

May 24, 2002

MEMORANDUM TO: Richard J. Laufer, Chief, Section 1  
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Division of Licensing Project Management

FROM: Patrick D. Milano, Senior Project Manager, Section 1 /RA/  
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Division of Licensing Project Management

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE ON MAY 10, 2002,  
WITH ENTERGY NUCLEAR OPERATIONS RE: RESPONSE TO  
BULLETIN 2002-01, INDIAN POINT NUCLEAR GENERATING UNIT  
NOS. 2 AND 3 (TAC NOS. MB4550 AND MB4551)

On May 10, 2002, the U.S. Nuclear Regulatory Commission (NRC) staff held a telephone conference with representatives of Entergy Nuclear Operations, Inc. (the licensee) regarding the information in its April 2, 2002, response (15-day response) to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002. The following questions, which were provided to the licensee by electronic mail, were discussed during the telephone conference for the Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and 3).

#### Staff Questions on IP2

Q.1 In its 15-day response to Bulletin 2002-01, the licensee indicated that sections of insulation adjacent to leaking canopy seal welds were removed in 1986, 1987, and 1988, and a bare-metal inspection of the reactor vessel head was performed. Provide a sketch of the location of the leaks and the locations where the insulation was subsequently removed for each occurrence. Discuss the size (area) of the insulation that was affected by the leaks and the size (area) of the base metal that was exposed. Discuss whether any boric acid deposits and/or residue were identified on the bare metal of the head and if any boric acid/water penetrated the insulation.

#### Licensee response

The licensee stated that a sketch of the vessel head had been prepared that provides details of the locations of prior leaks and areas where insulation had been removed. In this regard, the licensee discussed the removal: (1) in 1986 of an approximately 6-inch diameter section of insulation between nozzle nos. 70 and 81 (this area was re-inspected in 1987); (2) in 1986 of an approximately 15-inch x 15-inch section near nozzle no. 75; and (3) in 1988 of a 4-inch x 4-inch section near nozzle no. 97. The insulation was removed because several of the leaks sprayed liquid onto adjacent nozzle areas. In each situation, the insulation was removed down to the coating on the vessel head and no boric acid was observed. The licensee stated that a copy of the sketch would be provided with a supplement to the Bulletin response.

The top of the head is coated with a high-temperature aluminum silicate coating that provides some protection from boric acid corrosion. In the insulation removals in 1986, 1987, and 1988, the licensee found the coating intact in the inspected areas. The documentation from these inspections indicate that the coating had a grayish color and appeared intact. The licensee also stated that in 1986 it had done some independent testing of this type of coating and found that the coating does not readily react with boric acid.

In 1986, the licensee stated that it tested two samples of the insulation to determine degree of penetration of the boric acid liquid that had sprayed. These core samples were taken in areas adjacent to where leaks had occurred; near nozzle no. 70. Some of the boric acid had penetrated into the insulation (i.e., the insulation is not water-tight). However, the licensee found no boric acid deposits on the head surface.

2. The licensee's response to item 1.C of the Bulletin indicated that there were three instances of conoseal leakage and three instances of canopy seal weld leakage at IP2. It appears that the 1986, 1988, and 1997 leaks were corrected during the outage in which they were found. There was no mention of repair of the leak identified in 1996. Clarify whether all leaks were repaired during the outage in which they were identified. Discuss the amount of boric acid that was found on the insulation following these leakage events.

#### Licensee response

In February 1996, the licensee stated that a small leak occurred from conoseal no. 91 during a plant heatup. The licensee tightened the conoseal flange bolts which reduced but did not fully stop the leak. A small catch basin was temporarily installed to collect any leakage, and no leakage got onto the head. The licensee operated the plant until the 1997 refueling outage at which time a permanent repair was completed.

The prior canopy seal leaks were located in the air stream caused by the head cooling fans. It appeared that the leaks created a fine spray mist that was entrained in the air flow such that the drippage did not go onto a single area of insulation. For the conoseal leakage, the leakage tends to accumulate around the leaking flange creating "snowball" type deposits. Except for conoseal no. 91, all the leaks were repaired during the outage in which they were found or during the subsequent outage if the leaks were found while the plant was operating.

3. During an extended maintenance outage in 1998, the licensee performed a modification to the part-length control rod drive mechanism (CRDM) housing. Discuss the reason for the modification (i.e. was the modification necessary due to evidence of boric acid leakage).

#### Licensee response

Because of a problem identified at the Prairie Island Plant, the licensee decided to remove the suspect welds rather than perform inspections of the housings since the areas were difficult to inspect. The licensee stated that since it had questions on the

feasibility of inspection and since it had a nozzle with the same material heat number as the Prairie Island nozzle, it decided to remove the nozzles as a proactive measure. The removed nozzles were shipped to the Westinghouse Owners Group for testing, and no cracks were identified.

