NMC
Committed to Nuclear Excellence

Point Beach Nuclear Plant
Operated by Nuclear Management Company, LLC

May 15, 2004

NRC 2004-0054
10 CFR 50.55a(a)(3)

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

Point Beach Nuclear Plant, Unit 1
Docket 50-266
License No. DPR-24
NRC Order EA-03-009 Relaxation Request Supplement 2

Reference: 1) Letter from NMC to NRC dated May 14, 2004 (NRC 2004-0052)
2) Letter from NMC to NRC dated March 30, 2004 (NRC 2004-0031)
3) NRC Order EA-03-009, "Issuance of First Revised Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 20, 2004

In references 1 and 2, Nuclear Management Company, LLC (NMC), requested relaxation from certain requirements of Nuclear Regulatory Commission (NRC) Order EA-03-009 (reference 3), for the Point Beach Nuclear Plant, Unit 1.

During a conference call between NMC representatives and NRC staff on May 15, 2004, the staff requested additional information in support of their review of references 1 and 2. Enclosure 1 to this letter contains the NMC's response to the staff's questions.

This submittal provides a deterministic evaluation of a postulated axial flaw above the J-groove weld in nozzle 33 of the Unit 1 reactor vessel closure head (RVCH), an evaluation of k factors below the weld, and a basis for postulating 55 ksi.

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

for

Gary D. Van Middlesworth
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

6590 Nuclear Road • Two Rivers, Wisconsin 54241
Telephone: 920.755.2321

A101

Enclosure:

1 Response to Request for Additional Information

cc: Regional Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, NRR, USNRC
NRC Resident Inspector - Point Beach Nuclear Plant
PSCW

ENCLOSURE I

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC ORDER EA-03-009 RELAXATION REQUEST SUPPLEMENT 2

POINT BEACH NUCLEAR PLANT, UNIT 1

REQUEST FOR ADDITIONAL INFORMATION

During a conference call between NRC staff and NMC personnel on May 15, 2004, the staff requested additional information in support of their review of References 1 and 2, regarding a postulated axial flaw above the J-groove weld in nozzle 33 of the Unit 1 reactor vessel closure head (RVCH), an evaluation of k factors below the weld, and a basis for postulating 55 ksi.

POSTULATED AXIAL FLAW ABOVE THE J-GROOVE WELD IN NOZZLE 33

Nozzle 33 received a UT examination of less than 100% coverage. The lack of full coverage was due to weld distortion in the nozzle. This weld distortion made blade probe access very difficult, resulting in coverage limitations. NMC therefore performed manual UT examinations of the CRDM 33 nozzle material below the J-groove weld. No indications were detected on nozzle 33 during this exam. The only unexamined area is a 60° vertical area in the J-groove weld and above.

To support the NRC staff's review of the acceptability of coverage obtained in nozzle 33, additional deterministic assessments of a postulated axial flaw above the weld and in the weld was performed. As detailed in reference 1, a lack of coverage area exists in nozzle 33 above and in the weld region. The deterministic flaw tolerance method that was used in these assessments is documented in WCAP-14000, Revision 1 "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations to Support Continued Operation: Point Beach Units 1 and 2 (Proprietary)." This report was transmitted to the NRC by Westinghouse Electric Company on September 27, 2002. This evaluation supports the previously submitted circumferential crack growth and probabilistic evaluations.

An examination of CRDM 33 was performed during the Fall 2002 refueling outage (U1R27). An initial undetected axial flaw of a through-wall depth of 0.04 inch was assumed to have been present during that inspection. Recent CRDM inspections at PBNP have shown the capability to detect indications as small as 0.04 inch.

CRDM 33 is located is located in the 36.9° penetration ring. WCAP-14000 does not include flaw charts for that ring but recommends use of charts for penetrations with the closest angle. The 43.5° penetration ring is the closest ring analyzed in WCAP-14000. The lack of coverage area was near the downhill side of the penetration. Therefore, use of the 43.5° curve in Figures 6-5 and 6-7 of WCAP-14000 is appropriate. These charts

address crack growth predictions for axial flaws (downhill side) in and above the attachment weld.

Using an initial flaw depth (a) of 0.04 inch and a CRDM tube wall thickness (t) of 0.625, this results in an a/t value of 0.06.

