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February 20, 2013

NL-13-040

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

SUBJECT: Relief Request IP2-ISI-RR-16: Extend the Inservice Inspection Interval for the Reactor Vessel Weld Examination  
Indian Point Unit Number 2  
Docket No. 50-247  
License No. DPR-26

- REFERENCES:
1. Entergy Letter NL-11-075 Regarding Request For Relief To Extend The Inservice Inspection Interval For The Reactor Vessel Weld Examination, dated June 29, 2011.
  2. Entergy Letter NL-11-097 Regarding Request for Additional Information on Relief Request IP2-ISI-RR-13 For The Reactor Vessel Weld Examination (TAC No. ME6689), Dated September 8, 2011.
  3. NRC Letter Regarding Relief Request No. IP2-ISI-RR-13, Reactor Vessel Weld Examination for the Third 10-year Inservice Inspection Interval (TAC NO. ME6689), November 21, 2011.

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. (Entergy) is submitting Relief Request No. 16 (IP2-ISI-RR-16) (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 reactor vessel weld inspection until Refueling Outage 22 (2R22) scheduled for Spring 2016. This request is made in accordance with 10 CFR 50.55a(a)(3)(i), an alternative that provides an acceptable level of quality and safety.

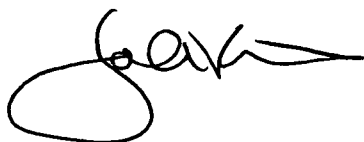
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Entergy previously requested this relief until 2014 based on WCAP-16168-NP-A, Revision 2, "Risk- Informed Extension of The Reactor Vessel In-Service Inspection Interval," and the supporting information in References 1 and 2. The NRC approved this relief request in Reference 3. Additional circumstances have arisen affecting the scheduling for this request.

Entergy requests approval of this relief request by August 2013 to support the planning of the IP2 Refueling Outage (RFO) – 2R21 in March 2014.

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.

Very truly yours,



JV/sp  
cc next page

Attachment: Relief Request No IP2-ISI-RR-16 Extend the Inservice Inspection Interval for the Reactor Vessel Weld Examination

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-13-040

RELIEF REQUEST IP2-ISI-RR-16

EXTEND THE INSERVICE INSPECTION INTERVAL FOR THE  
REACTOR VESSEL WELD EXAMINATION

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-16**  
**Reactor Vessel Inservice Inspection Interval 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 component is the Indian Point Unit 2 (IP2) reactor vessel (21RV), specifically the following American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code Section XI (Reference 1) examination categories and item numbers covering examinations of the reactor vessel (RV). These examination categories and item numbers are from IWB-2500 and Table IWB-2500-1 of the ASME BPV, Code Section XI.

**Examination**

<b>Category</b>	<b>Item No.</b>	<b>Description</b>
B-A	B1.11	Circumferential Shell Welds
B-A	B1.12	Longitudinal Shell Welds
B-A	B1.21	Circumferential Bottom Head Welds
B-A	B1.22	Meridional Bottom Head Welds
B-A	B1.30	Shell-to-Flange Weld
B-A	B1.50	Repair Welds
B-A	B1.51	Beltline Region
B-D	B3.90	Nozzle-to-Vessel Welds
B-D	B3.100	Nozzle Inside Radius Section

(Throughout this request the above examination categories are referred to as "the subject examinations" and the ASME BPV Code, Section XI, is referred to as "the Code.")

**2. Applicable Code Edition and Addenda**

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Code 2001 Edition through 2003 Addenda.

### **3. Applicable Code Requirement**

Paragraph IWB-2412 of the Section XI of the ASME Boiler and Pressure Vessel Code, Inspection Program B, requires volumetric examination of essentially 100% of reactor pressure vessel pressure retaining welds identified in Table IWB-2500-1 once each ten year interval. This interval was extended for the third ISI interval in Relief Request IP2-ISI-RR-13 (Reference 2) until 2014. Extension of this inspection frequency to 2016 is now being requested as relief in the fourth interval.

### **4. Reason for Request**

Relief is being requested at this time to extend the reactor vessel 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.

