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Robert Walpole
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December 12, 2008

Re: Indian Point Unit 2
Docket No. 50-247
NL-08-175

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

Subject: 10 CFR 50.55a Request RR-CRV-75 – Response to Request For Additional Information on Relief from Examinations of Component Welds with Less Than Essentially 100% Examination Coverage for Third-Ten Year Inservice Inspection Interval Closeout (TAC No. MD8416)

References:
1. NRC Letter dated October 9, 2008, Request for Additional Information Regarding Relief Request on Weld Coverage (TAC NO. MD8416)
2. Entergy Letter dated March 26, 2008 regarding 10 CFR 50.55a Request RR-CRV-75 – Relief from Examinations of Component Welds with less Than Essentially 100% Examination Coverage for Third-Ten Year Inservice Inspection Interval

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. (Entergy) hereby submits in attachment 1 a response to the NRC request for additional information (Reference 1) regarding relief request (RR) CRV-75 made in Reference 2.

There are no new commitments being made in this submittal.

If you have any questions or require additional information, please contact me at (914) 734-6710.

Sincerely,

C. Brian Rybak jlm

Robert Walpole
Licensing Manager
Indian Point Energy Center

cc: next page

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NRR

Attachment 1 Response to Request for Additional Information Regarding The Third 10-Year Inspection Interval Request for Relief RR-CRV-75

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
Mr. Samuel J. Collins, Regional Administrator, NRC Region 1
NRC Resident Inspector – IP2
Mr. Robert Callender, Vice President, NYSERDA
Mr. Paul Eddy, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-08-175

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE THIRD 10-YEAR INSPECTION INTERVAL REQUEST FOR RELIEF RR-CRV-75

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

**Response to Request for Additional Information
Regarding The Third 10-Year Inspection Interval
Request for Relief RR-CRV-75 (TAC MD 8416)**

Entergy Nuclear Operations, Inc. (Entergy) submitted a relief request (RR) CRV-75 from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," on March 26, 2008 (ADAMS Accession No. ML080920717). The RR was submitted in accordance with 10 CFR 50.55a(g)(5)(iii) and (iv) for NRC evaluation in accordance with 10 CFR 50.55a(g)(6) and applies to the third 10-year Inservice Inspection Interval (ISI). A NRC request for information was issued October 9, 2008. The questions and response by Entergy are provided below.

2. REQUEST FOR ADDITIONAL INFORMATION

2.1 Request for Relief RR-CRV-75, Part A, Examination Category B-A, Item B1.22, Pressure Retaining Welds in Reactor Vessel

2.1.1 The licensee stated that approximately 85% volumetric coverage could be obtained on reactor pressure vessel (RPV) Upper Closure Head Meridional Welds RVHM-2, -4, and -6 and has provided a general schematic of the RPV upper head depicting in-core instrumentation nozzles and control rod drive mechanisms. The ASME Code states that essentially 100% of the "accessible length" of the subject welds must be examined. The licensee defined the accessible length of the RPV upper closure head meridional welds as approximately 25-inches of the total 57-inches in length.

The accessible 25-inches for each weld is outside the area of control rod drive penetrations and RPV head shroud. However, the licensee's description of the interferences that caused the limited volumetric examinations is not sufficient to demonstrate impracticality, or the descriptions are unclear. The licensee stated:

> ***<100% coverage was achieved when scanned parallel to the weld due to the flange at the bottom of the weld and a taper 25" up on the weld.***

The licensee included a rough sketch showing how the blend radius of the flange might impact the parallel scans, however, the "taper 25-inches up on the weld" is not depicted. Please clarify the sketch, or submit a written text, to further describe how both of these geometrical conditions caused the limited volumetric coverage on the subject welds.

Response

Approximately 25 inches up on RPV meridional welds RVHM-2, -4, and -6 there is a taper where the RPV upper head goes from a machined surface to a rough as-rolled surface. This taper is around the entire head, not just at the weld locations, and is

located directly below the head shroud. At this point the thickness of the RPV head transitions from approximately 7.5 inches thick to approximately 8.4 inches thick and the head surface becomes very rough. An informational sketch, Figure 1, has been attached and depicts how both the blend radius of the flange and the taper 25 inches up the weld cause the limited coverage on welds RVHM-2, -4, and -6.

