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J.E. Pollock
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NL-09-099

July 29, 2009

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

SUBJECT: Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions Required by Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

REFERENCES:

- 1) Entergy letter NL-08-153, 10/17/08, "Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions Required by Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors""
- 2) NRC letter to Indian Point Vice President of Operations, 10/30/08, "Indian Point Nuclear Generating Unit Nos. 2 and 3 – Approval of Revised Extension Request for Corrective Actions Required by Generic Letter 2004-02 (TAC Nos. MC4689 and MC4690)"

Dear Sir or Madam:

The purpose of this letter is to request an extension to achieve compliance with the requirements of Generic Letter (GL) 2004-02 at Indian Point Units 2 and 3. Entergy Nuclear Operations (Entergy) previously requested an extension to achieve compliance with the requirements of GL 2004-02 by startup from the 2010 spring refueling outage for Unit 2 and August 31st, 2009 for Unit 3 (Reference 1). In response to that request the NRC granted extensions to August 31st, 2009 for Units 2 and 3 (Reference 2). Entergy has previously discussed this extension request with the NRC staff.

As discussed in Reference 1, Entergy is pursuing a plan that utilizes a debris and chemical head loss "test for success" methodology. The purpose of this testing is to determine the plant configuration needed to support strainer qualification, and what, if any, additional plant modifications would be required to resolve GL 2004-02. Entergy has recently completed this testing and it has been determined that additional plant modifications are required. In order to eliminate the potential for vortex formation under certain circumstances, vortex suppressors need to be installed above the internal recirculation and containment sump strainers. Entergy is proceeding with the design and procurement of these vortex suppressors and plans to install them during the next refueling outages. In addition, after April 30th, 2010, Entergy will include installation

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NRC

of the Unit 3 vortex suppressors on the forced outage planning list and will install the associated modification during any forced outage requiring entry into Mode 5, of a long enough duration in that mode, to install the suppressors.

Based on the above, this letter requests a Unit 2 extension to restart from refueling outage 2R19 (currently scheduled to begin March 10, 2010) and a Unit 3 extension to restart from refueling outage 3R16 (currently scheduled to begin March 11, 2011) to complete plant modifications and licensing activities determined to be needed to achieve compliance with the regulatory requirements of GL 2004-02. The basis for the proposed extensions is provided in Attachment 1.

The currently approved extensions expire on August 31st, 2009 for both Unit 2 and Unit 3 (Reference 2). Therefore, Entergy respectfully requests approval of the extension requests by August 27, 2009.

There are three new commitments being made in this submittal.

Should you have any questions or require additional information, please contact Mr. R. Walpole, Manager, Licensing at (914) 734-6710.

I declare under the penalty of perjury that the foregoing is true and correct. Executed on July 30, 2009.

Sincerely,


FOR
JEP/rw

Attachments:

1. Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions Required by Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"

2. New Commitments

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
Mr. Samuel J. Collins, Regional Administrator, NRC Region 1
NRC Resident Inspector, IP2
NRC Resident Inspector, IP3
Mr. Francis J. Murray, President and CEO, NYSERDA
Mr. Paul Eddy, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-09-099

**Request for Extension of Completion Dates for Indian Point Units 2 and 3
Corrective Actions Required by 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 UNIT Nos. 2 and 3
DOCKET Nos. 50-247 and 50-286

Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions
Required by Generic Letter 2004-02

1.0 Background

In Generic Letter (GL) 2004-02 (Reference 1), the NRC requested licensees to perform a mechanistic evaluation of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the Emergency Core Cooling System (ECCS) and Containment Spray System (CSS) following all postulated accidents for which these systems are required. The GL requested that all licensees complete the GL related actions by December 31, 2007. By letters dated September 1, 2005 (Reference 2) December 15, 2005 (Reference 3), and February 28, 2008 (Reference 4), Entergy provided responses to GL 2004-02 for Indian Point Units 2 and 3.

