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John A. Ventosa
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February 20, 2013

NL-13-041

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Relief Request IP2-ISI-RR-17: Code Case N-770-1 Weld Inspection
Frequency Extension
Indian Point Unit Number 2
Docket No. 50-247
License No. DPR-26

REFERENCES: 1 Entergy Letter NL-11-094 Regarding Request for Relief 14 – Code
case N-770-1 Weld Inspection Frequency Extension, dated August 3,
2011

2 Entergy Letter NL-11-123, Regarding Request for Additional
Information on Relief Request IP2-ISI-RR-14 for Code Case N-770-1
Weld Inspection Frequency Extension (TAC No. ME6689), dated
November 8, 2011.

3 NRC Letter Regarding Relief Request No. IP2-ISI-RR-14, Code Case
N-770-1, Reactor Coolant System Cold Leg Nozzle Weld Inspection
Frequency Extension (TAC NO. ME6801), dated February 2, 2014

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. (Entergy) is submitting Relief Request No. 17 (IP2-ISI-RR-17) (Attachment) for Indian Point Unit No. 2 (IP2). This relief request is for the Fourth 10-year Inservice Inspection (ISI) Interval.

The purpose of this relief request is to extend the inspection of the reactor vessel cold leg nozzle to safe-end welds (21-14A, 22-14A, 23-14A, 24-14A), which are Alloy 600 welds covered by Code Case N-770-1, Table 1, Inspection Item B. The requested extension is until Refueling Outage 22 (2R22) which is scheduled for Spring 2016. This request is made in accordance with 10 CFR 50.55a(a)(3)(i), an alternative provides an acceptable level of quality and safety.

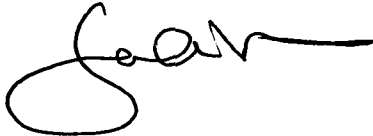
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NRR

Entergy submitted a similar Relief Request in Reference 1 and responded to a request for additional Information in Reference 2. This Relief Request was approved in Reference 3. Additional circumstances have arisen affecting the need for this request.

Entergy requests approval of the relief request by August 2013. Performance of this inspection in 2R21 would require planning to start at that time.

There are no new commitments identified in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Licensing Manager at 914-254-6710.

Sincerely,



JV/sp

Attachment: Relief Request No IP2-ISI-RR-17 Code Case N-770-1 Weld Inspection
Frequency Extension

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William M. Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office Indian Point
Ms. Bridget Frymire, New York State Department of Public Service
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA

ATTACHMENT TO NL-13-041

RELIEF REQUEST NO IP2-ISI-RR-17

CODE CASE N-770-1 WELD INSPECTION FREQUENCY EXTENSION

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

Indian Point Unit 2
Fourth 10-year ISI Interval
Relief Request No: IP2-ISI-RR-17
Code Case N-770-1 Weld Inspection Frequency Extension
Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(i)
-Alternative Provides Acceptable Level of Quality and Safety-

1. ASME Code Component(s) Affected

The affected components are the Indian Point Unit 2 (IP2) reactor vessel cold leg nozzle to safe-end welds (21-14A, 22-14A, 23-14A, 24-14A), which are Alloy 600 welds covered by Code Case N-770-1, Table 1, Inspection Item B.

These welds had an Alloy 600 ID onlay installed during original fabrication and do not join any cast stainless steel materials.

Examination Category	Inspection Item	Description
CC N-770-1	B	Weld 21-14A - Loop 21 cold leg nozzle to safe-end weld
CC N-770-1	B	Weld 22-14A - Loop 22 cold leg nozzle to safe-end weld
CC N-770-1	B	Weld 23-14A - Loop 23 cold leg nozzle to safe-end weld
CC N-770-1	B	Weld 24-14A - Loop 24 cold leg nozzle to safe-end weld

2. Applicable Code Edition and Addenda

Code Case N-770-1 as referenced in 10CFR50.55a(g)(6)(ii)(F).

3. Applicable Code Requirement

Table 1 of Code Case N-770-1, requires volumetric examination of essentially 100% of Inspection Item B pressure retaining welds once every second inspection period not to exceed 7 years.

4. Reason for Request

Relief is being requested at this time to extend the cold leg weld inspection until Refueling Outage 22 (2R22) scheduled for Spring 2016 to allow the refueling cavity liner to be repaired in order to maximize the water level in the cavity during inspection activities in order to minimize dose.

Examination of Item A-2 (Hotleg) and Item B (Coldleg) welds are performed from the inside surface of the pipe (ID) at IP2 due to extremely limited access provisions from the outside surface of the pipe. The IP2 Item A-2 and Item B welds are located inside a "sandbox" which

was installed during original plant construction after all welding was completed. Additionally, these welds are covered with asbestos insulation. The cost and personnel radiation exposure (approximately 11 Rem) to perform these examinations from the OD make the OD exam undesirable. The inspection of the Item A-2 (Hotleg) welds from the ID does not require removal of the reactor vessel core barrel, while the inspection of the Item B (Coldleg) welds from the ID does require removal of the reactor vessel core barrel.