2.1.2 The licensee's overall coverage of meridional Welds RVHM-2, -4, and -6 is stated to be 85%, however, other statements of coverage for portions of the weld volumes are provided:

a) <1% of the lower 15% of the weld was scanned in all four directions.

b) Using one sided qualified personnel, 100% of the upper 85% was covered in one direction perpendicular and one direction parallel.

It is unclear why the ASME Code-required orthogonal scans were not performed on the upper 85% of the weld volumes, if it was possible to do so. Please explain this discrepancy.

In addition, it is unclear what is meant by <1% in four directions for the inner 15% weld volume. Since it is expected that degradation, should it occur, may be manifested first in the inner and outer volumes of the welds, it is important to achieve maximum examination coverage for these areas. Please list the extent of volumetric coverage for each of the four scan directions, and adequately describe the cause(s) of limited examinations for each of these scanning directions. Discuss whether alternative angles and/or techniques, such as phased array, were considered to maximize coverage of the inner 15% of the weld volumes.

Response

In accordance with 10CFR50.55a(b)(2)(xv)(G) and the Performance Demonstration Initiative (PDI), for examination of Reactor Pressure Vessel circumferential and longitudinal welds the clad to base metal interface, including a minimum of 15 percent thickness (measured from the clad to base metal interface), shall be examined from four orthogonal directions (i.e., two parallel and two perpendicular). The remainder of the examination volume is considered fully examined if coverage is obtained in four orthogonal directions, or alternatively, a minimum of one parallel and one perpendicular direction using personnel qualified for single side access examination in accordance with Appendix VIII, Supplement 6.

An informational sketch, Figure 1, has been attached and depicts how both the blend radius of the flange and the taper 25 inches up the weld cause the limited coverage on welds RVHM-2, -4, and -6. In addition to the informational sketch in Figure 1, for welds RVHM-2, -4, and -6 the following descriptions of weld coverage apply.

1. Approximately 4 inches of the meridional welds adjacent to the flange weld exceeded the Section XI Appendix VIII qualified thickness range and coverage was not credited for this volume. Although coverage for this volume was not credited, the volume was examined and no indications were detected.
2. The accessible length of the meridonal welds (approximately 21") was scanned perpendicular to the weld in 2 directions and 100% coverage was achieved. The perpendicular scans would detect flaws parallel to the weld. These perpendicular scans would detect the most likely indications.
3. Due to the flange at the bottom of the weld and the taper 25 inches up the weld the inner 15% was only scanned in three directions. 100% coverage was obtained in the two perpendicular scans and 100% coverage was obtained in one parallel scan. Less than 1% coverage was obtained in the second parallel scan.
4. Using one sided qualified personnel as allowed by PDI (see the first part of this response), >90% of the upper 85% of the weld was covered in one direction perpendicular to the weld and one direction parallel to the weld.

In conclusion, although <1% of the inner 15% was scanned in all 4 directions, 100% of the inner 15% was scanned in three directions (2 perpendicular and 1 parallel) and the perpendicular scans, which are the most critical scans because they detect indications parallel to the weld, achieved 100% coverage. Additionally, the upper 85% of the weld was inspected in one direction perpendicular to the weld and one direction parallel to the weld using one sided qualified personnel as allowed by PDI (see the first part of this response). The inspection of the upper 85% of the weld achieved >90% coverage. The inspections performed and coverage achieved provides high confidence that if degradation was present, it would be detected. Phased Array technology was not considered for use in performing these examinations because this technology was not fully qualified for this application at the time that the examinations were performed.

2.1.3 For RPV Closure Head-To-Flange Weld RVHC-2, the licensee submitted sketches depicting the closure head geometry and appurtenances (such as the lifting lugs) that may impact ultrasonic scanning. However, sufficient discussion of scanning limitations has not been included. For each of the techniques applied, describe specifically how the geometric conditions and lifting lugs impacted the volumetric coverage.

Response

After reviewing the examination reports from 1997 and 2004 it was determined that there were no limitations associated with the scans from the RPV Head side. While the Raytheon Report UT-5-035 mentions a limitation to the 60 degree scan from the lifting lugs, from a practical standpoint, being thirteen inches back, and being able to skew the transducer, the lifting lug had no measurable impact on the ability of the inspector to insonify the volume of interest during the examination. This conclusion was further confirmed by reviewing the Westinghouse examination data Report IP2R16-001, Page 8 from 2004, which also used a 60 degree transducer, no scanning limitations from the Lifting Lugs were reported.

