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BL 2003-02

November 10, 2003

U.S. Nuclear Regulatory Commission
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KEWAUNEE NUCLEAR POWER PLANT
DOCKET 50-305
LICENSE No. DPR-43
NUCLEAR REGULATORY COMMISSION BULLETIN 2003-02: LEAKAGE FROM REACTOR PRESSURE VESSEL LOWER HEAD PENETRATIONS AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY – 90-DAY RESPONSE

On August 21, 2003, the Nuclear Regulatory Commission (NRC) transmitted Bulletin (BL) 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity." The NRC required that specific information be provided within 30 days of the date of the BL for those facilities that will enter refueling outages before December 31, 2003. The bulletin requested that all other responses be provided within 90 days. In accordance with this requirement, Nuclear Management Company, LLC (NMC) is providing the 90-day response for the Kewaunee Nuclear Power Plant (KNPP).

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

1. NMC will attempt, during the upcoming refueling outage, a 100% bare-metal visual exam of the lower Reactor Pressure Vessel (RPV) dome including each bottom-mounted instrumentation (BMI) penetration to RPV junction. It is possible that unforeseen circumstances will prevent a complete 100% bare-metal visual exam, but NMC will modify, as necessary, the inspection process or the insulation (based on the lessons learned during this inspection) to ensure the ability to perform 100% bare-metal examinations in subsequent outages.

2. NMC will perform a 100% bare-metal visual exam of the lower RPV dome including each BMI penetration to RPV junction. This examination will be completed during the refueling outages subsequent to the upcoming refueling outage.

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I declare under penalty of perjury that the foregoing is true and accurate.
Executed on November 10, 2003.

Thomas Coutu
Site Vice President Kewaunee Nuclear Power Plant
Nuclear Management Company, LLC

TLM

Attachment

cc: Administrator, Region III, USNRC
Project Manager, Kewaunee, USNRC
Senior Resident Inspector, Kewaunee, USNRC
Public Service Commission of Wisconsin

ATTACHMENT 1

NUCLEAR MANAGEMENT COMPANY, LLC

KEWAUNEE NUCLEAR POWER PLANT
DOCKETS 50-305

November 10, 2003

NRC BULLETIN 2003-02:
LEAKAGE FROM REACTOR PRESSURE VESSEL LOWER HEAD PENETRATIONS AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY
90-DAY RESPONSE

5 Pages Follow

Requested Information

(1) All subject PWR addressees are requested to provide the following information. The responses for facilities that will enter refueling outages before December 31, 2003, should be provided within 30 days of the date of this bulletin. All other responses should be provided within 90 days of the date of this bulletin.

Response

Nuclear Management Company, LLC (NMC) is providing a 90-day response in accordance with Nuclear Regulatory Commission (NRC) Bulletin (BL) 2003-02, "Leakage from Reactor Pressure Vessel (RPV) Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity," for the Kewaunee Nuclear Power Plant (KNPP).

Requested Information

(a) A description of the RPV lower head penetration inspection program that has been implemented at your plant. The description should include when the inspections were performed, the extent of the inspections with respect to the areas and penetrations inspected, inspection methods used, the process used to resolve the source of findings of any boric acid deposits, the quality of the documentation of the inspections (e.g., written report, video record, photographs), and the basis for concluding that your plant satisfies applicable regulatory requirements related to the integrity of the RPV lower head penetrations.

Response

The current KNPP program of RPV lower head examination consists of system pressure testing performed each refuel outage in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) code, Section XI, 1989 Edition, Table IWB-2500-1. The examination is a visual examination for evidence of leakage by a VT-2 qualified inspector with the system at normal operating pressure and with the insulation in place as allowed per IWA-5242. A 4-hour holding time at the test temperature and pressure is required prior to beginning the inspection. However, during 2003 KNPP was at the end of the 10 year interval and NMC used the alternative to the 10 year hydrostatic pressure test as described in code case N-498. The examination is performed by procedure (SP-36-267) and is documented on a system pressure test report in accordance with our ASME Section XI program.

The system pressure tests have not identified any bottom-mounted instrument (BMI) leakage to date. Indications of leakage would be dispositioned per subarticle IWB-3142 of the code. Any active leak would require repair, replacement or evaluation in accordance with subarticle IWA-5250 of the code.

In addition, KNPP performed an as-found VT-3 examination in 2003 to provide an opportunity for further investigation should the need arise. These examinations are documented with written records. Photographic evidence has been used to record evidence of refueling water leakage.

The visual examination of the reactor vessel bottom head was performed on May 1, 2003. The purpose of the exam was to assess the condition of the reactor vessel insulation. This was done to look for pressure boundary leakage as well as to perform field walk-down for possible future modifications. During performance of the exam, several indications of white color residue was observed.

The indications observed on the insulation were not indicative of pressure boundary leakage from the BMI penetrations. All indications were comprised of insulation tape residue and insulation material. This information was documented via photographs and is recorded in the report titled "Visual Examination For Leakage Of Reactor Vessel Bottom Head" by Lambert-MaGill-Thomas, Inc dated May, 2003.

There were no recordable indications noted per the requirements. A boroscope inspection was performed of the area between the RPV and the insulation at several locations. No boric acid crystals were observed. The tape residue around the BMI's was removed for all applicable penetrations. Visual VT-3 examinations were performed on the 36 BMI's following tape removal with acceptable results. Liquid penetrant examinations were performed on locations H-3 and J-3 with acceptable results. The final conclusion of the report is that the RPV pressure boundary is fully operational with no exceptions. The exams performed demonstrated that there is no pressure boundary leakage at the BMI penetrations.

