December 09, 2003

NRC 2003-0115
10 CFR 50, Appendix A, GDC 4
10 CFR 50.90

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

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
License Nos. DPR-24 and DPR-27
Request For Review Of Correction To Dynamic Effects Design Basis And Leak-Before-Break Analysis

References: *1) NRC Safety Evaluation dated November 7, 2000*
2) NRC Safety Evaluation dated December 15, 2000
3) NRC Safety Evaluation dated December 18, 2000

In References 1 through 3, the NRC reviewed and approved the technical justifications that demonstrated acceptability of applying "leak-before-break" to certain specific piping at Point Beach Nuclear Plant (PBNP), Units 1 and 2, and thereby allowed elimination of these lines from consideration of dynamic effects of postulated pipe ruptures at Point Beach per the allowances of General Design Criteria GDC 4. The evaluated piping included the pressurizer surge line from the primary loop nozzle junction to the pressurizer nozzle junction; the safety injection accumulator lines from the reactor coolant system loop to the accumulator tanks and connecting 10-inch lines to the containment penetration; and the high energy Class I portions of the residual heat removal system lines.

Nuclear Management Company, LLC (NMC) personnel recently identified that the associated technical justifications contained an incorrect statement regarding the sensitivity of the leak detection capability at PBNP. The technical justifications inappropriately stated that PBNP had the capability to detect leakage from the reactor coolant system (RCS) as low as one gallon per minute, within one hour. However, the sensitivity and response of the PBNP system was actually based on being able to detect leakage of one gallon per minute in four hours.

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Our assessment of this condition concluded that a sufficiently large amount of margin for detection of RCS leakage exists, such that an RCS leak would be detected in sufficient time to assure integrity of system piping. The corrected analysis demonstrates the continued acceptability of applying "leak-before-break" to certain specific piping. Therefore, this condition does not significantly affect reactor safety.

As required by 10 CFR 50 Appendix A, General Design Criterion 4, and in accordance with 10 CFR 50.90, NMC requests that NRC review the correction to the dynamic effects design basis analysis for the affected piping at PBNP and provide addenda to the NRC Safety Evaluations dated November 7, 2000, December 15, 2000, and December 18, 2000, correcting the assumption made for leak detection capability from "1 gpm in 1 hour" to the appropriate basis of "1 gpm in 4 hours". The corrected analysis continues to demonstrate that the probability of rupture of this specific piping interfacing with, or part of, the reactor coolant system, is extremely low and that leak detection capability is sufficient to detect leakage and allow appropriate action to be taken to prevent such an unlikely event from occurring.

Enclosure 1 to this letter provides a description, justification, and a significant hazards determination for the corrected analysis. Enclosed is a letter from Westinghouse Electric Company (WEP-03-153), the vendor of the original leak-before-break analysis, discussing the corrected technical justification.

NMC requests approval of the corrected analyses by November 2004.

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

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Wisconsin Official.

I declare under penalty of perjury that the foregoing is true and accurate. Executed on December 09, 2003.

A. J. Cayia
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosures: 1. Description and Assessment Of Change
2. Letter from Westinghouse Electric Company, WEP-03-153

cc: (w/enclosures)
Project Manager, Point Beach Nuclear Plant, NRR, USNRC

cc: (w/o enclosure 2)
Regional Administrator, Region III, USNRC
Resident Inspector - Point Beach Nuclear Plant
PSCW

ENCLOSURE 1
REQUEST FOR REVIEW OF CORRECTION TO DYNAMIC EFFECTS DESIGN BASIS AND LEAK-BEFORE-BREAK ANALYSIS

1.0 INTRODUCTION

As required by 10 CFR 50 Appendix A, General Design Criterion 4, and in accordance with 10 CFR 50.90, Nuclear Management Company (NMC) requests review and approval of the corrected analysis supporting the Point Beach Nuclear Plant (PBNP) dynamic effects design basis for certain piping. This analysis continues to demonstrate that the probability of rupture of certain specific piping interfacing with, or part of, the reactor coolant system (RCS), is extremely low and that leak detection capability is sufficient to detect leakage and allow appropriate action to be taken to prevent such an unlikely event from occurring. Thus, the evaluation demonstrates the acceptability of applying "leak-before-break" (LBB) to this piping for PBNP.