4. Discuss whether there are any gaps, cracks, or other similar disturbances in the insulation (i.e., discuss the integrity of the outer surface of the insulation). Also, discuss if there are any gaps between the insulation and the nozzles. If gaps are present, discuss any inspections that have been performed.

Licensee response

Although the insulation appears to be in good condition, the licensee stated that there are some cracks and gaps near the nozzles. Thus, the insulation is not leaktight and borated water could potentially flow down the gaps in the insulation. However, no boric acid was observed in the gaps.

5. In its 15-day response to Bulletin 2002-01, the licensee stated that examination of "essentially 100% of the CRDM penetrations" would be conducted during the next outage. In a prior submittal (supplemental response to Bulletin 2001-01), the licensee defined "essentially 100%" to mean "essentially 360 degrees around 100 percent of the vessel head penetrations". Discuss any limitations that may prevent examination of a full 360 degrees of 100% of the penetrations.

Licensee response

The licensee stated that it does not currently know of any limitation that would prevent it from conducting a 360° inspection of all nozzles. However, it noted that spacers that provide alignment of thermal sleeves were encountered at another station. If a similar situation occurs at IP2, the licensee stated that it would document the occurrence in its inspection summary report.

6. The NRC asked the licensee several additional questions which were identified by its Regional staff:
  - a. Discuss whether the recent experience with the removal of the head insulation at the Point Beach Station has been evaluated in light of the upcoming inspections for IP2 and 3.

Licensee response

The licensee stated that it monitored the insulation removal at Point Beach and talked to the vendor who removed the insulation regarding asbestos abatement and radiation dose considerations. The insulation material at Point Beach is similar in design to that used at IP2. The licensee stated that it is evaluating the removal but has not made a decision. The licensee will provide its decision in its 90-day plan report, but stated that its current plan is 100% non-destructive examination under the reactor pressure vessel head.

- b. In NRC Information Notice (IN) 2002-13, the NRC staff discussed information regarding possible indicators of reactor vessel head degradation. Discuss whether the licensee has evaluated the IN.

Licensee response

The licensee stated that it had evaluated IN 2002-13. However, the IP2 design does not include filters in the containment fan cooler units (CFCUs). The licensee has looked at the CFCUs and found them clean. In addition, there has been no visible signs of boron inside containment. During the periodic replacement of the filter media in the containment air particulate monitor, there has been no sign of discoloration. The health physics technicians replace the roll-type rotating filter media about every 3 weeks, and they have been briefed about looking for discoloration. There has been no increase in the schedule for changing filters. The daily unidentified leakage measurements taken by the plant operators has been low.

- c. Discuss the completeness of the inspection during the outage in 2000 that was documented in a licensee Condition Report (CR).

Licensee response

The licensee stated that it would include documentation about the inspection conducted in 2000 with its supplemental response. The issue documented in the CR involved the scope of the inspection inside the CRDM shroud during surveillance test PT-R75, an American Society of Mechanical Engineers Boiler and Pressure Vessel Code pressure test. The plant operator did not remember looking inside the shroud during the test, but the inspection records for the pressure test imply that the operator did look inside the shroud. The test procedure has since been revised to clearly require the shroud doors to be opened during the test.

Staff Questions on IP3

1. The licensee's 15-day response to Bulletin 2002-01 indicated that insulation around 14 CRDMs was removed, and inspections were performed due to a canopy seal leak that was identified in 1990. Discuss whether any boric acid deposits and/or residue were identified on the bare metal of the head and/or whether any boric acid/water penetrated the insulation. Clarify whether this area is still accessible, and if accessible, discuss the inspections that have been performed.

Licensee response

The licensee stated that a sketch showing the locations of the removed insulation was prepared at the time of insulation removal and will be submitted. In 1990, a leak occurred that sprayed water onto a large area of insulation around 14 nozzles. The licensee stated that it took pre-emptive action to remove the insulation and inspect the head surface. The insulation was removed from an approximately 3-feet x 5-feet area.

This area encompasses about 15-20% of the total head surface area. The area outside of the shroud was cleaned and no corrosion was observed. However, the inspection documentation makes no mention about the condition of the head coating.

During refueling outage (RFO) 11 in April 2001, the licensee stated that it inspected this area from above the head and found it acceptable. In particular, it looked for deposits in crevices at the insulation to CRDM tube interface. These inspections were video-taped.