Relief Request IP2-ISI-RR-13 and the corresponding SER (Reference 2) require that category B-A and B-D vessel welds be inspected during the upcoming 2014 refueling outage. Inspection of the reactor vessel welds requires removal of the lower internals including the core barrel and storing them in the lower cavity. These inspections had previously been planned to be performed concurrently with the Code Case N-770-1 weld inspection and the vessel internals inspections required by MRP-227 during the refuel outage of 2014. A separate IP2 Relief Request IP2-ISI-RR-17 has been submitted to the NRC staff to allow deferral of the Code Case N-770-1 weld inspections from 2014 to 2016.

Removal of the Core Barrel and the lower internals requires 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 vessel weld 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.

An additional benefit to performing the inservice inspection of the vessel welds during 2R22 (2016) would be to allow the vessel material inspection requirements to support implementation of the 10CFR50.61a optional pressurized thermal shock (PTS) rule to be identified. Although IP2 is currently not expected to exceed the  $RT_{PTS}$  limit of 270°F (i.e., the end of license  $RT_{PTS}$  is currently calculated to be 252°F for the limiting vessel material), the relief would ensure that the next vessel inspection acquires the entire flaw data required to support implementation of the rule should it become necessary in the future. The actual implementation details such as inspection volumes and flaw detection capabilities have not yet been established so there is a risk that the vessel inspection data collected during the next vessel ISI will not obtain all of the required flaw data and an additional vessel inspection could be required if the need arises to implement 10CFR50.61a.

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 in March 2014.

## **5. Proposed Alternative and Basis for Use**

Indian Point Unit 2 proposes to defer completion of the ASME Code required volumetric examination of the Reactor Pressure Vessel full penetration pressure retaining Category B-A and B-D welds from the March 2014 refueling outage to March 2016.

As discussed in Relief Request IP2-ISI-RR-13 and summarized below, there is reasonable assurance of continued structural integrity of the subject welds during the deferral of the subject examinations. In the initial Relief Request RR-76 (Reference 3), Entergy requested a deferral of the subject RPV full penetration pressure retaining welds based on WCAP-16168-NP-A, Revision 2 "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval" (the WCAP) (Reference 4). This request identified the schedule for future inspections and a discussion of past inspection results. The request also included an evaluation of Indian Point 2 to confirm the applicability of the parameters contained in Appendix A of the WCAP. This comparison confirmed the applicability of all these parameters with the exception of the Through-Wall Cracking Frequency (TWCF) parameter. An alternative analysis to address the TWCF parameter deviation was provided in Relief Request RR-76 (Reference 3). In response to an RAI, the alternative TWCF analysis was superseded by a plant specific change-in-risk analysis (Reference 5).

The Indian Point plant specific change-in-risk analysis used the same methodology as was used for the Westinghouse pilot plant, Beaver Valley Unit 1, in the WCAP. The analysis was performed for Indian Point Unit 3, which bounded Unit 2. Plant specific inputs for Indian Point Unit 3, including fluence, beltline material properties, and dimensions were used as inputs to the analysis. Inputs that were developed for the NRC's re-evaluation of the Pressurized Thermal Shock (PTS) Rule, and also used in the WCAP pilot plant analyses, were also used. The basis for the use of these non-plant specific inputs was discussed in detail in the response to Question 3. In addition, the use of the Westinghouse pilot plant PTS transients, as an input to the Indian Point change-in-risk analysis was justified through a detailed comparison of plant features that contribute to the likelihood of having a PTS event. This comparison was also provided in the response to Question 4. This plant specific change-in-risk analysis was performed using fluence values at 48 Effective Full Power Years (EFPY) to bound Indian Point until the end of the potential license renewal period through 60 calendar years of operation. The basis for several plant specific inputs to the change-in-risk analysis was provided in the response to Question 6. Furthermore, in the response to Question 6, it was demonstrated through the performance of surveillance data checks that the embrittlement trend curve correlations used in the change-in-risk analysis were appropriate for predicting the embrittlement of the Indian Point reactor vessel beltline materials.

The results of the change-in-risk analysis were provided in the response to Question 1 of Reference 5. Consistent with the WCAP pilot plant evaluations, the change-in-risk analysis considered the effects of inservice inspection and fatigue crack growth from design basis transients. Two cases were considered in the analyses, 1) inspection performed every 10 years and 2) inspection performed after the first 10 years but none performed thereafter (this approach is discussed in more detail in the response to Question 2). The bounding change-in-risk between these two cases was determined to be  $2.15\text{E-}08$  events per year which is about a factor of 5 below the criteria in Regulatory Guide 1.174 of  $1.0\text{E-}07$  events per year for an acceptably small change in core damage frequency.

