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May 15, 2002
NL-02-074
IPN-02-039

U.S. Nuclear Regulatory Commission
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SUBJECT: Indian Point 2 and 3 Nuclear Power Plants
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64
"Submittal of 60-Day Response to NRC Bulletin 2002-01"

Reference:

1. NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002

2. Entergy Letter NL-01-106, dated September 4, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

3. Entergy letter IPN-01-063, dated August 31, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

4. Entergy letter IPN-01-079/NL-01-133, dated November 13, 2001, Revised Vessel Head Penetration Inspection Plans, NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

5. Entergy letter NL-02-050/IPN-02-023, dated April 2, 2002, "Submittal of 15-Day Response to NRC Bulletin 2002-01"

Dear Sir:

Attached is the Entergy Nuclear Operations Inc. (ENO) 60-day response to Bulletin 2002-01 (Reference 1) for Indian Point Units 2 and 3, the Indian Point Entergy Center (IPEC). Attachments 1 and 2 contain the responses for Indian Point Units 2 and 3, respectively.

ENO recognizes the safety significance of the events discussed in the Bulletin and is committed to a timely and complete resolution of the issue. At this time, ENO continues to believe there is reasonable assurance that regulatory requirements are currently being met and will continue to be met. ENO will continue to monitor industry experience regarding this Bulletin for applicability to Indian Point Units 2 and 3.

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No new commitments are being made in this letter. If you have any questions, please contact Mr. John McCann (914) 734- 5074 or Mr. John Donnelly at (914) 736-8310, at Units 2 and 3, respectively.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

Executed on 5-15-02
(Date)

Mr. John Herron
Senior Vice President
Indian Point Units 2 and 3
Entergy Nuclear Operations, Inc.

Attachment: As stated

cc: Mr. Hubert J. Miller
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Indian Point 2

60-Day Response to Bulletin 2002-01

Indian Point Unit 2, 60-day response to Bulletin 2002-01

Required Information

3. Within 60 days from the date of this bulletin, all PWR addresses are required to submit to the NRC the following information related to the reactor coolant pressure boundary:

A. The basis for concluding that your boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and this bulletin. If a documented basis does not exist, provide your plans, if any, for a review of your programs.

Response: Generic Letter (GL) 88-05 required that licensees "...provide assurances that a program has been implemented consisting of systematic measures to ensure that boric acid corrosion does not lead to degradation of the assurance that the reactor coolant pressure boundary will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture." Although the GL included a discussion of leakage through defective welds the primary sources of the leakage both at Indian Point 2 and throughout the industry at that time were through improperly re-assembled bolted connections following maintenance activities.

Indian Point 2's response to GL 88-05 was documented in a letter from Consolidated Edison to the NRC dated May 31, 1988. In this response, Indian Point 2 described the three plant activities which ensure that leaks of borated water do not adversely impact the structural integrity of the reactor coolant system: These three programs were as follows:

1. Reactor Coolant Leakage Surveillance - performed once per shift by operations personnel. If the containment radioparticulate monitor indicates a step increase, within one hour the reactor coolant leak rate is calculated and monitored. Operations personnel with assistance from the Technical Support and Engineering organizations, evaluate the leakage to determine if continued operation is appropriate or if other corrective measures are appropriate to mitigate the leakage.

2. Containment Visual Inspections – performed monthly looking for any condition that does not appear normal, including leakage and boric acid accumulation. This inspection is performed monthly or, when deemed appropriate, more frequently. The inspection procedure specifically requires visual inspection of the seven reactor vessel conoseals, steam generator and pressurizer instrument taps and associated piping and the in-core instrument thimble seal table.

3. Carbon Steel Bolting Inspections - During each refueling outage, Indian Point 2 implements an inspection procedure, "Carbon Steel Fastener Inspection Program" for bolted connections one inch Nominal Pipe Size (NPS) or greater for Quality Group A systems and two inch NPS or greater for Quality Group B systems. This inspection program, which was initially established in response to Bulletin 82-02, was expanded to include more than 350 mechanical connections.

