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U. S. Nuclear Regulatory Commission
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Subject: **Indian Point 3 Nuclear Power Plant**
Docket No. 50-286
Generic Letter 92-01, Revision 1
<u>Response to Request for Additional Information (TAC No. M83473)</u>

References:

1. NRC letter, N. F. Conicella to R. E. Beedle, dated August 12, 1993, Request for Additional Information Concerning Generic Letter 92-01, Revision 1, "Reactor Vessel Integrity."

2. NYPA letter, R. E. Beedle to NRC, Response to Generic Letter 92-01, Revision 1, (IPN-92-031/JPN-92-037), dated July 9, 1992.

Dear Sir:

This letter provides the Authority's response to the NRC's request for additional information (Reference 1, Enclosure 1). The request concerns the Authority's reactor vessel integrity surveillance program and the information that was provided in our response (Reference 2) to Generic Letter 92-01. Discussions were held between the Authority and NRC staff members to clarify the NRC's questions and the basis for the Authority's original response. The NRC's questions, followed by the Authority's responses, are contained in Attachment I to this letter.

No commitments are being made by the Authority in this submittal. If you have any questions, please contact Mr. P. Kokolakis.

Very truly yours,

Ralph E. Beedle

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Attachments

cc: U.S. Nuclear Regulatory Commission
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ATTACHMENT I TO IPN-93-149

GENERIC LETTER 92-01, REVISION 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

New York Power Authority
Indian Point 3 Nuclear Power Plant
Docket No. 50-286

Generic Letter 92-01 Revision 1
Response to Request for Additional Information

This attachment contains the Authority's response to the NRC's request for additional information (RAI) regarding the Authority's reactor vessel integrity surveillance program. Each NRC question is followed by the Authority's response.

NRC Question 1

The response to Question 2a in Generic Letter (GL) 92-01 states that the thirty two effective full-power year upper shelf energy (USE) values for beltline plates and welds are predicted to be greater than 50 ft-lb. The staff analysis of beltline Plate B2803-1, using Position 1 of Regulatory Guide 1.99, Revision 2, resulted in an end of life (EOL) USE below 50 ft-lb. This analysis used the following values: EOL fluence at ¼ T location of 6.44 E18 N/cm^2, unirradiated USE of 64.5 ft-lb, and copper composition of 0.19 weight percent. Please provide a basis, calculations, and references for your analysis of the EOL USE for Plate B2803-1.

NYPA Response

The end of life upper shelf energy for Plate B2803-1 is 54 ft-lbs. The calculation provided (Attachment II) includes the basis and references used to determine the end of life upper shelf energy value.

The following discussion is provided to summarize the differences between the Authority and NRC calculated values. The most significant difference between end of life upper shelf energies is the unirradiated upper shelf energy value for Plate B2803-1 used in both calculations.

The unirradiated upper shelf energy for Plate B2083-1 is 72 ft-lbs (NRC used 64.5). This 72 ft-lb value is calculated using the guidelines specified in ASTM E185-82, which meets the requirements of 10 CFR Part 50, Appendices G and H. The 64.5 ft-lb value is the minimum upper shelf energy value listed in Table A-1 of WCAP-9491. The upper shelf energy values presented in WCAP-9491 for Plate B2803-1 were determined per ASTM E185-73. Since ASTM E185-73 did not have a definition for USE, the values reported in WCAP-9491 were generally determined by using the minimum upper shelf energy of the highest test temperature results, if all specimens tested at that temperature resulted in the same percent shear. If the specimens tested at the highest test temperature resulted in different percent shear, then the highest percent shear minimum energy value was reported.

The unirradiated upper shelf energy, as defined by ASTM E185-82, is taken as the mathematical average of the three energy values at 210 degrees F. Table A lists the Charpy V-notch test results that were used to determine the unirradiated upper shelf energy of Plate B2083-1.

TABLE A
Lower Shell, B2803-1 (Ht. AO495-2) Transverse

Temperature (°F)	Energy (ft-lbs)	% Shear	Upper Shelf (ft-lbs)
40	30	37	
40	22	37	
75	34	54	
75	37.5	45	
160	68.5	100	
160	71.5	100	
160	66	100	
210	64.5	100	
210	74	100	72
210	77	100	

The second parameter which affects the calculation of end of life upper shelf energy is the end of life fluence value at the ¼ T location. The attached calculation used a fluence value of 6.20 E18 N/cm^2, versus 6.44 E18 N/cm^2 reported in our original response. The fluence value differs from that used in our original response based on:

1) incorporating the influence of lower leakage core patterns;

2) using a bias factor of 1.086 which accounts for differences observed between cycle specific calculations and the results of neutron dosimetry observed in the first three capsules removed from the reactor; and

3) projecting the fluence to the new license expiration date of 2015, versus the previous expiration date of 2009.

Thus, the higher initial upper shelf energy (72 versus 64.5 ft-lbs) and refinements in the calculation of end of life fluence provide the difference in resultant end of life upper shelf energy.

NRC Question 2

The unirradiated USE values provided in the response to Question 2a in GL 92-01 for the surveillance materials (Plates B2803-3 and B2802-1) differ from the values provided in surveillance report Westinghouse Commercial Atomic Power (WCAP-9491). Please explain this discrepancy.