2.0 BACKGROUND

General Design Criterion (GDC) 4, "Environmental And Dynamic Effects Design Bases," requires that structures systems and components important to safety be protected from the dynamic effects of postulated pipe ruptures. GDC 4 further states, "Nuclear power units may be excluded from this design bases when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system pipe rupture is extremely low under conditions consistent with the design basis of the piping."

Analyses were performed by Westinghouse and reviewed and approved by the Commission that concluded that asymmetric blowdown loads resulting from double-ended pipe breaks in main coolant loop piping need not be considered as a design basis for Westinghouse Owner's Group plants, including Point Beach Nuclear Plant, Units 1 and 2. The evaluation was approved as documented in Generic Letter 84-04, "Safety Evaluation of Westinghouse Topical Reports Dealing With Elimination Of Postulated Pipe Breaks In PWR Primary Main Loops," dated February 1, 1984. The approval was predicated on at least one leak detection system with a sensitivity capable of detecting one gpm in four hours. As PBNP meets the conditions of the Safety Evaluation, the consideration of the dynamic effects of primary loop pipe ruptures was eliminated as a design requirement for PBNP upon revision of GDC 4 effective November 27, 1987.

Analyses were subsequently performed on additional piping in or interfacing with the reactor coolant system, which demonstrated that the probability of pipe rupture is extremely low under conditions consistent with the design basis of the piping. The piping evaluated included the entire pressurizer surge line from the primary loop nozzle junction to the pressurizer nozzle junction; the safety injection accumulator lines from the reactor coolant system loop to the accumulator tanks, and connecting 10-inch lines

to the containment penetration; and, the high energy Class I portions of the residual heat removal system lines (primary loop junction to the second isolation valve). The recommendations and criteria proposed in draft SRP 3.6.3, "Leak-Before-Break Evaluation Procedures," were used in these analyses. These analyses demonstrated that there is at least a factor of two between the leakage flaw size and critical flaw size; and, a factor of 10 between the calculated leak rate at the leakage flaw size and leak detection capability at PBNP. In References 1 through 3, the NRC reviewed and approved these analyses for PBNP. The NRC staff independently assessed these analyses, using the PICEP (Pipe Crack Evaluation Program), Revision 1, analytic code, to calculate the margin between the leakage flaw size and critical flaw size. This calculation was based on a factor of 10 between the calculated leak rate at the leakage flaw size and a leak detection capability of one gpm. The staff calculated the margin to be slightly less than two; however, they concluded that for this evaluation, a margin of slightly less than two provides adequate assurance that the piping will exhibit LBB behavior.

The following Westinghouse technical justification reports provided the analysis.

WCAP 15065-P-A Revision 1 WCAP 15066-NP-A Revision 1	Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plant
WCAP 15105-P-A Revision 1 WCAP 15106-NP-A Revision 1	Technical Justification for Eliminating Residual Heat Removal (RHR) Lines Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plant
WCAP 15107-P-A Revision 1 WCAP 15108-NP-A Revision 1	Technical Justification for Eliminating Accumulator Lines Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plant

NMC provided the above documents for NRC review in a submittal dated December 2, 1999, which was supplemented February 21, 2000. The NRC approved these documents in safety evaluations dated November 7, 2000, December 15, 2000, and December 18, 2000.

NMC personnel recently identified that the technical justifications supporting these analyses contained an incorrect statement regarding the sensitivity of the leak detection capability at PBNP. The Westinghouse technical justifications inappropriately stated that PBNP had the capability to detect leakage from the RCS as low as one gallon per minute, within one hour. However, the sensitivity and response of the PBNP system was actually based on being able to detect leakage of one gallon per minute in ***four*** hours (vice in one hour).