The above response to GL 88-05 was reviewed by the NRC with the conclusions summarized in NRC letter to Consolidated Edison dated January 26, 1990. In this letter, the review concluded that Indian Point 2 "... responded to Generic Letter 88-05, describing your commitment to a boric acid leakage monitoring and preventive program at your plant. We find that you have provided assurance that a program is in place dealing with boric acid leakage that potentially could affect the integrity of the reactor coolant pressure boundary. This fulfills your requirement in responding to Generic Letter 88-05".

As a result of Bulletin 2002-01, ENO has reviewed the commitments made in response to GL 88-05, to ensure that (1) they continue to be appropriately implemented as described in the response and (2) that they will continue to be effective in light of the recent industry experience with Alloy 600 cracking and with vessel head base metal wastage as described in Bulletin 2002-01. This review yielded the following results:

(1) RCS Leakage Surveillance – is performed at least once per shift in accordance with the requirements of procedure SOP 1.7. In addition, step 4.3.4 states that "...If R-41 indicates that an unexplained, increasing trend in radioparticulate activity has occurred in the VC, since the last recorded value, INITIATE execution of the IP2 Leakage Surveillance Computer Program as soon as practical, NOT to exceed one hour". The procedure also states that any leakage shall be considered unknown until the source is identified (step 4.3.3) and that any pressure boundary leakage would require a plant shutdown per Technical Specification 3.1.F.2.c(2) (step 5.3.2). Based on this review, IP2 considers the original GL 88-05 commitment continues to be properly implemented, and remains effective in monitoring leakage both in borated and in non-borated systems.

(2) Containment Monthly Visual Inspections – These monthly inspections are performed in accordance with the requirements of procedure PI-M 2, "Containment Building Inspection". This inspection is also performed during each plant shutdown prior to heating up above 350° F per step 2.3. The purpose of the inspection is to locate the source of active leaks. However, areas that show evidence of prior leakage, such as dry boron, are also noted in the comment section. Some of the areas specifically identified as requiring visual inspection for leakage, include the Steam Generator Level instrument taps, seal table, pressurizer taps and piping in addition to other, non-borated systems. The procedure also requires inspection of the floor outside of the crane wall to verify that there is no accumulation of water. Although the original response to GL 88-05 specifically mentioned inspection of the seven reactor vessel conoseals, the previous version of the procedure did not specifically mention the conoseals. It is believed that the conoseal inspections were discontinued when the leaks, which occurred during the mid to late 1980's, were corrected and the need to explicitly monitor the conoseals was eliminated. However this procedure has recently been updated to include the requirements to inspect each of the seven conoseals for leakage as originally discussed in the response to GL 88-05. This revised version of the procedure was used to perform the most recent inspection and no signs of leakage were detected in the conoseals. Based on these results, IP2 concludes that the monthly visual inspections of the containment continue to be implemented as originally described in the GL 88-05 response. In view of recent industry experience, IP2 is evaluating potential programmatic enhancements.

(3) Carbon Steel Bolting Inspections – As discussed in the original response to GL 88-05, IP2 implemented an extensive boric acid inspection program in response to Bulletin 82-02. This program is implemented through procedure SE-Q-12.707, "Carbon Steel Fastener Inspection Program" and requires inspection of all bolted connections one inch nominal pipe size (NPS) or greater for Quality Group A borated systems and two inches NPS or greater for Quality Group B borated systems. Although the original purpose of the procedure was to address the degradation of the carbon steel bolts resulting from boric acid leakage, it also requires that the surrounding area of all leaking components be inspected to determine the effect of the boron on adjacent components, supports and piping. This also includes the leak path of the boron and all components within the path. This inspection program has since been expanded to include additional components in borated water systems both inside and outside of the Containment. The inspection is typically performed at the beginning of every refueling outage by a qualified NDE inspector (i.e. VT-2 certified) to locate and document any potential leaks which might have developed during the previous operating cycle but which might have been below the leakage detection capabilities of the plant and might have been in radiologically inaccessible areas. Any evidence of leakage is evaluated and corrected as necessary. Based on these results, IP2 concludes that the carbon steel bolting inspections continue to be implemented as originally described in the GL 88-05 response. In view of recent industry experience, IP2 is evaluating potential programmatic enhancements.

