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Fred Dacimo
Vice President, Operations

November 13, 2003

Re: Indian Point Units 2 and 3
Dockets 50-247 and 50-286
NL-03-178

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: **90-Day Response to NRC Bulletin 2003-02 Regarding
Leakage From Reactor Pressure Vessel Lower Head Penetrations
and Reactor Coolant Pressure Boundary Integrity**

Reference: 1) NRC Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower
Head Penetrations and Reactor Coolant Pressure Boundary Integrity,"
dated August 21, 2003

Dear Sir:

Pursuant to 10 CFR 50.54(f), Entergy Nuclear Operations, Inc (Entergy) is hereby providing the response to Bulletin 2003-02 (Reference 1) for Indian Point Unit 2 (IP2) and Indian Point Unit 3 (IP3). The information requested by the Bulletin is provided in Attachment 1.

The U.S. Nuclear Regulatory Commission issued the Bulletin to advise licensees that current methods of inspecting Reactor Pressure Vessel (RPV) lower heads may need to be supplemented with additional measures to detect reactor coolant pressure boundary leakage. Licensees are required to provide information regarding RPV lower head inspection programs previously implemented and plans for future inspections to address observations identified in the Bulletin. Since the next refueling outages for IP2 and IP3 are after December 31, 2003 (Fall 2004 and Spring 2005, respectively), this response is due within 90 days of the Bulletin date.

The last inspections of the RPV lower heads for IP2 and IP3 were performed during the prior refueling outages, Fall 2002 and Spring 2003, respectively. A description of these inspections is provided in Attachment 1 in response to item (1)(a) of the Bulletin. Based on recommendations developed by the industry's Material Reliability Program, Entergy has prepared an expanded inspection program for the RPV lower head. A description of the inspections planned for future outages is provided in Attachment 1 in response to item (1)(b) of the Bulletin.

The Bulletin also requires that a post-inspection report be submitted to the NRC within 60 days following restart from the next refueling outage. Entergy agrees to provide the requested information as specified in item (2) of the Bulletin.

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There are no new commitments being made in response to this Bulletin. If you have any questions regarding this submittal, please contact Kevin Kingsley at (914) 734-5581.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 11/13/03

Sincerely,



Fred R. Dacimo
Vice President, Operations
Indian Point Energy Center

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ATTACHMENT 1 TO NL-03-178

90-DAY RESPONSE TO NRC BULLETIN 2003-02

Entergy Nuclear Operations, Inc
Indian Point Nuclear Generating Units 2 and 3
Docket No 50-247 and 50-286

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

Requested Information Item (1)(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.

Entergy Response:

During the most recent refueling outages for each unit, inspections were performed as an extension of actions that were taken to assess pressure boundary integrity for Alloy 600 penetrations in the RPV upper head. The scope and results of the most recent inspections are summarized below. A description of the RPV lower head penetrations and insulation configuration is also provided to support the inspection discussions provided in this response.

Description of RPV lower heads at IP2 and IP3:

There are 58 penetrations, nominally 1.5 inches in diameter, in the RPV lower head for the incore instrument nozzles. An Alloy 600 tube extends through each penetration and the tubes are welded at the inside surface of the lower head. Each penetration is surrounded by a ¼ - inch thick weld pad at the outside surface of the lower head. Discussions with the vessel fabricator indicate that the intent of this feature was to facilitate weld repair of an incore instrument nozzle.

The RPV lower head is covered with reflective metal insulation, approximately 3 to 3.5 inches thick, and contoured to the profile of the head. This insulation is part of the overall reactor vessel insulation package and is not designed to be removable. There is a 2.5 to 3 inch diameter hole in the insulation at each penetration, resulting in a ½ to ¾ - inch annular gap between the tubing outside diameter and adjacent insulation. This gap is filled with steel wool and capped with a metal ring that is secured with four screws to the insulation package.

IP2 Inspection During 2R15:

The latest inspection of the IP2 RPV lower head was performed in November 2002, during refueling outage 2R15. This inspection consisted of a visual inspection, without insulation removal, performed by a VT-2 qualified individual, as well as engineering personnel. The inspection scope included the outside surface of the lower head insulation and the 58 locations where the incore instrument nozzles penetrate through the insulation.

