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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

Clarification of Responses to Requests for Additional Information Regarding a License Amendment Request for Certain Applications of Leak-Before-Break Methodology (TAC Nos. ME2976 and ME2977)

References:

1. Letter from Northern States Power Company, a Minnesota corporation, to the Nuclear Regulatory Commission, "Supplement to License Amendment Request to Exclude the Dynamic Effects Associated with Certain Postulated Pipe Ruptures From the Licensing Basis Based Upon Application of Leak-Before-Break Methodology – Response to Request for Additional Information (TAC Nos. ME2976 and ME2977)," L-PI-10-077, dated July 23, 2010, ADAMS Accession Number ML102040612.

2. Letter from Northern States Power Company, a Minnesota corporation, to the Nuclear Regulatory Commission, "License Amendment Request to Exclude the Dynamic Effects Associated with Certain Postulated Pipe Ruptures From the Licensing Basis Based Upon Application of Leak-Before-Break Methodology," L-PI-09-134, dated December 22, 2009, ADAMS Accession Number ML100200129.

This letter provides clarifications to information provided in Reference 1, regarding the application of Leak-Before-Break (LBB) methodology to piping systems attached to the reactor coolant system at the Prairie Island Nuclear Generating Plant (PINGP). In Reference 1, Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, submitted responses to a Request for Additional Information (RAI) from the Nuclear Regulatory Commission (NRC) regarding the LBB License Amendment Request (LAR) submitted in Reference 2.

During a subsequent telephone conference with the NRC Staff on August 5, 2010, NSPM agreed to clarify the responses to two RAI questions regarding the LBB supporting analyses. The clarifying information is provided in Enclosure 1. NSPM submits this clarification in accordance with the provisions of 10 CFR 50.90.

The information provided in this letter does not impact the conclusions of the Determination of No Significant Hazards Consideration or Environmental Assessment presented in Reference 2.

In accordance with 10 CFR 50.91, NSPM is notifying the State of Minnesota of this LAR supplement by transmitting a copy of this letter to the designated State official.

If there are any questions or if additional information is needed, please contact Sam Chesnutt at 651-267-7546.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on AUG 20 2010

Mark A. Schimmel
Site Vice President, Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure (1)

cc: Administrator, Region III, USNRC
Project Manager, PINGP, USNRC
Resident Inspector, PINGP, USNRC
State of Minnesota

ENCLOSURE 1

CLARIFICATION OF RESPONSES TO A REQUEST FOR ADDITIONAL INFORMATION REGARDING APPLICATION OF LEAK-BEFORE-BREAK METHODOLOGY TO PIPING ATTACHED TO THE REACTOR COOLANT SYSTEM AT THE PRAIRIE ISLAND NUCLEAR GENERATING PLANT

This enclosure clarifies information previously provided by the Northern States Power Company, a Minnesota corporation (NSPM) doing business as Xcel Energy, in a letter dated July 23, 2010 (ADAMS Accession Number ML102040612). This information supports a License Amendment Request (LAR) to apply Leak-Before-Break (LBB) methodology to piping attached to the reactor coolant system (RCS) at the Prairie Island Nuclear Generating Plant (PINGP).

The subject LAR was submitted by NSPM on December 22, 2009 (ADAMS Accession Number ML100200129), and the Nuclear Regulatory Commission (NRC) Staff issued a Request for Additional Information (RAI) in a letter dated June 10, 2010 (ADAMS Accession Number ML101550668). NSPM's July 23, 2010 letter cited above provided responses to the NRC's RAI. During a subsequent telephone conference on August 5, 2010, the NRC requested further clarification of two RAIs, which are addressed as follows (RAI designations are consistent with the NRC's June 10, 2010 letter):

RAI E3-3.

Summary of Original RAI:
This RAI addresses the PINGP Unit 2 Pressurizer Surge Line weld overlay and the analysis provided with the LAR as Enclosure 3, Structural Integrity Associates evaluation SIA 0900634.402, *"Updated Leak-Before-Break (LBB) Report for Prairie Island Nuclear Generating Plant Unit 2 Pressurizer Surge Line Nozzle."* The original RAI requested justification for not combining thermal stratification loads with safe shutdown earthquake (SSE) loads in Table 4-2 of Enclosure 3. NSPM's response indicated that the duration of the transients (e.g., heatup) that cause large stratification loads is relatively short and the likelihood of an SSE during those transients is extremely low. Therefore, it is reasonable to use the larger of the two loads in the LBB evaluation.

Request for Clarification:

> The licensee stated that thermal stratification loads are not added to safe shutdown earthquake (SSE) because of the low probability of these two events occurring at the same time. A regulatory argument would be that the thermal stratification loads are not added to the SSE load because the ASME Code does not require the subject load combination. Absence of ASME Code permitting subject loads not to be combined, the thermal stratification loads should be combined with the SSE loads. Please address the staff's concern.

NSPM Clarification Response:
The ASME Boiler and Pressure Vessel Code does not specify loads or load combinations for design of Class 1 components. Rather, the loads and load combinations are specified in the Design Specification for the component. Moreover, the PINGP Unit 2 pressurizer surge line was designed in accordance with USA Standard (USAS) B31.1, *Code for Pressure Piping – Power Piping,* 1967, which also does not specify loads or load combinations for upset, emergency, or faulted conditions. For the PINGP Unit 2 pressurizer surge line, the loads and

load combinations are described in USAR Table 12.2-13, *"Loading Combinations and Stress Limits: Pressure Piping in Accordance with USAS B31.1."* The Table 12.2-13 and the discussion in USAR Section 12.2.1, "*Design Basis,*" do not identify thermal stratification as a design basis load for the pressurizer surge line. Therefore, thermal stratification has not been combined with other loads for design basis piping analyses.