Figure 6-5 of WCAP-14000 is reproduced below. This figure represents a crack growth prediction for axial inside surface flaws near the attachment weld on the downhill side. The 43.5° curve is used. The flaw aspect ratio is 6:1. For an initial a/t value of 0.06, a flaw would require over 3.4 EFPY to reach a through-pressure boundary of 1.0 a/t.

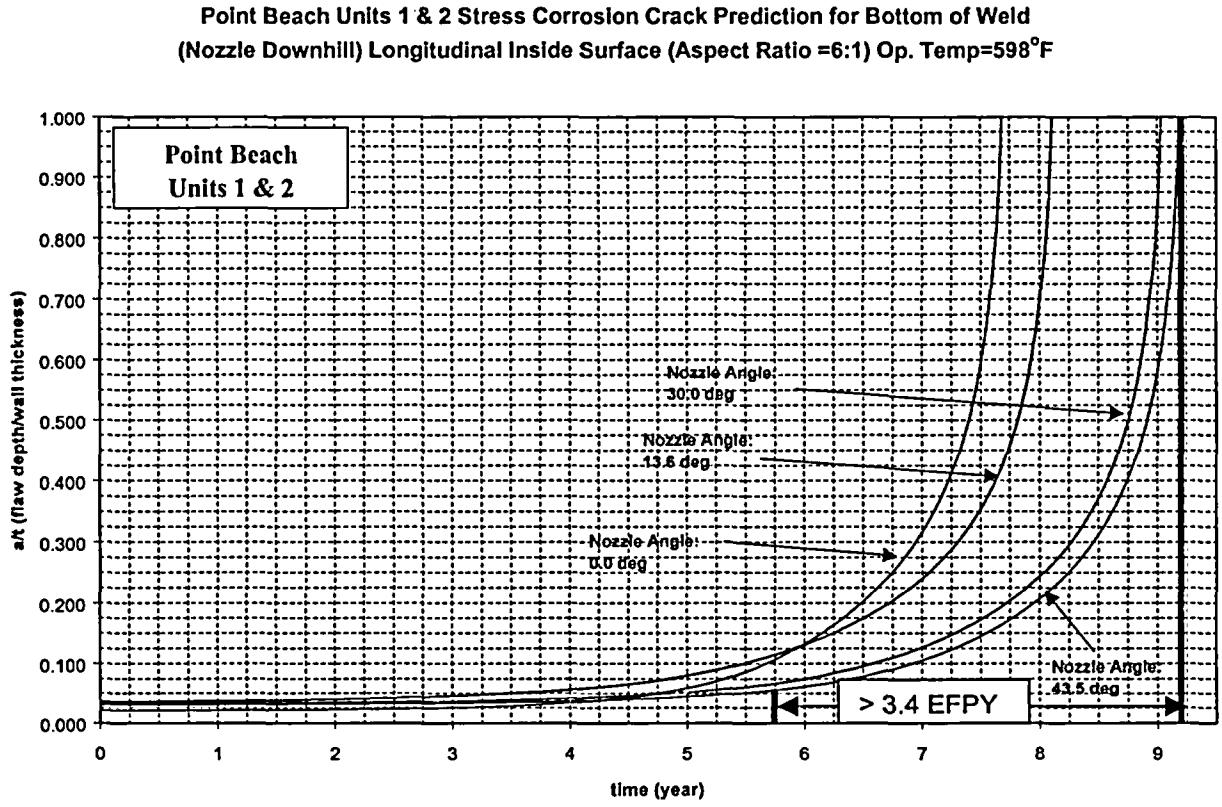

Figure 6-5

Figure 6-7 of WCAP-14000 is reproduced below. This figure represents a crack growth prediction for axial inside surface flaws above the attachment weld on the downhill side. The 43.5° curve is used. For an initial a/t value of 0.06, a flaw would require over 2.8 EFPY to reach a through-pressure boundary of 1.0 a/t.

