Entergy

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Fred Dacimo
Site Vice President
Administration

December 15, 2005

Re: Indian Point Units No. 2 and 3
Docket Nos. 50-247 and 50-286
NL-05-133

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

SUBJECT: Supplemental Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors

References:
1. NRC Generic Letter 2004-02, "Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors", dated September 13, 2004.
2. NL-05-094, "Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors", dated September 1, 2005.

Dear Sir:

Entergy Nuclear Operation's (Entergy), Inc. response for the Indian Point Energy Center to NRC Generic Letter (GL) 2004-02 (Reference 1) was provided in Reference 2. In that response Entergy stated that the responses to Requested Information Items 2(b), 2(d)(i), 2(d)(v) and 2(d)(vi) would be supplemented by December 15, 2005. These supplemental responses are provided in Attachment 1.

No new commitments are being made in this submittal. If you have any questions or require additional information, please contact Mr. Patric W. Conroy, Licensing Manager at 914-734-6668.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 12/15/2005.

Sincerely,

Fred R. Dacimo
Site Vice President
Indian Point Energy Center

cc: next page

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Attachment 1: Indian Point Unit 2 and Unit 3 Supplemental Response to NRC Generic Letter 2004-02

cc:

Mr. John P. Boska, Senior Project Manager
Project Directorate I,
Division of Licensing Project Management
U.S. Nuclear Regulatory Commission

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Mr. Paul Eddy
NYS Department of Public Service

INDIAN POINT UNIT 2 and UNIT 3

ATTACHMENT 1 TO NL-05-133

Supplemental Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNITS 2 AND 3
DOCKETS 50-247 AND 50-286

Supplemental Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors

Entergy's September 1st response to GL 2004-02 (Reference 1) identified that the responses to Requested Information Items 2(b), 2(d)(i), 2(d)(v) and 2(d)(vi) would be updated by December 15, 2005. The supplemental responses provided below provide these updates.

Some calculations and reports contain unverified assumptions. Entergy intends to verify these assumptions and complete all design, procurement, fabrication, delivery and installation of replacement sump screens and attendant modifications that will meet or exceed all applicable regulatory requirements for post-accident sump performance by startup from the 2R17 and 3R14 outages, but no later than December 31, 2007.

Requested Information Item 2(b):

A general description of and implementation schedule for all corrective actions, including any plant modifications, that you identified while responding to this generic letter. Efforts to implement the identified actions should be initiated no later than the first refueling outage starting after April 1, 2006. All actions should be completed by December 31, 2007. Provide justification for not implementing the identified actions during the first refueling outage starting after April 1, 2006. If all corrective actions will not be completed by December 31, 2007, describe how the regulatory requirements discussed in the Applicable Regulatory Requirements section will be met until the corrective actions are completed.

Supplemental Entergy Response to Item 2(b):

Entergy's response to Item 2(b) is provided in Reference 1 and is supplemented here to reflect the selection of the sump screen vendor, the status of the downstream effects evaluations, and the completion of the debris transport and Unit 2 Containment Sump evaluations.

Enercon has been selected as the sump screen vendor with Transco providing screen fabrication. The strainer is of a modular design that is expandable to meet the debris load for the ECCS pump margin requirements. The strainer is a matrix of multi-tube (Top-Hat) modules fabricated from perforated plate and mounted in a horizontal orientation. The perforated plate has circular holes sized to 3/32" diameter. The strainer tube modules have four concentric, parallel perforated surfaces for straining debris from the water and the design maximizes the interstitial volume to strainer surface area ratio to better accommodate the predicted fiber to particulate debris loading. The Top-Hats feature an internal vortex suppressor which prevents air ingestion into the piping system. In addition, the Top-Hats also possess a bypass elimination feature that minimizes fiber debris bypass. The bypass elimination feature dramatically reduces the magnitude of fiber debris bypassing the screens.

The downstream effects preliminary analysis results, as reported in Reference 1, indicated that the majority of close-tolerance components are not susceptible to undue wear, abrasion, and plugging including the Residual Heat Removal (RHR) and High Head Safety Injection (HHSI) pumps. However, these preliminary results also indicated that the upper and lower bearings of

the Internal Recirculation (IR) pumps may be adversely affected by wear. A final wear evaluation, performed by the pump vendor, utilizing the methods of WCAP-16406-P, has confirmed an acceptable wear rate for the RHR and HHSI bearings. As discussed in the supplemental response to 2(d)(vi) below the wear rate for the IR pump bearings is expected to be acceptable pending confirmation of rotor dynamics assumptions. In addition, as discussed in 2(d)(vi) below the mechanical seal life of the RHR and HHSI pumps is currently being evaluated.

The debris transport evaluations have been completed. These analyses were performed to predict the blowdown, washdown, pool fill-up, and recirculation transport of post LOCA generated debris. The debris transport was determined for each type/size of debris at each of the break locations postulated in the debris generation analysis.