(4) RCS Integrity Inspection – In addition to the above three programs/surveillances, IP2 also performs an RCS pressure test once per refueling outage, as required by the ASME, Section XI Code. This pressure test, which is performed in accordance with procedure PT-R75, requires a VT-2 visual examination of the RCS to look for any signs of leakage while the RCS is pressurized to normal operating pressure. Any leakage at bolted connections will require a VT-1 visual inspection of the bolting or alternate evaluation as required by 10CFR50.55a. Any pressure boundary leakage is corrected prior to returning the plant to service.

(5) ASME Section XI – ISI Program

ASME Section XI requires the inspection of pressure boundary components such as vessels, heat exchangers, pumps, valves and piping, including pressure-retaining bolts. Personnel performing these inspections are qualified and certified in accordance with ASME Section XI requirements. Although not specifically developed for the detection of boric acid leaks, the ISI program does afford the opportunity for periodic removal of insulation of specific portions of the RCPB to perform volumetric and surface examinations, which would lead to the detection of corrosion or leakage caused by boric acid.

Visual inspections (VT-1) are performed on pressure retaining bolts where the inspector is required to indicate evidence of coolant leakage and localized general corrosion. The reduction in nominal wall thickness is considered in the evaluation of ultrasonic and surface examination data, as required by the allowable flaw standards in the ASME Section XI code. The ISI findings are recorded in a CR and addressed via the corrective action program. The extent and frequency of inspections are in accordance with ASME Section XI or approved relief requests.

Based on the above discussion, it is concluded that the boric acid control measures described in the response to GL 88-05 continue to be implemented in an effective manner. However, in view of recent industry experience, IP2 is evaluating potential programmatic enhancements.

References

1. NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002

2. Entergy letter NL-01-106, dated September 4, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

3. Entergy letter IPN-01-063, dated August 31, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

4. Entergy letter IPN-01-079/NL-01-133, dated November 13, 2001, Revised Vessel Head Penetration Inspection Plans, NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

5. Entergy letter NL-02-050/IPN-02-023, dated April 2, 2002, "Submittal of 15-Day Response to NRC Bulletin 2002-01"

6. Con Edison letter NL-88-075, "Response to Generic Letter 88-05, Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants", dated May 31, 1988.

7. NRC letter RA-90-019, "Response to Generic Letter 88-05 (TAC NO. 68923)", Dated January 26, 1990

Indian Point 3

60-Day Response to Bulletin 2002-01

Indian Point Unit 3, 60-day response to Bulletin 2002-01

Required Information

3. Within 60 days from the date of this bulletin, all PWR addresses are required to submit to the NRC the following information related to the reactor coolant pressure boundary:

   A. The basis for concluding that your boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and this bulletin. If a documented basis does not exist, provide your plans, if any, for a review of your programs.

Response: Several elements of the programs and processes at Indian Point 3 provide reasonable assurance of compliance with the applicable regulatory requirements discussed. These programs and processes are based on both Regulatory and non-Regulatory commitments and ensure the integrity of the Reactor Coolant Pressure Boundary (RCPB), as well as systems and components outside the RCPB, are maintained. These elements are discussed as follows:

1. Regulatory Programs

A. Generic Letter 88-05

IP3 letter to the NRC (Reference 6) provided for the commitment to a boric acid inspection program for components in the RCPB that contain carbon steel subcomponents. This commitment was approved (Reference 7) and subsequently implemented by the issuance of Surveillance Procedure 3PT-R114, "RCS BORIC ACID LEAKAGE AND CORROSION INSPECTION". This program is directed by the Engineering Department and implemented by the Operations Department. This surveillance inspects specific components selected in accordance with guidance provided in GL 88-05. Additional components have been included (beyond the scope of GL 88-05) as deemed prudent due to plant specific history of leakage problems or industry concerns that have arisen since the issuance of GL 88-05. The inspection is performed every refueling outage with the plant in Mode 5 (Cold Shutdown). All of the selected components and subcomponents are inspected; the insulation, if installed, would typically not be removed from these components. However, because this inspection is performed after long periods of plant operation, it would be expected that there would be significant evidence of even a small RCS leak despite the presence of insulation. Recent changes to the test procedure now require that personnel who examine components for leakage be certified as a Level II Visual Examiner per ASME Section XI. The acceptance criteria for the examinations are incorporated into the procedure. Any leakage or degradation observed is documented and entered into the Corrective Action Program. The Corrective Action Program would dictate any evaluation and/or repair requirements for the affected components.