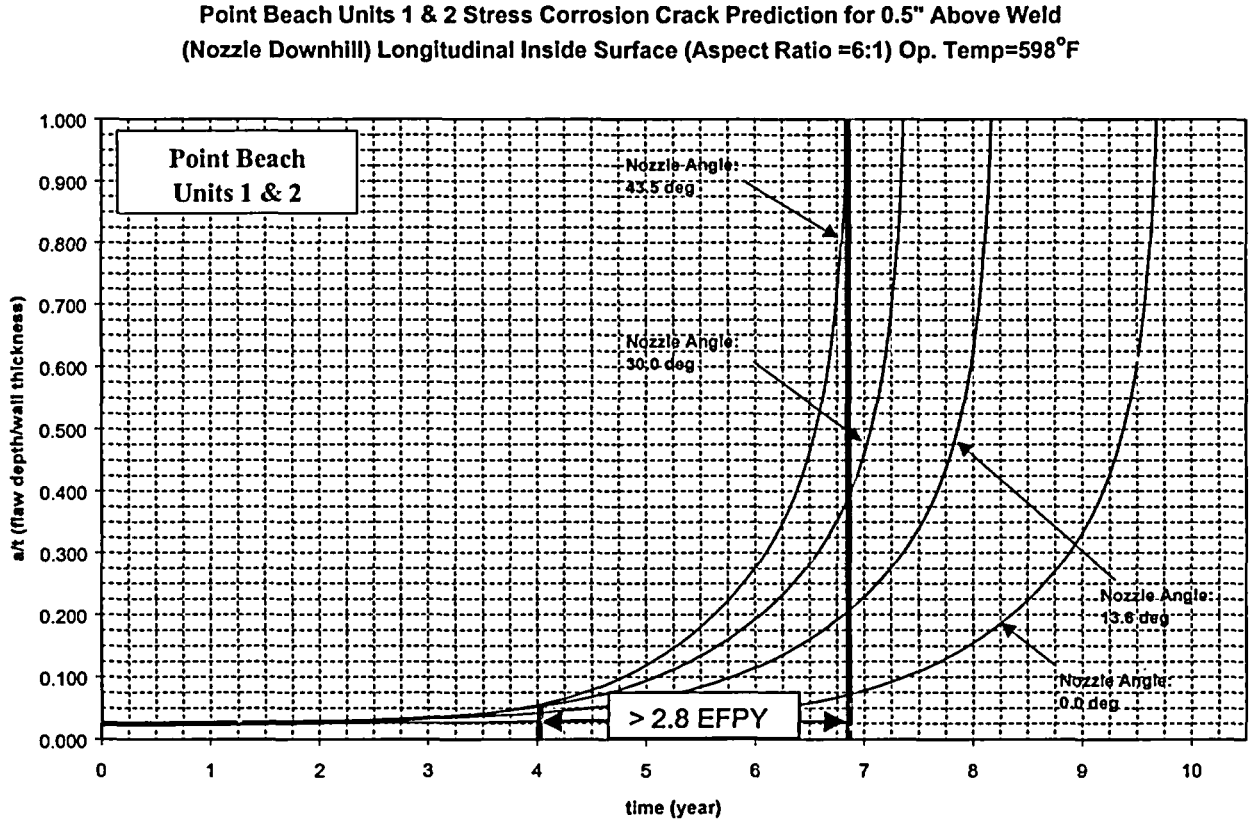

Figure 6-7

PBNP operates on an 18-month cycle and will be replacing the RPV head during the next refueling outage scheduled for fall 2005. Unit 1 operation following the fall 2002 refueling outage (initiation time of the postulated flaw) and the replacement of the RPV head will not exceed 2.8 EFPY. Therefore, a worst-case flaw could not progress through-wall during the next Unit 1 operating cycle.

EVALUATION OF FLAWS BELOW THE WELD AND K FACTOR OF 55 KSI

Seventeen nozzles could not be examined one inch below the toe of the J-groove weld on the OD surface. The amount of unscanned area is a function of the Areva blade tool and not a result of PNBP-specific nozzle geometry. The ID surface was fully examined.

A deterministic flaw tolerance evaluation was performed for the limiting nozzle (nozzle 20).

In the evaluation of Alloy 600 flaws below the J-groove weld, plant specific crack growth rate (CGR) data was used from EPRI MRP-55, "Materials Reliability Program (MRP) Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Thick-Wall Alloy 600 Material." The growth rate used was 1.98×10^{-03} $(K\text{-}K_{th})^{1.16}$ inch per year with a value of 55 ksi-$(in)^{0.5}$ for $K\text{-}K_{th}$. This K-independent method of flaw evaluation was considered conservative based on the actual stresses in the nozzle wall.

