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U S Nuclear Regulatory Commission
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Prairie Island Nuclear Generating Plant Units 1 and 2
Dockets 50-282 and 50-306
License Nos. DPR-42 and DPR-60

Request for Extension of Supplemental Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," for the Prairie Island Nuclear Generating Plant

References:
1. Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors", dated September 13, 2004, Accession Number ML042360586.
2. Nuclear Management Company Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," for the Prairie Island Nuclear Generating Plant, dated August 31, 2005, Accession Number ML052440054.
3. Revised Content Guide for Generic Letter 2004-02 Supplemental Responses dated November 21, 2007, Accession Number ML073110278.
4. NRC letter "Supplemental Licensee Responses to Generic Letter 2004-02,'Potential Impact of Debris Blockage on Emergency Recirculation During Design Bases Accidents at Pressurized-Water Reactors'", dated November 30, 2007, Accession Number ML073320176.

By letter dated September 13, 2004, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2004-02 (Reference 1) which requested specific information be provided by September 1, 2005 and all actions for resolution of GL 2004-02 issues be completed by December 31, 2007. By letter dated August 31, 2005 (Reference 2), Nuclear Management Company, LLC (NMC) provided the specific information required by September 1, 2005 in response to GL 2004-02.

Recently NMC determined that the some actions, ex-vessel downstream effects analysis and in-vessel effects analysis for the Prairie Island Nuclear Generating Plant (PINGP), cannot be completed until the first quarter of 2008. NMC notified the NRC

Staff, by telephone call and email on November 6, 2007, that an extension request would be submitted.

NMC requests an extension to March 31, 2008 to complete the ex-vessel downstream effects analysis, in-vessel effects analysis, and provide the final submittal for resolution of GL 2004-02. In Reference 3, the NRC provided GL 2004-02 supplemental response guidance as follows:

> If a licensee cannot provide complete information as requested by this Content Guide by December 31, 2007 (e.g., the licensee has received an extension), that licensee should provide all relevant and available information by that date. Remaining information should be provided within 90 days of completion of all actions needed to address GL 2004-02.

In a letter to the Nuclear Energy Institute (Reference 4) the NRC authorized all pressurized water reactor licensees until February 29, 2008, to provide the supplemental responses to the NRC. If an extension is granted and in conformance with the guidance of Reference 4, NMC will submit GL 2004-02 supplemental responses by February 29, 2008, with the exception of the analyses for which this letter requests an extension to March 31, 2008.

Supporting information for this extension request and the bases for continued safe PINGP operation are provided in the Enclosure to this letter.

If there are any questions or if additional information is needed, please contact Mr. Dale Vincent, P.E., at 651-388-1121.

Summary of Commitments

This letter contains no new commitments and revises commitment 1 in NMC letter dated August 31, 2005 (Reference 2) to state:

> NMC will evaluate and modify as appropriate the Prairie Island Unit 1 and Unit 2 Emergency Core Cooling (ECCS) systems to support long-term decay heat removal and resolve the issues identified in GL 2004-02 by March 31, 2008.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on DEC 05 2007

Michael D. Wadley

Michael D. Wadley
Site Vice President, Prairie Island Nuclear Generating Plant Units 1 and 2
Nuclear Management Company, LLC

Enclosures (1)

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC

Enclosure

Generic Letter (GL) 2004-02 Supplemental Response Extension Request
Prairie Island Nuclear Generating Plant

Background

By letter dated September 13, 2004, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2004-02 (Reference 1) which requested all actions for resolution of GL 2004-02 issues be completed by December 31, 2007. Recently the Nuclear Management Company, LLC (NMC) determined that the ex-vessel downstream effects analysis and the in-vessel effects analysis for the Prairie Island Nuclear Generating Plant (PINGP) will be completed in the first quarter of 2008. NMC requests an extension to the date of March 31, 2008 for completion of GL 2004-02 corrective actions.

In a letter to the Nuclear Energy Institute, dated November 8, 2007 (Reference 2), the NRC Staff identified three types of extension requests of which Case 2 most closely describes the circumstances for the Prairie Island Nuclear Generating Plant (PINGP). This extension request provides NMC's basis for concluding PINGP can continue to safely operate beyond 2007 and includes a description of mitigative measures taken by NMC which minimize the risk of degraded safety system functions during the extension period.