Although the inspection identified white streaks and some brown rust streaks on the outside of the insulation, there were no signs of inservice leakage attributed to RPV lower head penetrations. The observed streaking was considered characteristic of leakage that initiated outside of the insulation. Two possible sources of this leakage were (1) refueling cavity seal leakage or (2) refueling cavity liner leakage. Based on a review of the observations, Entergy concluded that there was no evidence of pressure boundary leakage at the lower head.

Since the above inspection of the IP2 lower reactor vessel head identified no through-wall leakage it was determined that the integrity of the lower vessel head, including the Alloy 600 penetrations remained within the applicable ASME Code and other regulatory requirements identified in the Bulletin.

IP3 Inspection During 3R12:

The latest inspection of the IP3 RPV lower head was performed in April 2003, during refueling outage 3R12. This inspection consisted of a visual inspection performed by a VT-2 qualified individual, as well as engineering personnel, without insulation removal. The inspection included all 58 of the penetrations as well as the outside surface of the lower head insulation.

Several brown streaks were observed on the outside of the insulation, originating at the circumferential seam between the hemispherical section of the insulation and the cylindrical section of the insulation. Since this seam is located above all of the lower head penetrations, Entergy concluded that these streaks, did not initiate at any of the lower head penetrations.

In addition, brown streaks were observed in the vicinity of penetrations 1, 10, and 45 with no apparent corresponding streak path between the penetration and the circumferential insulation seam. Penetrations 1 and 10 are near the center of the reactor vessel and penetration 45 is near the periphery. Further assessment of this observation was accomplished by removing the metal ring and steel wool from penetration 45 to allow performing a Bare Metal Visual (BMV) examination of the penetration and the surrounding area of the head. Penetration 45 was selected for this examination since it was the most accessible of the three. Similarly, the insulation was removed and a BMV examination was performed for penetration 55 (located adjacent to 45) and the surrounding area of the head. These inspections confirmed that there was no evidence of leakage at the annulus around the penetrations inspected.

A chemical or isotopic analysis of the observed streaks was not practical because the streaks consisted primarily of staining, with little or no accumulated deposits available for sampling. There was no visual evidence of boron residue associated with any of the observed streaks.

The results of the inspection were documented in the procedure associated with this inspection activity and the assessment of the observed streaking was documented in Entergy's Corrective Action Program. Several photographs taken during the inspection were compared with photographs taken during previous inspections. This comparison indicated that the observed streaks appeared to be historical in nature and not the result of leakage occurring during the prior operating cycle. Based on a review of the observations, Entergy concluded that there was no evidence of pressure boundary leakage at the lower head.

Since the above inspection of the IP2 lower reactor vessel head identified no through-wall leakage it was determined that the integrity of the lower vessel head, including the Alloy 600 penetrations remained within the applicable ASME Code and other regulatory requirements identified in the Bulletin.

Compliance with Regulatory Requirements:

The basis for concluding that IP2 and IP3 satisfy the regulatory requirements applicable to the RPV lower head penetrations is the same as that previously stated in prior Bulletin responses regarding the RPV upper head penetrations. Also, the information provided in Section 3, Regulatory Requirements, of MRP-48 (Reference 1) is applicable for the IP2 and IP3 RPV lower head. Compliance with the applicable general design criteria (GDC 14, 31, and 32) is discussed in the Updated Final Safety Analysis Reports for IP2 and IP3. Entergy complies with the requirements of 10 CFR 50.55a through the Inservice Inspection Program and associated implementing procedures established for inspection and repair activities. The requirements of 10 CFR 50 Appendix B, Criteria V and IX involve documentation and control of special processes that are applicable to the existing inspections and new inspections being planned per the response to Item (1)(b). Compliance with these criteria is specified in Entergy's Quality Assurance Program document, which is applicable to IP2 and IP3. Criteria XIV requires measures to assure that conditions adverse to quality are promptly identified and corrected. Entergy has an established corrective action program, which includes provisions for identification and assessment of conditions adverse to quality.

Requested Information Item (1)(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.