Baseline inspections of Code Case N-770-1 Inspection Item B welds, 21-14A, 22-14A, 23-14A and 24-14A were performed in May 2006. The ultrasonic examinations performed in 2006 met Section XI, Appendix VIII requirements, including examination volume of essentially 100%. The Safety Evaluation Report provided in Reference 3 requires examination of these welds by March 2014. Therefore, inspection of these welds would require removal of the core barrel during the March 2014 refueling outage.

Since inspection of these welds requires that the core barrel be removed from the reactor vessel, these inspections had previously been planned to be performed concurrently with the vessel shell weld inspections and the vessel internals inspections required by MRP-227 during the refuel outage of 2014. A separate IP2 Relief Request IP2-ISI-RR-16 has been submitted to the NRC staff to allow deferral of the vessel shell weld inspections from 2014 to 2016.

Removal of the Core Barrel and the lower internals requires that the water level in the refueling cavity to be increased to minimize the radiation fields since the height of the core barrel is greater than the depth of the water level during normal refueling operations. This increased water level and the displacement due to the weight from the core barrel and lower internals results in a significant increase in leakage through the existing cavity liner defects. This makes it more difficult to stabilize the water level at a higher value. IPEC is currently planning on repairing these liner indications during the 2014 refueling outage. Therefore, deferral of the Cold Leg Nozzle inspections from the 2014 to the 2016 refueling outage would eliminate the increased cavity liner leakage associated with the removal of the core barrel.

Repair of the liner would allow better control of the water level in the cavity and this water level must be maximized to minimize dose. The Core barrel (lower internals) is stored in the lower cavity stand and the Upper Internals are stored in the Upper Internals stand in the upper cavity. The repair of the cavity liner is expected to allow the maximized refueling cavity water level to be maintained because leakage will have been reduced or eliminated. Maximizing the water level reduces dose by approximately a factor of 10 if the water level is six inches higher. The dose rate for a water level of 94 feet 2 inches is about 18.6 R/hour at the cavity level and at 94 feet 8 inches is 1.47 R/hour.

IP2 is currently planning to perform the MRP-227 (i.e. Vessel Internals) inspections in 2R22 since the actual inspection scope has not yet been finalized (i.e. Entergy is still performing internals evaluations in response to NRC RAIs and these evaluations have the potential to impact the MRP-227 inspection scope). In addition, a significant pre-outage effort will be required to finalize inspection tooling and acceptance criteria which can not be completed prior to 2R21 which is currently scheduled to begin on February 24, 2014.

5. Proposed Alternative and Basis for Use

10CFR50.55a(a)(3) states:

“Proposed alternatives to the requirements of (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of Nuclear Reactor Regulation. The applicant shall demonstrate that:

- (i) the proposed alternatives would provide an acceptable level of quality and safety, or
- (ii) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.”

Entergy believes that the proposed alternatives of this request provide an acceptable level of quality and safety.

IP2 proposes a one time extension to the Code Case N-770-1, Table 1, Inspection Item B, volumetric examinations from a period of not to exceed 7 years to a period of not to exceed 10 years. The inspections which are currently required to be performed will be performed not later than the March 2016 refueling outage.

Operating experience on Primary Water Stress Corrosion Cracking (PWSCC) of Alloy 82/182 welds show that weld repairs performed during original plant construction are a significant contributor in the initiation and propagation of cracking. A review of the construction records and a weld repair search performed for the IP2 Reactor Vessel nozzle Alloy 82/182 welds did not identify any weld repairs performed on these welds during original plant construction. Additionally, IP2 has implemented Zinc injection since December 2007 which contributes to lower probability of PWSCC crack initiation during future plant operation.

The susceptibility to PWSCC of Alloy 82/182 welds is largely a function of time at temperature. Since IP2 operated at a low cold leg temperature (< 535F) for a significant portion of its operating life, it is ranked only moderately susceptible to PWSCC based on the susceptibility formula provided in NRC Order EA 03-009 for the upper vessel head penetrations.

Examination of Item A-2 (Hotleg) and Item B (Coldleg) welds are performed from the ID at IP2 due to extremely limited access provisions from the outside surface of the pipe. The IP2 Item A-2 and Item B welds are located inside a “sandbox” which was installed during original plant construction after all welding was completed. Additionally, these welds are covered with asbestos insulation. The estimated cost (\$750,000) and personnel radiation exposure (approximately 11 Rem) to perform these examinations from the OD make the OD exam undesirable. The inspection of the Item A-2 (Hotleg) welds from the ID does not require

removal of the reactor vessel core barrel, while the inspection of the Item B (Coldleg) welds from the ID does require removal of the reactor vessel core barrel.