In GL 2004-02 (Reference 1), the NRC Staff summarized the bases for concluding that existing pressurized water reactors (PWRs) could continue to operate through December 31, 2007, while implementing the required corrective actions for NRC Generic Safety Issue 191 (GSI-191), "Assessment of Debris Accumulation on PWR Sump Performance." The proposed extension of the GSI-191 implementation schedule by three months does not alter the original conclusions summarized in GL 2004-02 in which the NRC Staff determined that it is acceptable for PWR licensees to operate until the corrective actions are completed.

Reason for Request

Industry guidance in WCAP-16406-P, Revision 1, submitted to the NRC in September 2007, requires a revision of the previously completed ex-vessel downstream effects analysis. The revision of the guidance applies Archard's wear model to analyze wear in the high head safety injection pumps. Revision of this analysis for PINGP, including issues addressed in the anticipated NRC Safety Evaluation of this WCAP, will be completed in the first quarter of 2008.

With respect to the in-vessel effects analysis, PINGP is bounded by WCAP-16793-NP, Revision 0, the applicable industry guidance, submitted to the NRC in

June 2007, in the areas of fiber bypass, strainer opening size, time to initiation of recirculation operation, and debris quantities. The WCAP-16793-NP, Revision 0, discussion on the plate-out analysis modeling tool includes an example case for which the PINGP material inputs for fiber and calcium silicate quantities are much lower than the example case. However, PINGP may not be bounded by the aluminum quantity used in the example which may require a detailed analysis using the modeling tool with PINGP specific inputs to determine specific plate-out data. This analysis will be completed in the first quarter of 2008.

No further modifications to the facility are expected to result from these completed analyses.

Mitigative Measures

1. Design Modifications

   During the Spring and Fall of 2006 refueling outages, new containment sump strainers were installed in the Unit 1 and 2 reactor containments, respectively. The new strainers increased the effective surface area from approximately 60 ft^2 to 827.3 ft^2 for each unit which, in effect, reduced the flow velocity through the screens to 0.014 fps. The strainer configuration is designed to limit the head loss to 10 feet during the post loss of coolant accident (LOCA) design conditions. The new strainer is sized, with suitable margin, for the design bases debris loading and still assures that the resultant head loss is well within available margins.

   In SECY-06-0078 (Reference 3), the NRC Staff informed the Commission of review criteria for extension requests for delay of plant modifications. These criteria are not applicable to this extension request since, at PINGP, the sump screens have been replaced with strainers with larger area; no further modifications to the facility are required.

2. Procedure Enhancements

   Procedural actions have been implemented to provide clear direction to the operations and technical support staff for monitoring post-LOCA long term recirculation operation. These procedures include directions for monitoring system performance and contingency actions in the event that indications warrant the need.

3. Training

   In response to the issues associated with GSI-191, NMC implemented training activities to ensure that operations and technical personnel were aware of the issues and the plant changes implemented to address the

issues. These training activities include briefings of operators to heighten sensitivity to awareness of the GSI-191 issues, procedure changes that have been implemented, system indications that can be used to monitor recirculation performance and guidance on mitigation strategies from postulated blockage.

4. Administrative Controls

The minimum level in the refueling water storage tank (RWST) was administratively increased above the minimum level specified in the plant Technical Specifications (TS); a license amendment request (Reference 4) was submitted to make the corresponding change to the plant TS. Additional measures were implemented to provide more aggressive requirements for containment closeout and foreign material controls.

Analysis Conservatisms

The analyses of downstream effects include evaluations for both blockage and wear, and are to be performed following the NRC staff approved guidelines. The downstream effects analyses include the following conservative assumptions:

- 100% of the debris source term inside of containment is assumed to be at the strainer and available for passing through the strainer and entering the emergency core cooling system (ECCS). Assuming 100% debris transport of the debris is an analytical conservatism rather than a best estimate of realistic debris transport behavior.
- Margin is added to the significantly conservative debris source term described above.
- 100% of the debris smaller than the criteria in the approved guidance is assumed to pass through the strainer and enter the ECCS. This results in 100% of the transported qualified coatings, unqualified coatings, miscellaneous debris and latent debris (with the exception of the latent fiber in the fuels analysis) entering the ECCS. For analysis of the potential for fuel blockage the bypass fraction assumed is very conservative relative to the values measured during the strainer testing and is conservative compared to the approved guidelines. These assumptions provide bounding conditions for debris bypass. For the determination of the head loss through the debris bed at the strainer, it is assumed that the debris is retained at the strainer. For the determination of downstream effects, no credit for filtering at the strainer is assumed and it is assumed that all of the debris passes through the strainer and enters the system.
- Assumed system and component operating times are conservative relative to expected or limiting operating times to provide conservative wear results.