NYPA Response

The initial upper shelf energy for Plate B2803-3 is 68 ft-lbs, and can be extracted from the graph presented in Figure 5 of our original response. This graph is consistent with Figure 5-3 from WCAP-9491.

The unirradiated USE for Plate B2802-1 is 132 ft-lb for specimens orientated in the longitudinal direction, and can be read from Figure 1 in our original response. This graph is consistent with Figure 5-1 of WCAP-9491.

Although the USE values were consistent with the figures cited from WCAP-9491, Table A-1 of WCAP-9491 seemed to contain contradictory information. The difference in these numbers is as described in the response to Question 1. The USE values were calculated following ASTM E185-82, taking the average of energy value for three Charpy specimens whose temperature is above the upper end of the Charpy V-notch curve transition. For specimens tested in sets of three, the set having the highest average may be regarded as defining the material's upper shelf energy. The seemingly contradictory numbers in Table A-1 of WCAP-9491 used the ASTM E185-73 method of using the minimum USE.

For further information, USE values that were obtained using the different editions of ASTM 185 are presented below in Table B. WCAP-9491 used the 1973 edition of ASTM 185. The Authority is presently using the values listed in the last column (i.e., those determined using ASTM E185-82).

TABLE B

Plate No.	Heat No.	Minimum Unirradiated Upper Shelf Energy (ft-lbs) WCAP-9491 Transverse	Average Unirradiated Upper Shelf Energy (ft-lbs) ASTM E185-82
B2802-1	B5394-2	97	102
B2802-2	AO516-2	86	97
B2802-3	B5391-2	85	95
B2803-1	AO495-2	64.5	72
B2803-2	C1397-3	89	94
B2803-3	AO512-2	62	68

In reviewing the NRC RAI for Indian Point 3, additional information was received from the NSSS vendor. This information (Attachment III) provides the original Charpy V-notch test data results which were used to determine the IP3 lower and intermediate plate material unirradiated USE values.

NRC Question 3

In the response to Question 2b in GL 92-01, the nickel composition of Welds 2-042A, B, and C, and 3-042A, B, and C is listed in Table IV as 1.00%, and in Table V as 0.52%. Please explain this discrepancy and provide a single nickel composition, and the basis for the composition that will characterize these welds.

NYPA Response

The nickel content 0.52% listed in the WOG table in our response to GL 92-01 is incorrect. In general, the Authority is using the WOG generic mean chemistry values as the basis to characterize welds 2-042 A,B,C and 3-042 A,B,C. However, nickel information is not available in the WOG database for the heats of weld wire used to represent these welds. Therefore, the Authority is using the Regulatory Guide 1.99, Revision 2 recommended value of 1.0% Ni.

NRC Question 4

In the response to Question 2b in GL 92-01, the phosphorous composition of Weld 9-042 is listed in Table IV as 0.020%, and in Table V as 0.023%. Please explain this discrepancy, and provide a single phosphorous composition and the basis for the composition that will characterize this weld.

NYPA Response

The phosphorous composition for Weld 9-042 is 0.02%. The weld qualification chemistry value of 0.023% was provided for comparison only.

The chemistry composition used to characterize weld 9-042 is from the WOG database. The values are the averaged weld chemistry results from D.C. Cook unit 1 surveillance program and Diablo Canyon unit 1 vessel records. These results are representative of weld 9-042 because the same weld wire heat was used to fabricate both the D.C. Cook and Diablo Canyon weldments. The D.C. Cook weldment was fabricated with the same flux lot as the 9-042 weld.

NRC Question 5

The response to Question 2b in GL 92-01 did not include any sulfur values for the intermediate shell axial welds, lower shell axial welds, or intermediate to lower shell girth welds. Please provide a sulfur value, and the basis for the value, which is representative of each weld.

NYPA Response

The sulfur values are listed below. These values came from the weld wire manufacturer's certificate of compliance for the wire and various utility reactor surveillance programs.

Weld Location	Type	Wire Heat No.	Type	Flux Lot No.	Wt. % Sulfur	Reference
2-042A,B,C	RACO 3	34B009	Linde 1092	3708	0.017	1
3-042A,B,C	RACO 3	34B009	Linde 1092	3724	0.017	1
9-042	B4 Mod	13253	Linde 1092	3791	0.011	1

NRC Question 6

In the response to Question 2b in GL 92-01, the IRT_{ndt} of circumferential weld 9-042 is listed in Table IV as -54°F, and in Table V as -54°F and -70°F. Please explain this discrepancy and provide one value of IRT_{ndt} that will characterize this material.

NYPA Response

NYPA inadvertently reported two initial reference transition temperature (RT_{ndt}) values for weld 9-042. The -70°F is incorrect and represents the weld qualification nil-ductility transition temperature as defined by NB-2331 of the ASME code. The initial reference transition temperature value for weld 9-042 is -54°F. The value is reported from the D.C. Cook surveillance weld program. As discussed in Question 4, this surveillance weld is representative of weld 9-042 because the same wire heat and flux lot material were used.

This value (-54°F) was used for the Indian Point Unit 3 reactor vessel when the Pressurized Thermal Shock (PTS) Rule was addressed.

References:

1. J. M. Chicots, "Indian Point Unit 3 Upper Shelf Energy Data", FDRT-SRPLO-184/93, Westinghouse Electric Corporation, 10/93.