2. During RFO 10 in 1999, stains were observed on the head outside of the CRDM shroud between vessel stud nos. 5 through 18 (there are 54 studs installed on the head). As a result of these findings, the top of the insulation was inspected and streaks were observed on the CRDMs. No evidence of any new leakage or degradation of the insulation was found. Based on these findings, the licensee postulated that the residue found near the vessel studs was due to humidity and entrainment in the ventilation system. According to its 15-day Bulletin response, the only leak in IP3 at that time occurred in 1990. Discuss how/why staining would be observed 9 years after the original leak. Clarify whether the affected insulation was removed. In addition, discuss whether there are other instances of boric acid leakage onto the head.

#### Licensee response

During RFO 10, the licensee noted staining between vessel stud nos. 5 through 18. The residue was cleaned, and no degradation was noted. It also conducted an enhanced examination by video, and no degradation was noted. The studs, nuts, and washers were examined ultrasonically and visually during RFO 10 to comply with the 10-year inservice inspection requirements. The residue appears to be from prior leakage. However, the licensee did not identify the source of the leakage. The same areas were inspected during RFO 11 with no evidence of leakage or staining.

3. During RFO 11 in 2001, boron deposits were observed around a leaking conoseal. This leak resulted in staining of the reactor vessel head which was similar to the staining observed during RFO 10. Discuss the possibility that the boric acid reached the reactor vessel head, and the possibility that the staining observed during RFOs 10 and 11 was a result of corrosion of the base metal of the head.

#### Licensee response

The licensee stated that conoseal no. 4 was leaking before RFO 11 (i.e., noted while unit was online and inspected weekly until shutdown). This was noted during containment walkdowns. The licensee found some residue around stud hole no. 38, which is adjacent to conoseal no. 4. The conoseal was repaired during the outage. Except for the area around stud hole no. 38, the licensee stated there were no locations where staining or deposits reached the head. The licensee noted that most of the conoseal leakage remained on the nozzle assembly itself and did not reach the vessel head. Specifically, the leakage stopped 4 to 6 inches above the head. Some of the dried deposits fell off the tube onto the insulation. The surface outside the shroud was cleaned during the inspection.

4. The licensee's response to Bulletin 2002-01 stated that an engineering evaluation was performed during RFO 11 to ensure the integrity of the reactor vessel head. Provide a copy of this evaluation. In addition, address whether boric acid deposits were left on the reactor vessel head. Given the assumption that humidity is present, address whether any boric acid deposits would be wetted during operation such that active corrosion could be occurring.

Licensee response

The licensee stated that a copy of the evaluation would be attached to its Bulletin supplement. With regard to reactor vessel head cleaning, the head was cleaned during RFO 11. The licensee stated that reactor coolant system leakage measurements have been low and not increasing. In addition, there are no indications of corrosion of the vessel head.

5. Discuss whether there are any gaps, cracks, or other similar disturbances in the insulation (i.e., discuss the integrity of the outer surface of the insulation). Also, discuss if there are any gaps between the insulation and the nozzle. If gaps are present, discuss any inspections that have been performed.

Licensee response

The licensee stated that the insulation at IP3 is in good condition with minor cracking. There are gaps at the nozzle locations due to settlement of the insulation. The licensee stated that it had looked at the crevices around 60% of the nozzles and found no leakage deposits. The licensee was able to inspect some nozzles all the way to the top of the head dome. The inspection scope was limited by the ability to position the camera. The licensee stated also that it would provide a sketch that shows where the leaks had occurred. The licensee stated that there are areas where the insulation is discolored. However, it believes that this discoloration was from old leaks above the head where rusting had occurred and was blown down by the ventilation system.

6. The licensee's 15-day response to Bulletin 2002-01 states that examination of "essentially 100% of the CRDM penetrations" would be conducted during the next outage. In a previous submittal (supplemental response to Bulletin 2001-01) the licensee defined "essentially 100%" to mean "essentially 360 degrees around 100 percent of the vessel head penetrations". Discuss any limitations that may prevent examination of a full 360 degrees of 100 percent of the penetrations.

Licensee response

The licensee referred to the discussions about IP2.

7. The NRC asked the licensee additional questions which were identified by its Regional staff.
  - a. Discuss whether there are any possible indicators of reactor vessel head degradation.

Licensee response

As with IP2, it has reviewed the containment activity records and radiation monitor filter media. No indications of current leakage were noted.

- b. In the video record of the inspection of the head, several large deposits of material were noted on the surface of the insulation. What is the licensee's evaluation of this material?

Licensee response

The licensee stated that it evaluated the material as clumps of insulation cement that dropped onto the surface during repairs. This evaluation was based on the observed shape, surface texture, and presence of trowel marks on the deposits.

In summary, the licensee stated that it would be addressing the issues discussed during the telephone conference in a supplement to its April 2, 2002, letter. The NRC staff will review the information in the April 2 letter and the supplemental information as it continues to evaluate the licensee's response to NRC Bulletin 2002-01 for IP2 and 3.

Docket Nos. 50-247 and 50-286

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