In response to an additional question, the change-in-risk results were revised to include consideration of external events (Reference 6). Consideration of external events increased the bounding change in risk to  $2.66\text{E-}08$  events per year. This value is still below the criteria in Regulatory Guide 1.174 of  $1.0\text{E-}07$  events per year for an acceptably small change in core damage frequency.

It was on the basis of the information provided in the original Relief Request RR-76 (Reference 3), and the plant specific change-in-risk analysis provided in Reference 5, and the amended change-in-risk results (Reference 6), that the Staff provided their Safety Evaluation (Reference 2) dated March 6, 2009 approving the deferral of the Indian Point Unit 2 examinations to 2012. The Safety Evaluation concluded: "(a) the licensee has provided sufficient information requested in Sections 3.4 and 4.0 of the SE for the WCAP Report, (b) the licensee has provided a plant-specific  $\Delta\text{TWCF}$  analysis to demonstrate that the proposed change in the IP RPV ISI program meets the RG 1.174 guidelines

discussed in the SE for the WCAP Report, and (c) the licensee's proposed alternative provides an acceptable level of quality and safety." As indicated in Relief Request RR-76, the change-in-risk analysis was performed for 48 EFPY corresponding to 60 years of calendar operation but the NRC staff approval was limited to 2012. Subsequently Entergy submitted Relief Request IP2-ISI-RR-13 which extended the inspection period from 2012 to 2014 (Reference 7). Since the inspection date of 2016 requested in this relief request is within 48 EFPY and 60 calendar years, the information provided was adequate for the full 21 year extension to 2016. Therefore, this requested change in date is bounded by the change in risk analysis and the 2016 date provides reasonable assurance of continued structural integrity of the subject welds.

This relief request is similar to the previously approved Relief Request IP2-ISI-RR-13 approved under SER dated November 21, 2011 (Reference 7).

#### **6. Duration of Proposed Alternative**

This request is applicable to Entergy's inservice inspection program for the fourth interval for Indian Point Unit 2. The proposed alternative is until March 2016.

#### **7. References**

1. ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda, American Society of Mechanical Engineers, New York.
2. NRC Letter to Entergy, "Indian Point Nuclear Generating Units Nos. 2 and 3 – Relief Requests On Reactor Vessel Weld Examinations (TAC NOS. MD9196 AND MD9197)," dated March 6, 2009 (ML090360460)
3. Entergy Letter NL-08-096 to NRC, "Request For Relief To Extend The Unit 2 and 3 Inservice Inspection Interval For The Reactor Vessel Weld Examination And Request For License Amendment For Submittal of ISI Information and Analyses," dated July 8, 2008 (ML081980058)
4. WCAP-16168-NP-A, Revision 2, "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval," June 2008.
5. Entergy Letter NL-08-177 to NRC, "Response to Request For Additional Information on Request For Relief To Extend The Unit 2 and 3 Inservice Inspection Interval For The Reactor Vessel Weld Examination And Request For License Amendment For Submittal of ISI Information and Analyses (TAC Nos. MD9194-MD9197)" dated December 23, 2008 (ML090050020)
6. Entergy Letter NL-09-003 to NRC, "Supplemental Response to Request For Additional Information on Request For Relief To Extend The Unit 2 and 3 Inservice Inspection Interval For The Reactor Vessel Weld Examination (TAC Nos. MD9196 and MD9197)," dated January 20, 2009 (ML090400575)



7. NRC Letter Regarding Relief Request No. IP2-ISI-RR-13, Reactor Vessel Weld Examination for the Third 10-year Inservice Inspection Interval (TAC NO. ME6689), November 21, 2011. (ML113180244)
8. Entergy Letter NL-11-075 Regarding Request For Relief To Extend The Inservice Inspection Interval For The Reactor Vessel Weld Examination, dated June 29, 2011 (ML11192A013).
9. Entergy Letter NL-11-097 to NRC, "Request For Information on Relief Request IP2-ISI-RR-13 For The Reactor Vessel Weld Examination (TAC No. ME6689), dated September 8, 2011 (ML11265A227).