Our assessment of this condition concluded that a sufficiently large amount of margin for detection of RCS leakage exists, such that an RCS leak would be detected in sufficient time to assure integrity of system piping. The corrected analysis demonstrates the continued acceptability of applying "LBB" to certain specific piping. Therefore, this condition does not significantly affect reactor safety.

Westinghouse Electric Company letter, WEP-03-153 (enclosed), provides information regarding the corrected technical justification associated with the above referenced WCAP documents. Additionally, a revised leak-before-break analysis for PBNP primary coolant piping was submitted for NRC review on November 5, 2003. The WCAP document supporting this analysis (WCAP-14439) contains the appropriate leak detection capability sensitivity for PBNP of one gallon per minute in four hours.

3.0 DESCRIPTION OF CHANGE

NMC proposes to correct the dynamic effects design basis analysis for PBNP. The corrected analysis specifies that the sensitivity for leak detection is based on a leak of one gpm in four hours, as per NRC Generic Letter 84-04. Correcting the basis for leak detection sensitivity from "1 gpm in 1 hour" to the appropriate basis of "1 gpm in 4 hours" has negligible impact on the conclusion of the analysis.

NMC requests that NRC provide addenda to the NRC Safety Evaluations dated November 7, 2000, December 15, 2000, and December 18, 2000, correcting the assumption made for leak detection capability from "1 gpm in 1 hour" to the appropriate basis of "1 gpm in 4 hours".

4.0 ASSESSMENT

The original PBNP licensing basis for RCS leak detection was based on NRC Generic Letter (GL) 84-04. Although GL 84-04 discussed RCS leak detection parameters contained in Regulatory Guide (RG) 1.45, PBNP is not committed to the guidance of RG 1.45. In GL 84-04, the NRC provided a variance to RG 1.45 to allow for detection capability of one gpm in four hours. PBNP was required to meet the criteria specified in GL 84-04 of being capable of detecting RCS leakage of one gpm within four hours.

In submittals to the NRC dated December 2, 1999, February 21, July 7 and August 16, 2000, PBNP requested evaluation and approval of additional LBB analysis. The cover letter for the December 2, 1999 submittal correctly stated that PBNP LBB criteria was based on GL 84-04 and predicated on at least one leak detection system with a sensitivity capable of detecting one gpm in four hours. However, the Westinghouse technical justifications in support of this submittal incorrectly stated the leak detection capability as one gpm in one hour. The NRC safety evaluations approving the submittal (References 1 through 3) explicitly referenced the incorrect leak detection capability stated in the Westinghouse documents.

The NRC made numerous conservative assumptions in the safety evaluations that approved the LBB analysis (References 1 through 3). The margin used by the NRC in these safety evaluations assumed leakage of 10 gpm for the limiting flaw size (i.e., 10 times the amount of fluid detectable by the facility's leakage detection system). Additionally, a margin of approximately two was used on length between the leakage and critical flaw sizes. Finally, the time response for leak detection does not appear to have been explicitly used as a basis for approval of the LBB analysis in the NRC safety evaluation, only the magnitude of leak detection capability.

The correction to the analysis consists solely of changing the assumed leak detection capability from a value of "one gpm in one hour", to a value of one gpm in four hours". The enclosed letter from Westinghouse (WEP-03-153) provides the corrected information to the technical justifications. The value of the leak rate remains unchanged. The time duration required for this rate of leakage to be detected is increased from one hour to four hours. However, as stated in the Westinghouse letter, the Point Beach RCS leak detection capability of one gpm in four hours will not change the LBB analyses results and conclusions documented in WCAP-15065-P-A Revision 1, WCAP-15105-P-A Revision 1, and WCAP-15107-P-A Revision 1. Therefore, the results and conclusion of the analysis are not affected by this change. Based on the correct leak detection capability for PBNP, this analysis concludes that there remains at least a factor of two between the leakage flaw size and critical flaw size; and, a factor of 10 between the calculated leak rate at the leakage flaw size and leak detection capability at PBNP.