B. ASME Section XI – RCS Pressure Test

3PT-R131, "RCS INTEGRITY LEAK TEST", satisfies the ASME Section XI System Leakage Test of the Reactor Coolant System (RCS), reference Table IWB-2500-1 Category B-P, paragraph IWA-5214, and ASME Code Case N-416-1. This program is also directed by the Engineering Department and implemented by the Operations Department. This is a visual inspection of the Reactor Coolant System pressurized piping as identified by applicable marked-up Inservice Inspection (ISI) boundary drawings. This surveillance is implemented every Refueling outage with the plant in Mode 3 (Hot Standby) and the RCS at normal operating pressure and temperature (NOP/NOT). Insulation is not removed for this examination, however, specific instructions are provided for guidance in the visual inspection of insulated piping/components as well as a requirement that insulated piping/components are not to be inspected until after a minimum of a 4 hour hold time at NOP/NOT. All test inspectors are, as a minimum, certified as a VT-2 inspector under ASME XI. This surveillance is also a requirement of Plant Technical Specifications. The acceptance criteria for the examinations are incorporated into the procedure. Any leakage observed requires notification to the Shift Manager to determine if an Allowed Outage Time (AOT) is required and generation of a Problem Identification (PID) and/or Deviation Event Report (DER) into the Corrective Action Program.

C. ASME Section XI – ISI Program

ASME Section XI requires the inspection of pressure boundary components such as vessels, heat exchangers, pumps, valves and piping, including pressure retaining bolts. Personnel performing these inspections are qualified and certified in accordance with ASME Section XI requirements. Although not specifically developed for the detection of boric acid leaks, the ISI program does afford the opportunity for periodic removal of insulation of specific portions of the RCPB to perform volumetric and surface examinations, which would lead to the detection of corrosion or leakage caused by boric acid.

Visual inspections (VT-1) are performed on pressure retaining bolts where the inspector is required to indicate evidence of coolant leakage and localized general corrosion. The reduction in nominal wall thickness is considered in the evaluation of ultrasonic and surface examination data, as required by the allowable flaw standards in the ASME Section XI code. The ISI findings are documented and addressed via the corrective action program. The extent and frequency of inspections are in accordance with ASME Section XI or approved relief requests.

2. Non-Regulatory Programs

A. Fluid Leak Management Program

IP3 has recently started the development of a Fluid Leak Management Program modeled after EPRI Technical Report TR-114761, "Establishing an Effective Fluid Leak Management Program". This program is presently being developed with activities and schedules documented in Action Plan IMD-APL-01-006 under the direction of the Maintenance Department. The primary focus of this program is the categorization, prioritization and development of corrective actions for leaks when they have been identified, using the EPRI guidelines. This program is entered after leaks are identified by other processes or by general area observations by plant personnel. This program will identify both short and long term corrective actions and responsible organizations and allow tracking of leakage issues until final corrective actions are complete.

B. Plant Procedure SOP-CB-2, "Containment Entry and Egress"

This procedure provides guidance to plant personnel for entry and egress into the Containment Building during all modes of plant operation. Specifically, this procedure requires a general walkdown, including observation for any indication of RCS leakage, prior to exit from Mode 5 if the plant has been required to shutdown to Mode 5 or 6 for any reason. Generally, this procedure provides guidance for entry into Containment for Modes 1 through 4, but does not provide specific instructions for leakage observations during these modes of operation. However, it is expected that these entries and personnel training would afford the opportunity to identify gross conditions that would be indicative of an RCS leak. This procedure would also require a documented Post-Entry Debrief between Operations and the entry personnel to discuss any abnormal conditions found. Containment entries are specially scheduled to search for RCS leaks based on trends and changes to the calculated RCS leak rate.