Regarding the ultrasonic scans from the flange side, the Westinghouse examination report IP2R16-001, Page 8 of 15, shows a sketch, attached as Figure 2, illustrating the surface contour as well as the scanning angles, and the coverage of those ultrasonic beams. From those sketches with the ultrasonic beam angles included, it can be seen that the ultrasonic beam cannot "reach" any further down into the component because of the sharp transition of the flanged surface.

2.1.4 The licensee also stated the following concerning Weld RVHC-2:

> ***Entergy performed the volumetric examination to the extent practical; resulting in approximately fifty percent (50%) of the weld volume [being] ultrasonically examined for 2/3 of the weld length in 1997. Eighty four percent (84%) coverage was obtained using updated equipment and better technique in the last 1/3 of the weld length in 2004.***

It is noted that the licensee was able to dramatically increase coverage through the use of updated equipment, better procedures and ultrasonic techniques during the third interval. Since only limited volumetric sampling is required by ASME Code, it is expected that licensee's will maximize examination coverage throughout the interval using new technology as it becomes available. This expectation is the primary basis for allowing licensee's to wait up to 12 months after the interval is completed to submit requests for relief [10 CFR 50.55a(g)(5(iv)].

The licensee applied better techniques and equipment to only 1/3 of the RPV head-to-flange weld, when in fact, the remaining 2/3 could have been re-inspected with these new techniques and equipment to maximize the coverage for the interval during the same outage without significantly impacting schedule or personnel exposure. Discuss why the new techniques and equipment were not used on the remaining 2/3 of Weld RVHC-2.

Response

After reviewing the ultrasonic reports for the 1997 examinations performed by Raytheon and the 2004 examinations performed by Westinghouse, Entergy concluded that both ultrasonic techniques were similar, and the equipment that was used was equivalent. The examinations performed were both conducted to the requirements of ASME Section XI and ASME Section V, Article IV. There were no advanced techniques nor special equipment used in the performance of either examination. The difference in the 50% of coverage that was obtained by Raytheon, and the 84% coverage obtained by Westinghouse are primarily due to differences in coverage calculations. While the Westinghouse examination performed during the 2004 outage attempted an axial scan of the weld from the flange side, it did not significantly increase, compared to the Raytheon examination coverage.

The Raytheon examination coverage was documented as having been 50%. While the report provides no details on how coverage was determined, it was common practice at that time to look at coverage, as being up/down and right/left. The note on Page 2 of 2

of the Limitation Sketch states "no scan of flange side". It would have been common practice to estimate the axial scan from the head side, and the circumferential scans from the head side to constitute that only two of the four examinations were accomplished, equating to 50% coverage. In fact the weld contour was fairly smooth, and the circumferential scans would have covered both the head and flange side of the weld. Since it was not stated nor implied, credit was not taken for that coverage. Westinghouse in turn, seven years later took a different approach to calculate coverage of that same configuration. Westinghouse looked at the Code examination of this area to be made up of nine separate examinations, each one considered equally important. While taking credit for the circumferential scans both from the head and flange side, Westinghouse also took credit for the 0 degree examination; so when they factored in partial coverage for the 45 degree and 60 degree axial examinations from the flange side, the nine examination average brought the total coverage percentage to 84%.

Using the Westinghouse methodology of calculating examination coverage, and back fitting the scans performed by Raytheon during the 1997 inspection and subtracting the limited axial scans Raytheon did not attempt the total percent of coverage would have risen to close to 78%. Although ultrasonic examinations should be conducted in four, EPRI has determined there is an high probability of detection using a single sided ultrasonic examination technique (when necessary) in ferritic materials. Even though the Raytheon examination was performed only from one direction, it was a quality examination, covering the entire examination volume from one direction.

To summarize, the limited 45 degree and 60 degree axial scans performed in 2004 did not significantly impact the overall quality of the examination process, nor significantly increase the actual coverage. Further, these examinations are required to be conducted from the head surface, in a high radiation environment. The slightly improved coverage benefit does not offset the additional radiation exposure that would have been required to perform the examinations a second time.

