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BL 2003-02
Order EA-03-009

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

60-Day Report Pursuant to NRC Bulletin 2003-02 and NRC First Revised Order
EA-03-009 for Unit 1 Refueling Outage 28 Reactor Vessel Inspections

- References: 1) *"Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 20, 2004.*
- 2) *NRC Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity," dated August 21, 2003.*
- 3) *Letter from NRC to NMC, "PBNP Unit 1 – Relaxation of the Requirements of First Revised Order (EA-03-009) Regarding Reactor Pressure Vessel Head Inspections," dated June 4, 2004*

Reference 1 promulgated revised requirements regarding reactor pressure vessel (RPV) head and head penetration nozzle inspections. These requirements included submittal of a report detailing the inspection results, within 60 days after returning the plant to operation. In accordance with these requirements, a bare metal visual examination of the Point Beach Nuclear Plant (PBNP) Unit 1 RPV head surface, corresponding to that specified in paragraph IV.C.(5)(a) of Reference 1, and a nonvisual non-destructive examination of each penetration, corresponding to that specified in paragraph IV.C.(5)(b) of Reference 1 (with the exception of 17 penetration nozzles), were performed during PBNP Unit 1 refueling outage 28 (U1R28) in spring 2004. Seventeen penetration nozzles could not be examined to the extent required; therefore, relaxation of First Revised Order EA-03-09 was promulgated in Reference 3. The results of these inspections are provided in Enclosure 1 to this letter.

No leaks or boron deposits were identified by the visual inspections performed pursuant to paragraph IV.D of Reference 1.

Reference 2 requested information regarding the RPV lower head penetration inspection program and a summary of the inspections performed within 60 days of plant restart. In accordance with its commitment, NMC completed a 100% bare-metal visual examination of the lower RPV dome, up to and including each bottom-mounted instrumentation (BMI) penetration to RPV junction, during U1R28. The results of this inspection are provided in Enclosure 2 to this letter.

In accordance with the above, NMC is providing the 60-day response for PBNP Unit 1 refueling outage U1R28.

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

I declare under penalty of perjury that the foregoing is true and accurate. Executed on August 6, 2004.

A handwritten signature in cursive script that reads "Dennis L. Koehl for".

Dennis L. Koehl
Site Vice President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosures (2)

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC

ENCLOSURE 1
NRC ORDER EA-03-009
POINT BEACH NUCLEAR PLANT 60-DAY RESPONSE
UNIT 1 RPV UPPER HEAD PENETRATION INSPECTION SUMMARY

On February 20, 2004, the NRC issued First Revised Order EA-03-009, establishing interim inspection requirements for reactor pressure vessel (RPV) heads of pressurized water reactors. In Section IV.E of the Order, the NRC required that inspection results be provided within sixty (60) days of the plant being returned to operation. Nuclear Management Company, LLC (NMC), hereby submits the inspection results for the Point Beach Unit 1 spring 2004 refueling outage (U1R28).

Plant Susceptibility Category

The Point Beach Unit 1 RPV closure head had approximately 15.5 effective degradation years (EDY) at the start of the U1R28. The inspection category for this plant, as identified in the First Revised Order, is High.

Inspection Scope and Method

RPV Head Visual Inspection

A bare metal visual (VT) inspection of the RPV head top surface, including 360° around each RPV head penetration nozzle, was performed as specified in section IV.C.(5)(a) of the First Revised NRC Order. The VT was performed both remotely and directly by inspectors through the use of mirrors, direct lighting, and video probe mounted on a remotely operated magnetic crawler and video stick.

RPV Head Penetration NDE Inspection

The ultrasonic (UT) examination technique option, identified in Section IV.C.(5)(b)(i) of the First Revised NRC Order, was performed on all of the 49 reactor vessel head penetration (VHP) nozzles and one (1) vent nozzle. The inspection included the nozzle base material from two inches above the J-groove weld, down to the bottom end of all of the penetrations.

All nozzles without thermal sleeves (16) were examined using a rotating probe UT technique. The remaining penetrations containing thermal sleeves (33) were examined using a blade probe UT technique. The thermal sleeves of nozzles 26 and 33 were removed to provide greater UT coverage during the performance of the examinations. As a result, nozzles 26 and 33 were examined with both a blade probe and a rotating probe. The vent line was examined with a rotating UT probe specifically designed for the nozzle.

As part of the UT examinations, the 49 penetrations with interference fit design (excluding the vent) were assessed to determine if leakage had occurred into the

interference fit zone. This assessment used the Framatome-ANP proprietary "leak path" technique.

Because the vent line is not an interference fit nozzle, a clean visual inspection provides a direct determination that no leakage has occurred into the annulus. However, as an added conservatism, the flush pressure boundary surface inside of the RPV head associated with the vent line (the head vent line, Alloy 600 attachment weld) was examined using the liquid penetrant (PT) examination method.