C. RCS Leakage Monitoring

Monitoring for leakage to maintain compliance with Technical Specification limits of 1 gpm unidentified and 10 gpm identified is implemented in accordance with SOP-RCS-004, "Reactor Coolant Leakage Surveillance", and SOP-RCS-5, "Reactor Coolant Leakage Evaluation" by the Operations Department. RCS leak rate is reported on a daily basis. Although it is recognized that certain types of leakage are small and not readily detectable by leak rate monitoring, IP3 maintains a trending of leak rate and has established a limit far below Technical Specification limits as an alert point. This limit is a part of the Post Outage Goals established after each refueling outage and for RCS leak rate is presently 0.1 gpm during normal, steady state operation. Should the RCS leak rate show increasing leakage, action is taken to investigate the cause of this trend and implement corrective actions, including Containment entries as appropriate and as indicated above.

D. Engineering Evaluation of Boric Acid Leakage

The processes and programs noted above are focused on the identification and repair of sources of RCS leakage. However, in some instances, immediate repairs are not considered practical and an Engineering Evaluation is required to determine if continued operation with active leakage, or the residue left from an inactive leak, is acceptable. This evaluation is implemented in accordance with the guidance provided in Procedure TSP-025, "Evaluation of RCS Pressure Boundary Components Affected by Boric Acid Corrosion" which is maintained under the control of the Engineering Department. This evaluation is only an interim measure, and final corrective measures to address the leak are still put into place in parallel with the evaluation.

The effectiveness of these programs and processes in the identification and evaluation of leaks in the RCPB has been demonstrated on several occasions as follows:

- In late 1996, the daily RCS leak rate began to trend up. The Operations Department implemented inspections, including Containment entries into low radiation dose areas in an attempt to determine any additional sources of leakage. In January of 1997, an event occurred which resulted in the plant entering Mode 3. This afforded the opportunity to inspect those areas of Containment that are normally at higher dose rates. This resulted in the discovery of a leak in the Pressurizer manway flange (DER 97-00166). Plant management was informed and it was determined the leak, although small, had the potential to worsen and the plant proceeded to Mode 5 for repairs.

- In March of 2001, again RCS leak rate appeared to be trending up. Health Physics (HP) personnel enter the Containment for inspections of the low dose areas in accordance with procedures. An HP supervisor noted from a distance evidence of boric acid on Conoseal Clamp Assembly #4 associated with one of the Reactor Vessel Head penetrations for core exit thermocouples (DER 01-00952). This leakage was categorized and prioritized in accordance with the EPRI guidance. It was determined that the leakage was minor, such that no degradation of RCPB components was likely, and a periodic monitoring program was established until permanent repairs could be implemented during the next Refueling outage which was scheduled to start the end of April, 2001.

- In February of 2002, evidence of boric acid residue was identified on the floor of the adjacent high dose area by an individual who was a participant in a HP supervisor training session. An inspection of this area was later implemented using a robot equipped with video devices. The inspection verified that there was boric acid residue due to RCS leakage and tracked the leak to the intermediate loop drain valves on the RCS piping. An active packing leak on the outboard drain valve was identified. The leak was estimated to be extremely small, on the order of a few thousandths of a gpm. Again, the leakage was categorized and prioritized and it was determined to implement repairs immediately. The most expedient repair was to

further tighten the two valves. This was done in April 2002 and subsequent robotic inspection indicates the leakage has stopped. Periodic robotic inspections will be maintained to ensure the leakage does not resume.

References

1. NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002

2. Entergy letter NL-01-106, dated September 4, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

3. Entergy letter IPN-01-063, dated August 31, 2001, "Thirty-Day Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

4. Entergy IPN-01-079/NL-01-133, dated November 13, 2001, Revised Vessel Head Penetration Inspection Plans, NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Vessel Pressure Vessel Head Penetration Nozzles"

5. Entergy letter NL-02-050/IPN-02-023, dated April 2, 2002, "Submittal of 15-Day Response to NRC Bulletin 2002-01"

6. NYPA letter IPN-88-022, dated June 1, 1988.

7. NRC letter J. D. Neighbors to J. C. Brons, dated September 14, 1988.