These inspections as well as those of the Boric Acid Control Program and Section XI Program inspections (described in the Kewaunee's responses to Bulletin 2002-01, ML021570010 and ML030280586) ensure compliance to all regulatory requirements related to the integrity of the RPV & lower head penetrations.

Requested Information

(b) A description of the RPV lower head penetration inspection program that will be implemented at your plant during the next and subsequent refueling outages. The description should include the extent of the inspections which will be conducted with respect to the areas and penetrations to be inspected, inspection methods to be used, qualification standards for the inspection methods, the process used to resolve the source of findings of boric acid deposits or corrosion, the inspection documentation to be generated, and the basis for concluding that your plant will satisfy applicable regulatory requirements related to the structural and leakage integrity of the RPV lower head penetrations.

Response

Insulation Description
The Kewaunee RPV is installed with mirror-type insulation at the lower RPV dome. This insulation generally conforms to the contour of the lower RPV dome but has a gap of about 1-3 inches between the RPV surface and the insulation. Each BMI penetration has a slight gap between the insulation and the BMI tube material. This annular gap varies in size (approximately one half inch) and is normally covered by metal flashing.

Inspection Plans
The next Kewaunee refueling outage will be conducted in October 2004. A bare-metal visual (BMV) examination of the lower RPV dome including the BMI to RPV junction will be performed during this outage. If limitations exist during performance of this examination, lessons learned will be incorporated and changes will be made to ensure that a 100% BMV exam will be performed during subsequent refueling outages.

Any evidence of boric acid will be evaluated to determine the source, extent of leakage and possible extent of cracking. Detection of cracking may require characterization by non-destructive methods as applicable and comparison to the acceptance criteria specified in ASME Section XI. Any indication of cracking will be evaluated in accordance with the acceptance standards of ASME Section XI.

Personnel performing visual examinations will be VT-3 qualified with additional training and procedures to meet the latest industry standards for boric acid identification of the lower RPV dome and penetration nozzles. Qualification requirements for these visual examinations will be in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition through 2000 Addenda. The acceptance criterion will be zero leakage from the lower RPV dome and penetration nozzles. Examination methods may include fixed, pole-mounted, or robotic video, still photography, or direct visual examination. A combination of written and photographic evidence will be used to document each examination. The examiner will be VT-3 qualified since this will not be an ASME Section XI VT-2 examination subject to the pressure and temperature requirements, hold times, and other requirements specific to the performance of a code-required system pressure test.

The long-term inspection plans will include BMV exams of the BMI to RPV junction during each refueling outage. This will continue until industry experience, changes to the ASME code, or a change in regulatory requirements justify a change to the inspection frequency or method.

These inspections as well as those of the Boric Acid Control Program and Section XI Program inspections (described in the Kewaunee responses to Bulletin 2002-01, ML021570010 and ML030280586) ensure compliance to all regulatory requirements related to the integrity of the RPV & lower head penetrations.

Resolution of Possible Boric Acid Deposits

As stated in BL 2003-02, evidence of past leakage from refueling operations may be present in the vicinity of the BMIs. NMC understands the importance of accurate analyses and inspections to verify this type of leakage. NMC has been very active with the EPRI Materials Reliability Panel (MRP) in developing interim and long-term guidance for this issue.

NMC will fully document the as-found condition of suspect deposits whether adhering to the RPV lower head or present on the insulation facing the RPV. Such deposits will be carefully evaluated to determine the most likely origin of the material based on visual, physical, and chemical evidence. Visual evidence will be evaluated with consideration of the guidance and examples given in industry reference materials for similar inspections of RPV upper heads supplemented by the recent observed conditions at the South Texas Project. Relevant physical evidence will be collected in a methodical manner that is intended to provide reliable, documented data for use in the evaluation process and is consistent with the analytical methods to be employed. Chemical and radio isotopic analysis techniques may be employed where appropriate to help discriminate between deposits with operational versus outage-related sources.

Requested Information

(c) If you are unable to perform a bare-metal visual inspection of each penetration during the next refueling outage because of the inability to perform the necessary planning, engineering, procurement of materials, and implementation, are you planning to perform bare-metal visual inspections during subsequent refueling outages? If so, provide a description of the actions that are planned to enable a bare-metal visual inspection of each penetration during subsequent refueling outages. Also, provide a description of any penetration inspections you plan to perform during the next refueling outage. The description should address the applicable items in paragraph (b).

Response

As described above, the goal for the upcoming Kewaunee refueling outage is to complete a 100% bare-metal inspection of each BMI penetration. If some currently unforeseen circumstance prevents the ability to inspect each penetration, NMC will apply lessons learned to ensure a bare-metal inspection of each penetration is performed during the next refueling outage. Until the lessons learned from the upcoming inspection are evaluated, NMC is unable to specify in detail and with certainty what actions will be taken to enable a 100% bare-metal visual inspection of each penetration during the subsequent refueling outage. These actions may include modification of the reactor vessel insulation or the use of alternative inspection techniques.

Requested Information

(d) If you do not plan to perform either a bare-metal visual inspection or non-visual (e.g., volumetric or surface) examination of the RPV lower head penetrations at the next or subsequent refueling outages, provide the basis for concluding that the inspections performed will assure applicable regulatory requirements are and will continue to be met.

Response

As described above, NMC plans to perform BMV inspections of the lower RPV head and BMI to RPV junction at the next and subsequent refueling outages at KNPP.