Inspection Results Summary

RPV Head Visual Inspection Results

The overall condition of the Point Beach Unit 1 RPV head was very good. The examination resulted in an effective visual examination that revealed no evidence of boric acid deposition or wastage of the reactor pressure vessel (RPV) head. All RPV head penetrations were examined with no limitations or masking.

The support structure of the RPV head obscured less than 5% of the surface area of the RPV head. The area affected by the obstruction was down slope from the outermost RPV head penetration. The examination did include those areas of the RPV head upslope and down slope of the support structure interference.

RPV Head Penetration NDE Inspection Results

The overall condition of the Point Beach Unit 1 VHP nozzles was very good. There were no indications of leakage identified in any of the 49 VHPs or in the vent line of the Point Beach Unit 1 RPV head.

UT examination of Nozzle 26 revealed indications that prompted the performance of a follow-up PT examination of the J-groove weld. The results of the surface PT examination showed unacceptable linear surface indications. Following several attempts to remove the indications through surface grinding, Nozzle 26 was repaired using the Areva ID temper bead repair process. It should be noted that no leakage was observed via leak-path indications or surface examination for this nozzle.

There were no indications of unacceptable flaws identified in any of the other 48 VHPs or in the vent line of the Point Beach Unit 1 RPV head.

Due to the design of the Areva blade tool, a UT examination blind zone exists at the nozzle end for all nozzles with thermal sleeves. The blind zone has a height of 0.4 inches on the OD of the nozzle. The ID of the nozzle was fully inspected to the nozzle end. Seventeen nozzles inspected with the blade probe could not be examined to a distance of 1 inch below the toe of the J-groove weld. Relaxation of First Revised Order EA-03-09 was therefore required. A deterministic fracture mechanics evaluation was

performed to justify that a flaw would not grow to the toe of the weld in one cycle of operation for the limiting nozzle (i.e., nozzle 20).

The time for a worst-case flaw to grow to the toe of the J-groove weld was calculated to be approximately 2.5 effective full-power years (EFPYs). PBNP Unit 1 operates on an 18-month cycle and will be replacing the RPV head during the next refueling outage, scheduled for Fall 2005. Based on this justification, relaxation of the First Revised NRC Order EA-03-09 was granted for these limitations on June 4, 2004. There were no other limitations in examination coverage.

Conclusion

NMC has complied with the requirements of the First Revised NRC Order (EA-03-009), as relaxed by the NRC in their letter dated June 4, 2004, for the Point Beach Unit 1 Spring 2004 refueling outage (U1R28). Based on the results of the visual examinations, UT examinations, and leak path assessments (including PT of the vent), NMC concluded that the VHP nozzles that were returned to service were not degraded, and no wastage of the RPV head had occurred.

**ENCLOSURE 2
BULLETIN 2003-02
POINT BEACH NUCLEAR PLANT 60-DAY RESPONSE
UNIT 1 LOWER HEAD PENETRATION INSPECTION SUMMARY**

NRC Bulletin 2003-02 requested information regarding the reactor pressure vessel (RPV) lower head penetration inspection program and a summary of the inspections performed within 60 days of plant restart. NMC committed to attempt a 100% bare-metal visual exam of the lower RPV dome up to and including each bottom-mounted instrumentation (BMI) penetration to RPV junction during the upcoming Unit 1 and Unit 2 refueling outages. Nuclear Management Company, LLC (NMC), hereby submits the inspection results for the Point Beach Unit 1 Spring 2004 refueling outage (U1R28).

Summary of Inspections Performed

The lower RPV insulation was removed to perform a visual exam of the lower Reactor Pressure Vessel (RPV) dome including each bottom-mounted instrumentation (BMI) penetration to RPV junction. No indications were observed that were similar to the South Texas Project Unit 1 deposits. There was no boric acid buildup present at any BMI to RPV annulus. In addition, no indications were observed that were similar to any of those depicted in Electric Power Research Institute (EPRI) technical guidance for inspecting RPV heads. There were no indications of RCS leakage from any BMI penetration.

Method and Extent of Inspection

Each of the 36 BMI nozzles was examined completely around their circumference. In addition, the adjacent bare metal of the lower RPV surface was inspected up to six (6) inches above the highest BMI penetration.

The visual examination was accomplished utilizing VT-2 certified personnel. The examinations were performed directly, with a resolution capability of VT-1. Direct lighting was provided during the inspection. All BMI nozzles were photographed utilizing digital cameras.

As-Found Condition of Point Beach Nuclear Plant Unit 1 Lower Head

The general condition of the bottom of the vessel was very good. Some minor rust staining was observed coming down the side of the RPV. These indications had no volume and were determined to be a result of historical cavity seal ring leakage. This determination was made through direct visual exam and by comparison of past photographic evidence.

Following completion of the inspections, the lower RPV insulation was replaced with insulation of a new design. This new insulation was installed with inspection ports to permit ease of access during subsequent inspections of the PBNP Unit 1 BMI penetrations.