2.2 Request for Relief RR-CRV-75, Part B, Examination Category B-D, Item B3.110, Full Penetration Welded Nozzles in Vessels

2.2.1 The licensee has requested relief from the inside radius examinations on pressurizer spray and surge nozzles. These nozzles are integrally cast into the upper and lower heads, respectively. The licensee previously requested relief for these inner radii examinations, and it was concluded that a visual examination would be performed on the inside of the pressurizer in these areas. A thermal shield and an array of nozzle heads preclude meaningful visual examination on the spray nozzle; similarly, the inner radius of the surge nozzle is covered by a retaining basket.

The licensee cites discussions with two inspection vendors to establish a basis for why the ASME Code volumetric examinations cannot be performed from the outside surface of the nozzles:

> ***Further, discussions that were had with two ISI examination vendors that serviced Indian Point 2 during the third interval confirmed our earlier opinion***

that the nozzle configuration of both the PRZN-1 [spray] and PRZN-6 [surge] nozzles precluded examination of those locations [inner radius areas], even with the most advanced ultrasonic systems currently in use. No coverage was obtained.

However, the staff has noted that other licensees have completed similar examinations through the use of modeling (performed by Electric Power Research Institute) and novel transducer designs, including recent phased array technology.

No objective evidence has been provided by the licensee to demonstrate a basis for impracticality. Submit drawings and descriptions to document the assessments IP-2 has completed to demonstrate that no volumetric examinations could be performed from the outside surface of the nozzle/head.

Response

As stated in the relief request submitted March 26, 2008, Entergy discussed the feasibility of performing volumetric examinations of the spray and surge nozzle inner radius locations with NDE vendors and concluded that the nozzle geometry precluded an effective volumetric examination from being performed. However, additional reviews performed as a result of this RAI indicated that these reviews were performed at the beginning of the interval (i.e. 1995), and that subsequently volumetric examination techniques did become more readily available prior to the end of the interval (2006). Based on these findings, Entergy concurs that volumetric examination techniques did become available and these inspections could have been performed prior to the end of the third interval. However due to personnel oversight, this evaluation was not performed again prior to the end of the interval. Therefore, Entergy proposes to perform the fourth interval inspection of all of the pressurizer nozzles (i.e. spray, surge and safety relief nozzles) inner radii during the next refueling outage currently scheduled for March 2010. These inspections will be performed in accordance with the current requirements of 10CFR50.55a which allow the use of either volumetric or enhanced visual examination techniques.

2.3 Request for Relief RR-CRV-75, Part C, Examination Category R-A, Item R1.20, Risk-Informed Piping Examinations

2.3.1 The licensee has requested relief from 100% examinations on four safe end-to-piping welds adjacent to dissimilar metal welds on the RPV inlet/outlet nozzles. The licensee listed these welds in the following manner:

RCC 21-1 RCS Pipe-to-Safe End Circ Weld RO @ 202°
RCC 22-1 RCS Pipe-to-Safe End Circ Weld RO @ 158°
RCC 23-1 RCS Pipe-to-Safe End Circ Weld RO @ 338°
RCC 24-1 RCS Pipe-to-Safe End Circ Weld RO @ 022°

However, in the text of Attachment 4 (Page 25 of 71) of the licensee's submittal dated March 26, 2008, the following is stated:

The safe-end-to-nozzle welds (RCC-21 -1, RCC-22-1, RCC-23-1, & RCC-24-1) had limitations due to the tapered area of the weld overlay on the ID **[inside diameter].**

It is unclear whether the safe end-to-nozzle welds or the safe end-to-piping welds are intended to be included in RR-CRV-75. A drawing provided by the licensee appears to indicate that the welds listed above are the pipe-to-safe end similar metal welds. Please confirm that relief is intended for limited examinations on the pipe-to-safe end welds, and if so, provide new text and/or drawings/sketches, as needed, to support the request.

In addition, please discuss the ID welded overlay (The ASME Code currently describes this as an on-lay), including materials deposited, thickness and extent, and when this on-lay was applied.

Response

The relief is intended for limited examinations on the pipe-to-safe end welds RCC 21-1, RCC 22-1, RCC 23-1, and RCC 24-1. The text in RR-CRV-75, Attachment 4 (Page 25 of 71) says:

The safe-end-to-nozzle welds (RCC-21-1, RCC-22-1, RCC-23-1, & RCC-24-1) had limitations due to the tapered area of the weld overlay on the ID.