Entergy Response:

The next refueling outages for IP2 and IP3 are scheduled for Fall 2004 and Spring 2005, respectively. Entergy is currently planning to perform a BMV inspection, 360 degrees around each of the 58 incore instrument nozzles at both units. Should unexpected obstructions or conditions be encountered during this effort, Entergy will implement the required changes to allow for a 100% BMV examination during the subsequent refueling outage, consistent with the requirements of this Bulletin. The BMV inspection would also apply to subsequent outages, unless industry experience or site-specific observations indicate the need for an alternate inspection approach.

As described in the response to item (1)(a), the area around each penetration is packed with steel wool covered by a metal cover that is screwed to the main insulation package. Entergy

will remove the steel wool and metal covers from each of the 58 penetrations in order to gain access for a direct, unobstructed view of each incore instrument nozzle at the penetration through the RPV lower head. Remote visual devices may also be used to ensure a comprehensive inspection. The inspection procedures and inspector qualifications will be consistent with the requirements of ASME Section XI and EPRI recommendations (Reference 2) previously established for similar visual examinations of the RPV upper head. In addition, Entergy will monitor industry developments and inspections at other facilities through the existing operating experience program and will incorporate new information into the inspection plans, as appropriate.

Each of the 58 RPV lower head penetrations will be inspected for conditions that would be indicative of reactor coolant leakage from a through-wall defect in the incore instrument nozzle or in the J-Groove attachment weld that secures the instrument nozzle to the reactor vessel. Boron residue or other signs of leakage will be documented in Entergy's corrective action program and will be evaluated using the applicable ASME Section XI requirements. In the event that through-wall or other unacceptable defects are identified, repairs will be made in accordance with the requirements of 10 CFR 50.55(a), prior to restart from the refueling outage.

The process to be used to resolve findings will be similar to that previously established to support RPV upper head inspections, including use of industry-developed guidance (Reference 2). Operating experience from the South Texas examination will also be included if needed to assess findings from the inspection. Because of the physical configuration of the lower head, the potential for masking affects that can occur on the RPV upper head (such as conoseal leakage and material entrained by the ventilation system) will not be a factor for the RPV lower head inspection. Masking sources that could apply for the lower head inspection (refueling cavity seal or refueling cavity liner) occur at low temperature and tend to result in staining streaks on the insulation surface rather than accumulation of boron deposits. Chemical and / or radioisotopic analysis techniques may be used to help characterize the composition and source of deposits, if appropriate. The results of the inspections will be documented in accordance with the inspection procedures and resolution of findings, if any, will be documented through the Entergy corrective action program.

Compliance with Regulatory Requirements:

Adopting expanded inspection activities for the RPV lower head and penetrations does not adversely affect Entergy's compliance with applicable regulatory requirements. The response to item 1(a) regarding compliance with regulatory requirements is also applicable for the inspection program that will be implemented during the next and subsequent refueling outages. Conducting the planned BMV inspections, will provided additional assurance of reactor coolant pressure boundary integrity at the RPV lower head.

Requested Information Item (1)(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).

Entergy Response:

Entergy intends to perform a BMV inspection of each penetration in the RPV lower head during the next refueling outages for IP2 and IP3. However, as stated in the response to item 1(b), if unexpected obstructions or conditions interfere with completing the full inspection at that time, as planned, other actions may be taken to allow for the BMV inspection to be performed at the subsequent refueling outage. In the event that this situation develops, a discussion of the circumstances and updated inspection strategy will be included in the inspection results report discussed in Requested Information Item (2).

Requested Information Item (1)(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.

Entergy Response:

Entergy intends to perform a BMV inspection of the RPV lower head penetrations during the next refueling outage for each unit. Therefore the basis for ensuring that applicable regulatory requirements are and will continue to be met includes the performance of these inspections. In the event that inspections cannot be performed as planned Entergy will reassess the basis for concluding that applicable regulatory requirements are met, and document this reassessment in the inspection results report discussed in Requested Information Item (2).

Requested Information Item (2):

Within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject PWR addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found.

Entergy Response:

Entergy agrees to submit the requested information within 60 days of restart following the next inspection of the RPV lower head penetrations. These inspections are currently planned for the next refueling outages as discussed in the response to item (1)(b).

References:

1. EPRI Report MRP-48, "PWR Materials Reliability Program Response to NRC Bulletin 2001-01", August 2001.
2. EPRI Report 1006296, "Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of RPV Head", Revision 1 dated March 2002. (or later version as needed)