Requests for extensions and the associated NRC approvals (References 5 through 13) extended the completion dates to August 31st, 2009 for both units. The intent of these extensions was to allow Entergy additional time to perform the final corrective actions, facility modifications, and licensing activities to achieve compliance with GL 2004-02. For the reasons presented below, this letter requests a Unit 2 extension to restart from refueling outage 2R19 (currently scheduled to begin March 10, 2010) and a Unit 3 extension to restart from refueling outage 3R16 (currently scheduled to begin March 11, 2011) to complete the plant modifications and licensing activities determined to be needed to achieve compliance with the regulatory requirements of GL 2004-02.

As previously reported a number of significant modifications have been completed in support of GL 2004-02 compliance. During the spring 2006 (Unit 2) and spring 2007 (Unit 3) refueling outages, the original internal recirculation and containment sump screens were replaced with strainers. Other significant modifications were also made including flow channeling. Subsequent to these outages Entergy completed the modifications described in Reference 7. These modifications include the installation of additional strainer modules in Unit 2 and the replacement of the pH buffer by sodium tetraborate for both units. These modifications represent a significant improvement over the original design by providing greatly increased strainer surface areas, reduced debris transport, reduced downstream effects and a significant reduction in the amount of chemical precipitate.

2.0 Reason for the Request for Extension

Entergy previously requested an extension to achieve compliance with the requirements of GL 2004-02 by startup from the 2010 spring refueling outage for Unit 2 and August 31st, 2009 for Unit 3 (Reference 8). In response to this request the NRC granted extensions to August 31st, 2009 for both Unit 2 and 3 (Reference 12).

As discussed in Reference 8, Entergy is pursuing a plan that utilizes a debris and chemical head loss "test for success" methodology. The purpose of this testing is to determine the plant configuration needed to support strainer qualification, and what, if any, additional plant modifications would be required to resolve GL 2004-02. Entergy has recently completed this testing and it has been determined that additional plant modifications are required. During full flow testing with a thin bed and chemical precipitants a vortex was observed to form. In order to eliminate the potential for vortex formation a vortex suppressor was used in all subsequent testing. Therefore, in keeping with the test for success approach, vortex suppressors must be installed in the plant. Entergy is proceeding with the design and procurement of these vortex suppressors and plans to install them above the internal recirculation and containment sump strainers during the

next refueling outages. Online installation of the suppressors is not feasible as any construction activity in the area of the sumps would necessarily render them inoperable. In addition, construction activities would be precluded in certain areas due to dose considerations particularly for the containment sump that lies within the shield wall.

Also as discussed in Reference 14, Entergy is planning a modification that would negate the need to assume spurious closure of two motor operated valves within the Unit 2 Emergency Core Cooling System (ECCS). It is planned to install the modification during the next Unit 2 (2R19) refueling outage pending prior NRC approval of the associated license amendment.

Based on the above, this letter requests a Unit 2 extension to restart from refueling outage 2R19 (currently scheduled to begin March 10, 2010) and a Unit 3 extension to restart from refueling outage 3R16 (currently scheduled to begin March 11, 2011) to complete plant modifications and licensing activities determined to be needed to achieve compliance with the regulatory requirements of GL 2004-02. In addition, after April 30th, 2010, Entergy will include installation of the Unit 3 vortex suppressors on the forced outage planning list and will install the associated modification during any forced outage requiring entry into Mode 5, of a long enough duration in that mode, to install the suppressors.

3.0 Technical Basis for Proposed Extension

Entergy considers that the conditions at Indian Point Units 2 and 3 meet the criteria identified in SECY-06-0078 (Reference 15) for extension beyond the completion date of December 31, 2007 specified in GL 2004-02. The SECY criteria are,

Proposed extensions to permit changes at the next outage of opportunity after December 2007 may be acceptable if, based on the licensee's request, the staff determines that:

- *The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties.*
- *The licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS [emergency core cooling system] and CSS [containment spray system] functions during the extension period.*

For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed Mitigative measures include temporary physical improvements to the ECCS sump or materials inside containment to better ensure a high level of ECCS sump performance.

Indian Point Units 2 and 3 meet these criteria as described below.

3.1 Plant Specific Technical/Experimental Plan

As described in the previous extension request, Reference 8, Entergy is pursuing a plan that involves a debris and chemical head loss "test for success" methodology based on the NRC "March 2008 protocol" (Reference 16). The plan involved the development of a test protocol, NRC review of the protocol, "test for success" testing, preparation of the test report, and completion of analyses including strainer qualification. These actions are complete with the exception of the

analyses that support strainer qualification. Strainer qualification is scheduled for completion by August 31st, 2009.