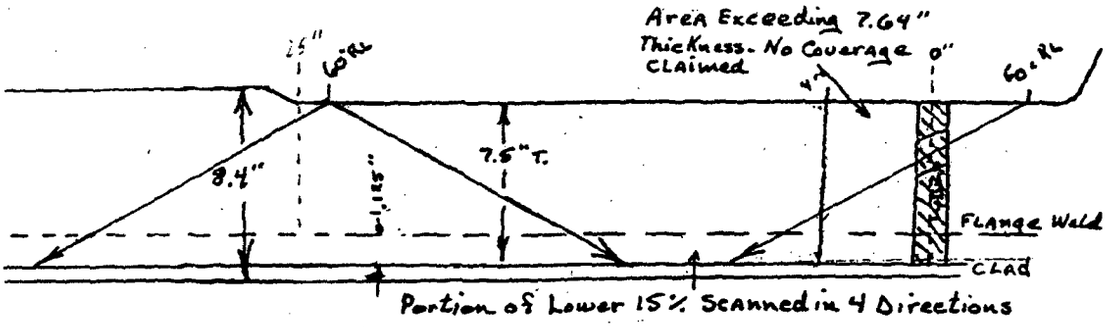
This is a typo and should be replaced with:

The safe-end-to-pipe welds (RCC-21-1, RCC-22-1, RCC-23-1, & RCC-24-1) had limitations due to the tapered area of the weld overlay on the ID.

The ID welded overlay (weld on-lay) material deposited over welds RCC 21-1, RCC 22-1, RCC 22-3, and RCC 24-1 is Type 304 stainless steel. The nominal thickness of the on-lay is ¼" and the on-lay extends past the root of the welds. The weld on-lay, including materials, thicknesses, extent, etc. is shown on drawing D207896 which is in Attachment 4 (Page 27 of 71) of relief request RR-CRV-75. This on-lay was applied during original construction of the reactor vessel prior to plant operation.

Figure 1

Coverage Plot For Examination of the Lower 25" of the Meridional Weld
Welds RVHM-2, -4, and -6



Westinghouse

LIMITATION TO EXAMINATION

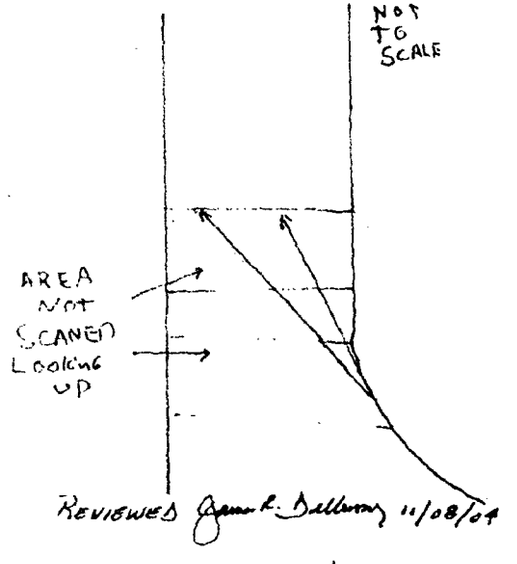
PLANT INDIAN POINT UNIT 2 SKETCH A206913-1

SYST./COMP. RPV PROCEDURE IPEC-UT-210, Rev. 1

EXAMINER [signature] DATE 11/4/2004

RELATED TO: UT X PT ____ MT ____ VT ____ IDENT. NO. RVHC2 "Head to Flange"

PROVIDE GENERAL INFORMATION TO DESCRIBE APPROXIMATE SIZE, LOCATION AND TYPE OF LIMITATION.



	0°	100%
CCW	45°	100%
CW	45°	100%
LK DN	45°	100%
LKUP	45°	39%
CCW	60%	100%
CW	60%	100%
LK DN	60%	100%
LKUP	60%	21%

760 ÷ 9 = 84%

Reviewed James R. Dallaway 11/08/04

ENTERGY REVIEW / DATE [signature] LVIII 11/11/04

ANII REVIEW / DATE [signature] HIBT 11/12/04

Figure 2