Separately, WCAP-14439-P, Revision 2, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for Point Beach Nuclear Plant Units 1 and 2 for the Power Uprate and License Renewal Program", dated September 2003, was submitted for NRC review on November 5, 2003. This document provides an updated LBB analysis for the primary coolant piping at PBNP. The analysis provided in WCAP-14439 contains the appropriate leak detection capability sensitivity for PBNP of one gallon per minute in four hours. Although the analysis in WCAP-14439 was performed for primary coolant piping, it employs an analogous methodology and relies on the same leak detection capability criteria as for the smaller diameter piping.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Determination

As required by 10 CFR 50 Appendix A, General Design Criterion 4, and in accordance with 10 CFR 50.90, NMC requests review and approval of the corrected analysis supporting the PBNP dynamic effects design basis for certain piping. This analysis continues to demonstrate that the probability of rupture of certain specific piping interfacing with, or part of, the RCS is extremely low and that leak detection capability is sufficient to detect leakage and allow appropriate action to be taken to

prevent such an unlikely event from occurring. Thus, the evaluation demonstrates the acceptability of applying "LBB" to this piping for PBNP.

NMC has evaluated the proposed amendment in accordance with 10 CFR 50.91 against the standards in 10 CFR 50.92 and has determined that the operation of PBNP in accordance with the proposed amendments presents no significant hazards. Our evaluation against each of the criteria in 10 CFR 50.92 follows.

1. **Operation of PBNP in accordance with the proposed amendments does not result in a significant increase in the probability or consequences of any accident previously evaluated.**

   The proposed change corrects the analysis supporting the PBNP dynamic effects design basis for certain specific piping interfacing with, or part of, the RCS. The proposed change does not adversely affect accident initiators or precursors nor alter the design assumptions, conditions, or the manner in which the plant is operated and maintained. The proposed change does not alter or prevent the ability of structures, systems, and components from performing their intended function to mitigate the consequences of an initiating event within the assumed acceptance limits. The proposed change does not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of an accident previously evaluated. Further, the proposed change does not increase the types or amounts of radioactive effluent that may be released offsite, nor significantly increase individual or cumulative occupational/public radiation exposures. The proposed change is consistent with safety analysis assumptions and resultant consequences. Therefore, it is concluded that this change does not significantly increase the probability of occurrence of an accident previously evaluated.

2. **Operation of PBNP in accordance with the proposed amendments does not result in a new or different kind of accident from any accident previously evaluated.**

   The proposed change corrects the analysis supporting the PBNP dynamic effects design basis for certain specific piping interfacing with, or part of, the RCS. The change does not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. In addition, the changes do not impose any new or different requirements or eliminate any existing requirements. The proposed changes are consistent with the safety analysis results and conclusions. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Operation of PBNP in accordance with the proposed amendments does not result in a significant reduction in a margin of safety.**

   The proposed change revises the analysis supporting the PBNP dynamic effects design basis for certain specific piping interfacing with, or part of, the RCS. All the recommended margins regarding leak-before-break conditions (margin on leak rate, margin on flaw size, and margin on loads) are satisfied for this piping. The proposed change does not alter the manner in which safety limits, limiting safety system settings or limiting conditions for operation are determined. The setpoints at which protective actions are initiated are not altered by the proposed changes. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event.

Conclusion

Operation of PBNP in accordance with the proposed amendment will not result in a significant increase in the probability or consequences of any accident previously analyzed; will not result in a new or different kind of accident from any accident previously analyzed; and, does not result in a significant reduction in any margin of safety. Therefore, operation of PBNP in accordance with the proposed amendment does not result in a significant hazards determination.

5.2 Applicable Regulatory Requirements

Nuclear power plant licensees have, in general, been required to consider the dynamic effects that could result from the rupture of sections of high energy piping (fluid systems that during normal plant operations are at a maximum operating temperature in excess of 200°F and/or a maximum operating pressure in excess of 275 psig). This requirement has been formally included in 10 CFR Part 50, Appendix A, GDC 4, which states, "[s]tructures, systems, and components important to safety....shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit."