WCAP-14000, Revision 1 "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations to Support Continued Operation: Point Beach Units 1 and 2 (Proprietary)" includes an analysis of this flaw growth. The initial flaw size for both examples is 0.4 inch in length and extends through-wall. To demonstrate that the values used in the submittal are conservative, a separate assessment was performed. As discussed in reference 1, this is a calculation of the worst-case flaw growth in the shortest OD distance below the weld achieved on the downhill side during the examinations. Accounting for instrument uncertainty this worst-case dimension is 0.41 inch.

Figure 6-13 of WCAP-14000, shown below, is a crack growth prediction for through-wall axial flaws located in the 30.0° penetration ring. Nozzle 20 is the limiting nozzle for this assessment and is also located in the 30.0° penetration ring. As shown below, the assumed through-wall flaw would take over 2.5 EFPY to reach the J-groove weld.

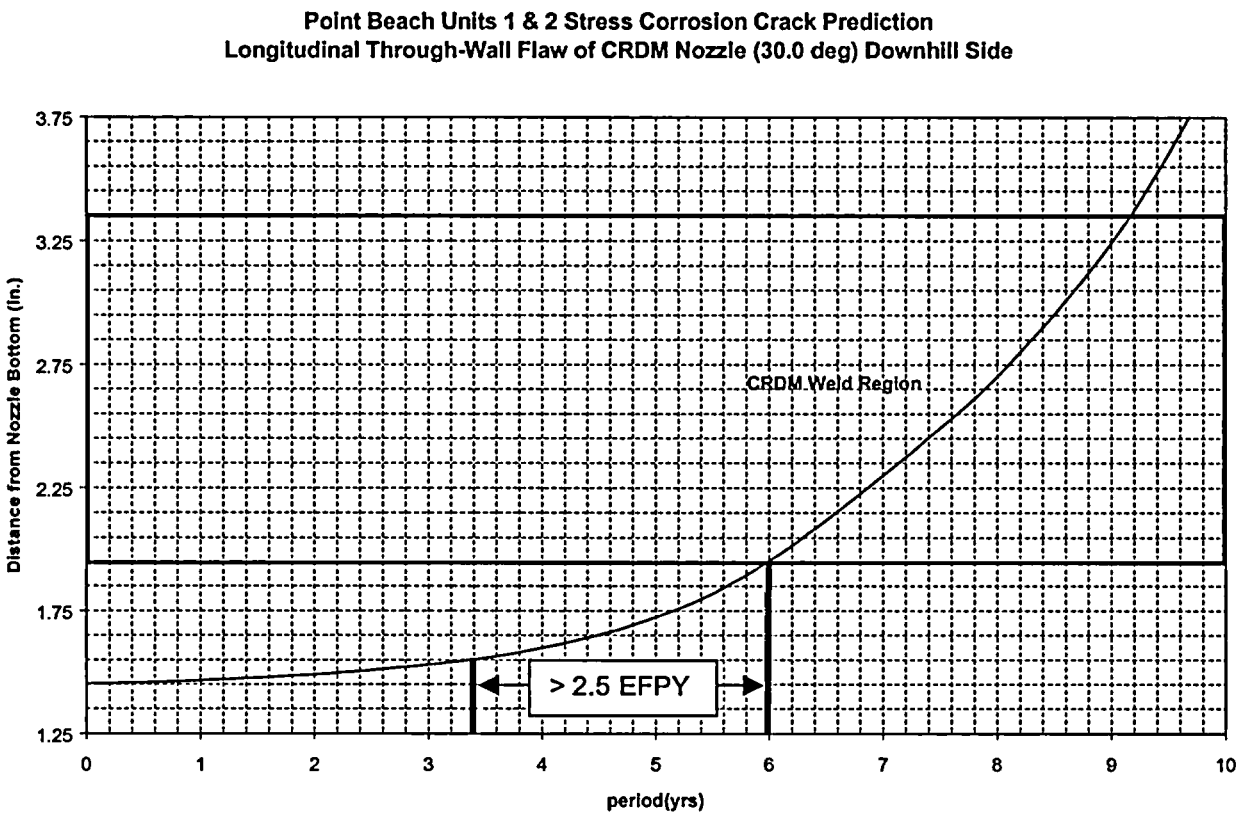

Figure 6-13

PBNP operates on an 18-month cycle and will be replacing the RPV head during the next refueling outage scheduled for fall 2005. Therefore, a worst-case flaw could not progress sufficiently to reach the J-groove weld during the next Unit 1 operating cycle. Thus, the values used in our calculation are considered appropriate and conservative.