The Unit 2 Containment Sump is relatively small, and by itself, cannot contain the required strainer surface area. Entergy has reviewed available analysis, design and licensing basis options. Design evaluations have shown that acceptable screen surface area can be achieved by extending the sump screen outside of the Containment Sump. Therefore, Entergy does not expect to pursue a licensing basis change for the Containment Sump nor the use of an Alternative Evaluation methodology as previously discussed in Reference 1.

The key activities that could impact final design and planned installation were previously identified in Reference 1. As discussed above, the strainer fiber bypass fraction is crucial to the acceptance of certain downstream effects evaluations. Therefore, the strainer debris bypass fraction test, which is scheduled for late January/early February, 2006, must be added to the previously identified key activities.

Requested Information Item 2(d)(i)

The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen.

Supplemental Entergy Response to Item 2(d)(i):

Entergy's response to Item 2(d)(i) is provided in Reference 1 and is supplemented here to reflect the status of the Net Positive Suction Head (NPSH) analyses. As the clean strainer design is not yet complete the final NPSH analyses for the IR and RHR pumps cannot be provided at this time.

The minimum available NPSH margins for the IR and RHR pumps in the recirculation mode, not including the clean strainer or debris head loss, are provided in Tables 1 and 2. The strainer design that was selected is expected to have a clean strainer and debris head loss that is lower than the IR and RHR pump NPSH margins. Final clean strainer and debris head loss values will be confirmed upon completion of the strainer designs.

Requested Information Item 2(d)(v)

The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g. a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen, or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface.

Supplemental Entergy Response to Item 2(d)(v):

Entergy's response to Item 2(d)(v) is provided in Reference 1 and is supplemented here to reflect the status of the downstream blockage analyses. As certain blockage analyses are continuing the final results of the downstream blockage analyses cannot be reported at this time.

The impact of debris passing through the strainers causing blockage in downstream components has been evaluated. The purpose of the evaluation was to determine whether the ECCS and portions of the CSS flowpaths could become blocked due to the debris that passes through the containment and recirculation sump screens. The evaluation utilized the methods described in proprietary WCAP-16406-P (Reference 2) and vendor analyses. A conservative sump screen circular hole size of 1/8-inch was used as a basis for these evaluations except for the Unit 2 High Head Safety Injection (HHSI) pump discharge valves. For these valves a circular screen hole size of 3/32-inch was assumed. The replacement sump screen hole size is 3/32-inch.

With the exception of the Unit 2 HHSI pump discharge valves, all of the ECCS and CSS components can accommodate the predicted particulate and fibrous debris without blockage occurring. The evaluation of the flow opening and cage holes of the Unit 2 HHSI pump discharge valves show a small C_v reduction due to possible partial clogging of the cage. This exception is under resolution.

The preliminary evaluation results for the fuel assembly inlet strainers were problematic as reported in Reference 1 for a typical strainer fiber debris bypass. Westinghouse has performed fuel blockage analyses using plant specific debris loads. Based on these analyses and utilizing the debris bypass eliminator it is expected that fuel assembly blockage will not be an issue. This expectation is to be confirmed by the strainer debris bypass fraction test.

Requested Information Item 2(d)(vi)

Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids.

Supplemental Entergy Response to Item 2(d)(vi):

Entergy's response to Item 2(d)(vi) is provided in Reference 1 and is supplemented here to reflect the status of the downstream wear analyses. As certain wear analyses are continuing the final results of the downstream wear analysis cannot be reported at this time.

The potential for excessive wear and abrasion of close-tolerance subcomponents in pumps, valves and other ECCS and CSS components due to ingestion of debris downstream of the sump screen has been evaluated. The evaluation used the methods described in proprietary WCAP-16406-P (Reference 2), vendor analyses, and an assumed circular sump screen hole size of 1/8-inch. The replacement sump screen hole size is 3/32-inch.

With the possible exception of the IR, RHR and HHSI pumps all of the ECCS and CSS components have acceptable cumulative wear and abrasion effects for the required mission time. The IR pump bearings show acceptable wear under assumed rotordynamic conditions. These conditions are currently being confirmed by the pump vendor. The wear rate analysis for the RHR and HHSI pump bearings show acceptable results. However, these evaluations did not consider the impact of debris on mechanical seal life. Mechanical seal life is currently being evaluated by the pump vendor.

References

1. NL-05-094, "Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors", dated September 1, 2005.

2. WCAP-16406-P, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," June 2005.

Table 1
Unit 2 Minimum available NPSH margin for the ECCS pumps not including the clean strainer or debris head losses [1]

Pump	NPSH Margin
Internal Recirculation	1.3 feet
Residual Heat Removal	8.5 feet

(1) System Alignment - Cold Leg Recirculation utilizing one pump, one RHR heat exchanger and one spray line in service.

Table 2
Unit 3 Minimum available NPSH margin for the ECCS pumps not including the clean strainer or debris head losses[1]

Pump	NPSH Margin
Internal Recirculation	0.86 feet
Residual Heat Removal	8.66 feet

(1) System Alignment - Cold Leg Recirculation utilizing one pump, one RHR heat exchanger and one spray line in service.