In March 2012, ultrasonic (volumetric) and eddy current (surface) exams were performed on the Code Case N-770-1 Inspection Item A-2 (Hotleg) welds and no indications were identified. In 2014, ultrasonic (volumetric) and eddy current (surface) exams are scheduled to be performed on the Code Case N-770-1 Inspection Item A-2 (Hotleg) welds. Since PWSCC is temperature dependant, it would be expected that Inspection Item A-2 (Hotleg) welds would show evidence of crack initiation before Inspection Item B (Coldleg) welds. Therefore, the lack of any indications in the Inspection Item A-2 (Hotleg) welds provides added assurance that the one time extension of the inspection of the Inspection Item B (Coldleg) welds by two years provides an acceptable level of quality and safety.

The baseline inspection requirements of the Code Case N-770-1 Inspection Item B (Coldleg) welds, as required by Code Case N-770-1-2200, were satisfied by crediting the MRP-139 examination that was performed in May 2006. At that time, in addition to the ultrasonic (volumetric) examination, an additional surface examination utilizing an eddy current technique was performed. Both the ultrasonic (volumetric) and eddy current (surface) examinations were performed from the ID surface and confirmed the absence of any unacceptable indications after approximately 33 years of operation. The ultrasonic examinations performed in 2006 met Section XI, Appendix VIII requirements, including examination volume of essentially 100%. The use of eddy current examination in addition to the Code Case N-770-1 required ultrasonic examination provides a higher probability of detection of smaller flaws than an ultrasonic examination alone. Since the Code Case N-770-1 inspection frequency is based on flaw sizes associated with ultrasonic examination, the proposed alternative provides an equivalent protection against unacceptable PWSCC as the Code Case N-770-1 exam schedule.

Enclosure 1 to Reference 2 provides a flaw tolerance analysis performed by Westinghouse for the IP2 RPV inlet nozzle to safe end DM welds. The purpose of this analysis was to assess the impact of extending the inspection frequency beyond the 7 year inspection frequency required by Code Case N-770-1.

Enclosure 1 to Reference 2 calculated the length and the depth of the largest axial and circumferential flaws which, if left in service for more than 7 years would not grow beyond the limits provided in sub section IWB-3600 of the ASME Section XI Code.

The evaluation also established the maximum flaw size which could have reasonably been missed during the 2006 inspection considering the detection capabilities of the NDE techniques used during the inspection. It was estimated that the volumetric inspection technique (i.e. Ultrasound) used during the inspection was capable of reliably detecting a 10% through wall, surface breaking flaw. This size flaw was then assumed to have been missed during the 2006 inspection even though a surface examination (i.e. Eddy Current) did not identify any surface breaking flaws. Based on this, assuming that the 2006 inspection could have missed a 10% through wall flaw is a conservative assumption.

A comparison of the depth of the maximum flaw which could have been reasonably missed during the 2006 inspection (i.e. 0.25") with the depth of the maximum flaw (i.e. 1.05") which would not grow beyond the ASME Section XI limits after 10 years of service results in a margin of conservatism of approximately 4 beyond the margins of safety required by the ASME Section XI Code. Based on these results and the details provided in the Enclosure 1 to Reference 2 evaluation, it is concluded that performing the next cold leg nozzle DM weld inspections during the 2016 refueling outage is acceptable since it will not result in flaws which exceed the ASME Section XI Code limits.

Based on the fact that no weld repairs were documented on these welds during plant construction, zinc addition which decreases the probability of PWSCC crack initiation has been implemented at IP2 since December 2007, the hotleg examinations including both ultrasonic and eddy current inspections were performed in 2012 with no indications, hotleg examinations including both ultrasonic and eddy current inspections are scheduled to be performed in 2014, and the coldleg examinations including both ultrasonic and eddy current inspections were performed from the ID in 2006 with no indications, the one time alternative inspection frequency of every 10 years instead of every 7 years provides an acceptable level of quality and safety.

6. Duration of Proposed Alternative

This request is applicable to Entergy's inservice inspection program for the fourth interval for Indian Point Unit 2.

7. References

1. *Code Case N-770-1, Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of listed Mitigation Activities Section XI, Division 1.*
2. Entergy Letter NL-11-123, Regarding Request for Additional Information on Relief Request IP2-ISI-RR-14 for Code Case N-770-1 Weld Inspection Frequency Extension (TAC No. ME6689), dated November 8, 2011.
3. NRC Letter Regarding Relief Request No. IP2-ISI-RR-14, Code Case N-770-1, Reactor Coolant System Cold Leg Nozzle Weld Inspection Frequency Extension (TAC NO. ME6801)