Reference 8 also discussed the following plans or contingencies:

- Plans to install a Unit 2 modification following approval of a license amendment that would negate the need to assume the spurious closure of two motor operated valves within the ECCS. The license amendment is currently under NRC review.
- Plans to replace the Unit 2 internal recirculation pump bearings during refueling outage 2R19 (spring 2010) and the Unit 3 pump bearings during refueling outage 3R15 (spring 2009).
- Strainer structural enhancements should they be determined necessary.
- Insulation replacements should they be determined necessary.

Entergy continues to plan to install the Unit 2 modification regarding the two motor operated valves. However, based on the "test for success" results and continued analysis, it was determined that insulation does not need to be removed or replaced, and refined analyses shows physical strainer structural enhancements are not required. Also based on testing and analysis of the internal recirculation pump bearings it has been determined that the internal recirculation pumps meet their required mission time in a debris laden fluid and, therefore, need not be replaced.

3.2 Mitigative Measures

The mitigative measures described in References 5, 6 and 7 are already in place and minimize the risk of degraded ECCS and CSS functions. These measures include installation of replacement internal recirculation and containment sump strainers, installation of flow channeling, replacement of pH buffers, implementation of mitigative measures in response to NRC Bulletin 2003-01 (References 17 through 20), and procedural enhancements in the areas of containment cleanliness, foreign material exclusion and insulation control.

3.3 Generic Letter 2004-02 Basis for Continued Operation

In addition to the mitigative measures identified above the basis for continued operation provided by GL 2004-02 include a number of factors that remain applicable to Indian Point Units 2 and 3 during the period of the proposed extension.

The NRC staff provided a justification for continued operation (JCO) (as discussed in Reference 1), that justifies continued operation of pressurized water reactors through December 31, 2007. Elements of the JCO applicable to Units 2 and 3 include:

- (1) The containment is compartmentalized making transport of debris to the sump difficult.
- (2) Switchover to recirculation from the sump during a LBLOCA would not occur until 20 to 30 minutes after accident initiation, allowing time for much of the debris to settle in other places within containment.

- (3) The probability of the initiating event (i.e., large and intermediate-break LOCAs) is extremely low.
- (4) Leak-before-break (LBB) has been approved by the NRC in relation to breaks in the reactor coolant loop primary piping. Qualified piping is of sufficient toughness that it will most likely leak rather than rupture.
- (5) The NPSH analyses for the pumps used to perform the recirculation function do not credit containment overpressure.

3.4 Risk Analysis

With the installation of the new strainers, flow channeling, buffer replacement and other associated modifications there has been a significant reduction in vulnerability to debris blockage and downstream effects as compared to the original physical configuration.

The period of extension from the original compliance date to the requested compliance date (from December 31, 2007 through startup of Unit 2 from refueling outage 2R19 (currently scheduled to begin March 10, 2010) and startup of Unit 3 from refueling outage 3R16 (currently scheduled to begin March 11, 2011) represents a very small increase in incremental risk for the following reasons:

- 1) During a LBLOCA the flowrates through the strainers would be at maximum because the internal recirculation pumps would be supplying both cold leg recirculation and recirculation spray flow requirements with minimal system backpressure. The LBLOCA Zones of Influence (ZOIs) are larger than the ZOIs for intermediate and small break LOCAs. The LBLOCAs therefore generate significantly more debris resulting in more debris transport to the sump strainers and higher sump strainer head loss. However, a LBLOCA has a very low probability of occurrence.
- 2) The more probable intermediate and small break LOCAs have significantly less potential for debris generation and transport due to the lower ZOIs and reduced flowrates.
- 3) There are two sumps in containment – the internal recirculation sump and the smaller containment sump. The internal recirculation sump is the primary sump used for accident mitigation and the containment sump provides backup capability for the internal recirculation system.
- 4) There are four low head pumps available for accident mitigation – two internal recirculation pumps that draw from the internal recirculation sump and two residual heat removal pumps that draw from the containment sump. Should an internal recirculation pump fail, then the second recirculation pump would be available. Should both internal recirculation pumps fail then either of the two residual heat removal pumps would be available for accident mitigation.
- 5) The replacement strainers have 3/32" diameter holes versus the 1/8" original design. The downstream effects evaluation has shown that components are not subject to blockage.
- 6) The replacement strainers consist of hollow concentric cylinders fitted with a bypass eliminator mesh. The bypass eliminator significantly reduces the total quantity of fiber that could bypass the strainer and therefore aids in mitigating downstream effects.
- 7) The head loss across the strainers will be reduced due to a significant reduction in the amount of chemical precipitates generated as a result of the buffer replacement modifications.