- Flow rates are selected to maximize wear. This includes assuming flow rates corresponding to pump runout flow where appropriate and pump dead head conditions where appropriate.
- Debris concentrations in the recirculation liquid are determined based on minimum liquid volume determinations. This maximizes the debris concentrations which maximize the wear on components in the fluid stream. The determination of the minimum liquid in the pool is based on an initial RWST level of 68% versus the 90% minimum limit in plant procedures and in the license amendment request currently being reviewed by the NRC.

Risk Considerations

Generic Letter 2004-02 provides the following observations regarding risk significance that remain valid through the proposed extended implementation period to the completion of the downstream effects analyses:

- The probability of a large break LOCA remains extremely low, as is the probability of a small break LOCA that may require recirculation.
- PINGP does not need to switch over to recirculation from the sump during a LOCA until 14 minutes after the large break LOCA initiation and the elapsed time for all LOCAs will allow time for some of the debris to settle into other places within the containment.
- PINGP has received approval by the staff for leak-before-break (LBB) credit on the largest reactor coolant system (RCS) primary coolant piping. While LBB is not acceptable for demonstrating compliance with 10 CFR 50.46, it does demonstrate that LBB-qualified piping is sufficiently tough that it will most likely leak (even under safe shutdown earthquake conditions) rather than rupture.
- There are sources of margin in pressurized water reactor (PWR) design which are not always credited in the licensing basis. PINGP does not credit containment overpressure (which may be present during a LOCA) in the net positive suction head (NPSH) analyses.

NRC GSI-191 Audit Report

In October 2006, the NRC audited NMC's activities in response to GL 2004-02. NMC had performed ex-vessel downstream effects analyses based on the guidance available at that time which the NRC Staff reviewed as part of their audit. The NRC issued an audit report May 2, 2007 (Reference 5). The audit report concluded, with respect to PINGP ex-vessel downstream effects, that:

> The [NRC] staff believes that there is a negligible change to PI [PINGP] system flow operating characteristics due to structures, systems or component wear, accumulation of debris or clogging of system components. This conclusion is based on the staff review of Calculation

> ENG-ME-654 . . . and related documentation as noted above. However, PI's analysis needed to verify this conclusion is incomplete.

NMC requests this extension to allow additional time to complete the ex-vessel downstream effects analyses based on the recent revision of WCAP-16406-P (Revision 1). NMC believes that the results will continue to demonstrate that the ex-vessel downstream effects have negligible impact on PINGP system post accident performance.

The NRC also audited the evaluations of post-LOCA consequences of debris ingestion into the reactor system and its affect on long-term core cooling for PINGP. These evaluations were not complete at the time of the audit and therefore the audit report included open items for these evaluations. The NRC audit report noted:

> The licensee is working with the PWR Owners Group to complete evaluations for the effects of ingested debris on long-term reactor core cooling. The licensee believes that when the evaluations are completed that the effect of debris ingestion will be shown to be small.

As noted above, the WCAP-16793-NP, Revision 0, example bounds many areas of the PINGP design. NMC believes that the analysis results will continue to demonstrate that the in-vessel downstream effects have negligible impact on PINGP post accident core cooling.

Conclusion

Based on the above discussion, the Nuclear Management Company, LLC has determined that overall Prairie Island Nuclear Generating Plant safety will be maintained until the final analytical and testing results can be provided March 31, 2008.

References

1. Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors", dated September 13, 2004, Accession Number ML042360586.

2. Letter to Mr. Anthony R. Pietrangelo, Nuclear Energy Institute, from William H. Ruland, NRC, "Plant-Specific Requests for Extension of Time to Complete One or More Corrective Actions for Generic Letter 2004-02, 'Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors'", dated November 8, 2007.

3. SECY-06-0078, "Status of Resolution of GSI-191, 'Assessment of [effect of] Debris Accumulation on PWR Sump Performance'", dated March 31, 2006, Accession Number ML053620174.

4. Prairie Island Nuclear Generating Plant, Units 1 and 2, "License Amendment Request (LAR) to Revise Technical Specifications (TS) in Support of Containment Sump Resolution", dated December 14, 2006, Accession Number ML063480462.

5. Prairie Island Nuclear Generating Plant Corrective Actions for Generic Letter 2004-04, dated May 2, 2007, Accession Number ML070750065.