFERENCES: Entergy letter to the NRC dated September 12, 2003, License Amendment Request NPF-38-248, Relaxation of Ventilation System Heater Surveillance Acceptance Criteria (W3F1-2003-0044)

Dear Sir or Madam:

By the referenced letter, Entergy Operations, Inc. (Entergy) proposed a change to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TSs) to relax the heater acceptance criteria contained in surveillance requirements (SR) 4.6.6.1d.5, 4.7.6.1d.3, and 4.7.7d.4 for the shield building ventilation, control room ventilation, and controlled ventilation area systems, respectively.

On February 25, 2004, Entergy discussed two questions with a member of the NRC staff regarding emergency diesel generator loading and the root cause of the May 22, 2003 inoperability of the shield building ventilation heaters. As a result of the call, Entergy agreed to provide a formal response. Entergy's response is attached to this letter.

There are no technical changes proposed. The original no significant hazards consideration included in referenced letter is not affected by any information contained in the supplemental letter. There are no new commitments contained in this letter.

If you have any questions or require additional information, please contact Jerry Burford at 601-368-5755.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 22, 2004.

Sincerely,

Bradford L Houck 4/22/04

BLH/FGB/cbh

Attachment: Response to Request for Additional Information

cc: Dr. Bruce S. Mallett
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U.S. Nuclear Regulatory Commission
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American Nuclear Insurers
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Attachment

To

W3F1-2004-0027

Response to Request for Additional Information

Response to Request for Additional Information Related to License Amendment Request NPF-38-248, Relaxation of Ventilation System Heater Surveillance Acceptance Criteria

Question 1:

In the staff review of the licensee's submittal, we were unable to determine what value was used for the power of the heaters in the diesel load calculation EC-E90-006. Please confirm that Calculation EC-E90-006 considered +5 percent tolerance of the subject heaters (i.e. 63 KW, 21 KW, and 10.5 KW). Are there any other loads that may be operating at more than nameplate rated values or at a service factor? The staff is concerned about the cumulative effect of all such loads. How will this additional KW load be captured in the calculation?

Response 1:

Calculation EC-E90-006 uses the nominal nameplate rating of the heaters (i.e., 60KW, 20KW and 10KW). This is based on the fact that the heater load is dependent on voltage at the heater terminals. During the emergency mode of operation, the emergency diesel generator (EDG) is expected to maintain approximately 4160V at the 4160V busses. The 4160/480V transformers have a typical impedance of approximately 9%. This implies that at 100% transformer loading, there will be a 9% voltage drop across the transformer. The transformers have a 2.5% tap setting to boost the secondary voltage. The voltage drop associated with cable losses from the 4160V bus to the heater terminals is assumed to be 1%. Hence, if the transformer is loaded up to 100% of the rating, the voltage drop to the heater terminals is expected to be 7.5% (9.0+1 - 2.5). For the purposes of evaluating the heater rating, a voltage drop of 3.5% was conservatively assumed at the heater terminals. As the power consumed by the heater is a function of the square of the voltage, the heater load will be approximately 7% less than nameplate rating. Cable losses were added directly to the net heater load on the EDG. Including the impact of cable losses, the heaters will still consume less power than their respective nameplate rating.

The EDG loading is calculated using a time dependent methodology. Calculation EC-E90-006 uses motor brake horsepower to evaluate the EDG loading. The brake horsepower is derived in a supporting calculation EC-M89-032 "Calculations for Motors Driven by Emergency Diesel Generator." Based on this methodology, the peak load on each EDG is less than 4200KW. After 75 minutes into the event, the loading is reduced due to recirculation actuation signal and the long term steady state loading for a large break loss of coolant accident is computed to be less than 3800KW.

Calculation EC-E90-006 Supplement A also evaluates the electrical loading on the EDG assuming all loads are at the "maximum expected brake horsepower." Maximum expected brake horsepower values were obtained from pump/motor curves, technical manuals, specifications and nameplate data to determine the bounding horsepower for postulated EDG loading scenarios. Any motor service factor contributions are therefore not applicable because motors will not exceed the maximum expected brake horsepower values listed in Supplement A.

For most loads, the maximum expected brake horsepower is at or nominally below nameplate horsepower values, but some loads were evaluated at greater than their nameplate values

(e.g. component cooling water pumps A, B & AB, emergency feedwater pumps A&B, AB fire pump) for the purposes of the calculations in Supplement A. The calculation concludes that the peak electrical load on EDG A will be about 4450KW (for about 45 minutes). This is due to an assumption that manual loads are added after 30 minutes into an event. This short term overload is well within the 2 hour rating of 4840KW. EDG B has a slightly lower peak load.

A +10% increase in heater nameplate loading for the six heaters in question will result in a power consumption increase of 9 KW per EDG. In view of the margin available between the EDG rating and postulated accident loading (based on maximum expected brake horsepower) any minor deviations, such as the additional 9 KW of heater load, will not result in overloading the EDGs for extended durations.

Question 2:

The submittal stated in the background section that approximately half of the heating coils were replaced due to the shield building ventilation system being declared inoperable on May 22, 2003. Please provide us with the root cause of the change of heating coils resistance of B train SBVS on May 22, 2003? What is the reason that the new coils were able to pass the surveillance test and the old coils which had in the past found to be acceptable were no longer able to pass the surveillance test?

Response 2:

Based on the field measured resistance and voltage, the B train shield building ventilation system heater capacity was less than 63KW as the bus voltage was less than 480V. When the field readings were normalized to a common base of 480V, the resultant computed value was marginally over the 63KW technical specification limit.

Discussions with the vendor revealed that nuclear sites are intentionally provided heating coils near the minimum heater resistance tolerance to ensure excess heater capacity margin. While some slight reduction in resistance can occur as a result of humidity, the overall degradation mechanism that indicates heater end of life remains higher resistance (lower output). Past experience has also shown that field measurement inaccuracies, especially voltage, can impact the results of the surveillance test. These conditions may have contributed to not passing the surveillance test on May 22, 2003.

Entergy Operations, Inc. personnel hand selected the replacement coils based on the individual coil resistance. Low resistance heating coils were replaced with higher resistance heating coils from stock to reduce the overall heater output. This enabled Waterford Steam Electric Station, Unit 3 to satisfy technical specification requirements.