- 8) The ECCS valves, heat exchanger tubing, instrument tubing, and orifices have been evaluated for blockage and erosion and found to be acceptable for their required mission time assuming a debris laden fluid.
- 9) The residual heat removal and high head safety injection pump mechanical shaft seals have been evaluated and are expected to perform satisfactorily during their required mission time assuming a debris laden fluid.
- 10) The internal recirculation, residual heat removal and high head safety injection pumps have been evaluated and are expected to perform satisfactorily during their required mission time assuming a debris laden fluid.
- 11) Testing has shown that a vortex does not form when conducting debris only testing without a vortex suppressor for both thin debris beds (using March 2008 Guidance) and thick debris beds (prior to March 2008 Guidance). However, it has also been shown that in the presence of chemical precipitate, a vortex suppressor is required for limiting conditions during cold leg recirculation. Entergy has also shown, via solubility testing in a high temperature vertical loop, that chemicals in the sump are not expected to precipitate out above approximately 95°F. Therefore, it is not anticipated that the function of the emergency core cooling system would be compromised by vortex formation during cold leg recirculation when the sump temperatures are the highest and core cooling requirements are the most demanding. At switchover to hot leg recirculation, the sump water level will be higher and the total sump flow rate will be lower, both of which reduce the likelihood of vortex formation.

For these reasons there is reasonable assurance that for intermediate and small break LOCAs the ECCS would continue to provide adequate core cooling.

Thus the following quantitative risk evaluation addresses potential vulnerability for large break LOCAs only. Even though there are two sumps in containment and four ECCS pumps available for accident mitigation it is assumed here that both sumps and all four pumps fail at the initiation of recirculation. It is further assumed that no credit is taken for recovery actions that would be available to the operators. Therefore, all LBLOCAs (equivalent to pipe diameter of 6" and greater) are assumed to impact sump performance and lead to core damage.

The frequency of the LBLOCA event is very low at 5×10^{-6} /yr. Therefore, based on the above conservative assumption regarding LBLOCA mitigation, the annual increase in Core Damage Frequency (CDF) for each unit is taken to be 5×10^{-6} /yr. This change is considered small and falls into Region II of the Acceptance Guidelines for CDF in Regulatory Guide (RG) 1.174. From the current Probabilistic Risk Assessment models, the baseline CDFs for internal events are 1.79×10^{-5} /yr for Unit 2 and 1.15×10^{-5} /yr for Unit 3. Since the contribution of external events to total baseline CDF is 6.33×10^{-5} /yr (Unit 2) and 5.20×10^{-5} /yr (Unit 3), even considering the change in risk due to the assumed inability to mitigate a LBLOCA, total CDF for each unit would still remain below 10^{-4} per yr. The Regulatory Guide (RG) 1.174 guidelines state that when the increase in CDF is between 10^{-6} per year and 10^{-5} per year, an application will be considered only if it can be reasonably shown that the total CDF is less than 10^{-4} per year. Since the risk associated with this application meets those guidelines, the CDF results remain very low and this risk assessment is considered acceptable for this application.

There is no significant contribution to Large Early Release Frequency (LERF) for loss of recirculation following large LOCAs. External event contributions can also be neglected since they do not result in large LOCAs.