The NRC modified GDC 4 to permit the dynamic effects of some high energy piping ruptures to be excluded from facility licensing bases based upon the demonstration of an extremely low probability of piping system rupture. Consistent with this modification to GDC 4, the NRC accepted the LBB analysis methodology as an acceptable means by which this extremely low probability of piping system rupture could be demonstrated. The philosophy of LBB behavior for high energy piping systems was developed by the NRC in the early 1980s, used in certain evaluations stemming from Unresolved Safety Issue A-2, "Asymmetric Blowdown Loads on PWR Primary Systems," and then subsequently expanded for application toward resolving issues regarding defined dynamic effects from high energy piping system ruptures.

NMC concludes that the corrected analysis is in accordance with 10 CFR Part 50, Appendix A, GDC 4, in that the probability of piping system rupture is extremely low under conditions consistent with the design basis for the piping. The corrected analysis thus continues to be compliant with the above regulatory requirements.

5.3 Commitments

There are no actions committed to by NMC in this document. Any statements in this submittal are provided for information purposes and are not considered to be commitments.

6.0 ENVIRONMENTAL EVALUATION

NMC has determined that the information for the proposed amendment does not involve a significant hazards consideration, authorize a significant change in the types or total amounts of effluent release, or result in any significant increase in individual or cumulative occupational radiation exposure.

Accordingly, this proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with this proposed amendment.

ENCLOSURE 2

REQUEST FOR REVIEW OF CORRECTION TO DYNAMIC EFFECTS DESIGN BASIS AND LEAK-BEFORE-BREAK ANALYSIS

Westinghouse Electric Company
Nuclear Services
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

November 5, 2003
WEP-03-153

Mr. Brad Fromm
Nuclear Management Company
Point Beach Nuclear Plant
6610 Nuclear Road

Nuclear Management Company
Point Beach Units 1 and 2
Clarification of Leak Detection Capability for Point Beach LBB Analysis

Project Reference:

1. NMC Purchase Order P003618
2. W Sales Order No. 16526

Dear Mr. Fromm:

Leak-before-break (LBB) analyses have been performed for the pressurizer surge line, RHR lines, and accumulator lines for Point Beach Units 1 and 2 (References 1 through 3). In these topical reports, it is indicated that the Point Beach RCS pressure boundary leak detection capability is consistent with the guidelines of Regulatory Guide 1.45 for detecting leakage of 1 gpm in one hour. Point Beach personnel have indicated that the actual Point Beach RCS leak detection capability is 1 gpm in 4 hour.

The Point Beach Units 1 and 2 RCS Leak detection capability of 1 gpm in 4 hours will not change the LBB analyses results and conclusions documented in WCAP-15065-P-A Revision 1, WCAP-15105-P-A Revision 1, and WCAP-15107-P-A Revision 1.

Document References:

1. WCAP-15065-P-A Revision 1," Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear plants," June 2001.
2. WCAP-15105-P-A Revision 1," Technical Justification for Eliminating Residual Heat removal (RHR) lines Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear plants," June 2001.
3. WCAP-15107-P-A Revision 1," Technical Justification for Eliminating Accumulator lines Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear plants," June 2001.

If there are any questions concerning this conclusion, contact Dulal Bhowmick at 412-374-6160 for clarification.

This transmittal constitutes the final deliverable under Task 12 for the License Renewal Support Project. An earlier letter, WEP-03-128, September 29, 2003, transmitted proprietary and non-proprietary versions of the primary loop LBB evaluation, WCAP-14439. These versions of the WCAP mentioned the revised lead detection capability described above. The WCAPs and associated documents transmitted by WEP-03-128 were also deliverables under Task 12.

Very truly yours,

WESTINGHOUSE ELECTRIC COMPANY

Stephen P. Swigart
Customer Project Manager

cc: S. Swigart
M. Miller
R. Pearce
C. Meyer
D. Bhowmick