Thermal stratification has been considered in the analysis in Enclosure 4 to the LBB LAR to address fatigue concerns, as were described in Bulletin 88-11, but these loads have not been combined with SSE loads.

RAI E4-4.

Summary of Original RAI:
This RAI addresses the Unit 2 Pressurizer Surge Line and the analysis provided with the LAR as Enclosure 4, Westinghouse evaluation WCAP-15379, "*Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Prairie Island Unit 2 Nuclear Plant.*" The original RAI noted that Section 4.4 of WCAP-15379 identified three normal operation cases (A, B, C) and four faulted load cases (D through G), and questioned why load combinations A/E, A/G, B/D, C/D, C/E, and C/F were not evaluated. The RAI response described each of these combinations and stated that they would not be logical combinations.

Request for Clarification:

> The licensee provided the reason why load combinations of A/E, A/G, B/D, C/D, C/E, and C/F are not considered in the LBB evaluation. The licensee's reason does not explain exactly why the load combinations are not considered. Please provide additional technical basis.

NSPM Clarification Response:
As described in Section 4.4 of the analysis in Enclosure 4 to the LBB LAR, the evaluation considers cracks or flaws in the RCS piping that would result in a 2 gpm leak (leakage flaw size), and then evaluates the stability of these flaws during various faulted conditions. Stability evaluations determine the flaw size that would become unstable (critical flaw size) and the analysis demonstrates that there is a margin of at least two between the leakage flaw size and the critical flaw size.

The analysis evaluates three different operating conditions to determine the leakage flaw size. The applicable loads for these three conditions, Cases A, B, and C, are identified in Table 4-2 on page 4-5 of LAR Enclosure 4. These cases include various combinations of thermal expansion, thermal stratification, and heatup/cooldown loads.

The analysis then evaluates various faulted conditions to determine the critical flaw size at which point the leak would no longer be stable and a rupture could occur. The loads for these faulted conditions, Cases D, E, F, and G, are also shown in Table 4-2 on page 4-5 of LAR Enclosure 4. These faulted cases include various combinations of safe shutdown earthquake (SSE), thermal expansion, thermal stratification, and heatup/cooldown loads.

The analysis in LAR Enclosure 4 combines the leak detection load cases (A, B, and C) and the critical flaw load cases (D, E, F, and G) to determine whether the crack producing the leak will remain stable for various normal and postulated faulted conditions. For example, if a leak were detected during normal full power operations without thermal stratification (Case A), the plant could then potentially experience an SSE (Case D), and the load combination A/D is evaluated in the analysis as shown in Table 4-3, page 4-6 of LAR Enclosure 4.

Load combinations that the plant would not encounter before a detected flaw could be repaired were not evaluated in the analysis. Examples of these combinations include the following:

- The existence of thermal stratification conditions should be the same for both leak detection evaluations and stability evaluations under faulted conditions (SSE), because factors such as piping configurations and flow rates that affect thermal stratification would not be affected by an SSE event. That is, combinations A/D and B/E are logical combinations, but A/E and B/D are not. Also, as shown below, combinations A/E and B/D are bounded by other combinations.

- If a leak is detected during heatup conditions described by Case C, and the leak is found to be through a nonisolable fault in the RCS pressure boundary, the PINGP Technical Specifications would preclude the operating mode changes that would result in Cases D or E, which include normal operating temperature and pressure conditions. Based on this, combinations C/D and C/E need not be considered.

In addition, operating conditions where leakage flaw sizes would be bounded by other conditions were not evaluated in the analysis. Examples of combinations that are bounded by other combinations include the following:

- The leakage flaw from Case A would be bounded by a leakage flaw in Case B, as shown in Table 5-1 on page 5-5 of LAR Enclosure 4. Therefore, load combinations A/E and A/G are bounded by load combinations B/E and B/G.

- The critical flaw for Case F is bounded by the critical flaw for Case G, as shown by the critical flaw sizes in Table 5-2 on page 5-5 of LAR Enclosure 4. Therefore, combination C/F is bounded by load combination C/G.

- The critical flaw size for Case D is bounded by the critical flaw for Case G, as shown by the critical flaw sizes in Table 5-2 on page 5-5 of LAR Enclosure 4. Therefore, combination B/D is bounded by load combination B/G.

The completeness of the load combinations selected for evaluation in the LAR analysis can also be seen by comparing the leakage flaw sizes and critical flaw sizes shown in Tables 5-1 and 5-2 on page 5-5 of Enclosure 4 to the LBB LAR. From Table 5-1, it can be seen that Case B results in the largest leakage flaw size. From Table 5-2, it can be seen that Case G results in the shortest critical flaw length. The margin to failure is determined by ratioing the leakage flaw length to the critical flaw length and, as shown on Table 7-1, page 7-2, the most limiting ratio of Case B to Case G well exceeds the factor of 2.

Based on the above, the load combinations evaluated in the LAR Enclosure 4 analysis address a credible range of conditions under which a postulated RCS leak would be detected, and the range of conditions that could be encountered until the leak could be repaired. The load combinations evaluated in the analysis conservatively bound other combinations and there is no need to evaluate combinations A/E, A/G, B/D, C/D, C/E, or C/F in the LBB analysis.