4.0 References

1. NRC Generic Letter 2004-02, 09/13/04 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
2. Entergy letter NL-05-094, 09/01/05 "Response to NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
3. Entergy letter NL-05-133, 12/15/05 "Supplemental Response to NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
4. Entergy letter NL-08-025, 02/28/08, "Supplemental Response to NRC Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors"
5. Entergy letter NL-07-074, 09/17/07, "Request for Extension of Completion Date for Indian Point Unit 2 Corrective Actions and Modifications Required by Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
6. Entergy letter NL-07-129, 11/30/07, "Revised Request for Extension of Completion Date for Indian Point Unit 2 Corrective Actions and Modifications Required by Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
7. Entergy letter NL-08-054, 03/28/08, "Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions Required by Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
8. Entergy letter NL-08-153, 10/17/08, "Request for Extension of Completion Dates for Indian Point Units 2 and 3 Corrective Actions Required by Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
9. NRC letter to M.A. Balduzzi, 11/20/07, "Indian Point Nuclear Generating Unit No. 2 – Approval of Extension Request for Corrective Actions Required by Generic Letter 2004-02 (TAC No. MC4689)"
10. NRC letter to M.A. Balduzzi, 12/20/07, "Indian Point Nuclear Generating Unit No. 3 – Approval of Revised Extension Request for Corrective Actions Required by Generic Letter 2004-02 (TAC No. MC4690)"
11. NRC letter to Indian Point Vice President of Operations, 04/11/08, "Indian Point Nuclear Generating Unit Nos. 2 and 3 – Approval of Revised Extension Request for Corrective Actions Required by Generic Letter 2004-02 (TAC Nos. MC4689 and MC4690)"

12. NRC letter to Indian Point Vice President of Operations, 10/30/08, "Indian Point Nuclear Generating Unit Nos. 2 and 3 – Approval of Revised Extension Request for Corrective Actions Required by Generic Letter 2004-02 (TAC Nos. MC4689 and MC4690)"
13. NRC letter to Indian Point Vice President of Operations, 09/17/08, "Indian Point Nuclear Generating Unit Nos. 2 and 3 – Request for Additional Information Regarding Responses to Generic Letter 2004-02 (TAC Nos. MC4689 and MC4690)"
14. Entergy letter NL-09-004, 03/25/09, "License Amendment Request Regarding Surveillance Requirements for ECCS Valves Required to be in Position with Power to the Valve Operator Removed"
15. SECY-06-0078, from L. A. Reyes, NRC Executive Director for Operations, to NRC Commissioners, 03/31/06 "Status of Resolution of GSI-191, Assessment of [Effect of] Debris Accumulation on PWR [Pressurized Water Reactor] Sump Performance"
16. NRC letter to NEI, 03/28/08, "Revised Guidance for Review of Final Licensee Responses to Generic Letter 2004-02, Potential Impact Of Debris Blockage On Emergency Recirculation During Design Basis Accidents At Pressurized-Water Reactors"
17. NRC Bulletin 2003-01, 06/09/03 "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"
18. Entergy letter NL-03-128, 08/07/03 "60 Day Response to NRC Bulletin 2003-01 Regarding Potential Impact of Debris Blockage of Emergency Sumps"
19. Entergy letter NL-04-151, 12/08/04 "Reply to RAI Regarding Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"
20. NRC letter, 08/22/05 "Indian Point Nuclear Generating Unit Nos. 2 and 3 – Response to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors (TAC Nos. MB9582 and MB9583)"

ATTACHMENT 2 TO NL-09-099

New Commitments

ENERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT Nos. 2 and 3
DOCKET Nos. 50-247 and 50-286

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

#	COMMITMENT	IMPLEMENTATION SCHEDULE
NL-09-099-1	Install Unit 2 vortex suppressors and complete licensing activities to achieve compliance with the regulatory requirements of GL 2004-02.	Prior to restart from refueling outage 2R19 (currently scheduled to begin March 10, 2010)
NL-09-099-2	Pending NL-09-004 License Amendment Request approval, modify the Unit 2 ECCS valve position indicator power supplies for MOV-745A & B.	Prior to restart from refueling outage 2R19 (currently scheduled to begin March 10, 2010)
NL-09-099-3	Install Unit 3 vortex suppressors and complete licensing activities to achieve compliance with the regulatory requirements of GL 2004-02.	Prior to restart from refueling outage 3R16 (currently scheduled to begin March 11, 2011) Or Between April 30 th , 2010 and 3R16, prior to restart, during any forced outage requiring entry into Mode 5, of a long enough duration, in that mode, to install the suppressors.