Stephen B. Bram
Vice President

Consolidated Edison Company of New York, Inc.
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October 12, 1993

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

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

SUBJECT: Response to Generic Letter 92-01, Revision 1, Request for Additional Information dated August 9, 1993

By letter dated July 6, 1992, Consolidated Edison Company of New York, Inc. responded to Generic Letter 92-01, Revision 1. The information provided was in addition to information supplied to the NRC over a number of years on this subject. In all cases, we understand the NRC concurs that the unit's reactor pressure vessel fulfills current licensing requirements for operation. For example, in your October 21, 1992 letter, it was stated that the unit satisfies the 50 ft. lb. requirement using the method in regulatory guide 1.99 Rev. 2.

Nonetheless, we recognize the NRC's need for thorough analysis in this area and stand ready to assist you in connection with followup reviews such as the request for additional information dated August 9, 1993. Attached are our responses to your current request which have been prepared by our staff and reviewed by Westinghouse.

Should you have any further questions regarding this matter, please contact Mr. Charles W. Jackson, Manager, Nuclear Safety and Licensing.

Very truly yours,

25-098

A028

cc: Mr. Thomas T. Martin
Regional Administrator - Region I
US Nuclear Regulatory Commission
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ATTACHMENT

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION FOR

GENERIC LETTER 92-01 REVISION 1

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
INDIAN POINT UNIT NO. 2
DOCKET NO. 50-247
OCTOBER, 1993

QUESTION 2a IN GL 92-01

1. The response to GL 92-01, Rev. 1 refers to an internal memorandum (Consolidated Edison Internal Memorandum, NAF-2-039, June 16, 1992) for end of license (EOL) fluence values. Provide the ID and 1/4T EOL fluence values for each beltline material.

RESPONSE TO 2a.1

For all base metal (Intermediate and lower shell plates) and the Intermediate-to-Lower Shell Circumferential Weld:

ID	$1.21 \times 10^{19} n/cm^2$
1/4-T	$7.22 \times 10^{18} n/cm^2$

For intermediate shell longitudinal welds:

ID	$8.40 \times 10^{18} n/cm^2$
1/4-T	$5.01 \times 10^{18} n/cm^2$

For lower shell longitudinal welds:

ID	$8.53 \times 10^{18} n/cm^2$
1/4-T	$5.08 \times 10^{18} n/cm^2$

QUESTION 2a IN GL 92-01

2. The response to GL 92-01 does not provide the initial USE values for lower shell longitudinal welds 3-042A, B, and C, or for intermediate to lower shell girth weld 9-042. Either provide the initial Charpy USE for each beltline weld or provide the initial Charpy USE and analysis from welds that were fabricated using the same vendor, fabrication time frame, fabrication process, and material specification to demonstrate that all beltline welds will meet the USE requirements of Appendix G, 10 CFR 50. If this cannot be provided, then submit an analysis which demonstrates that lower values of USE will provide margins of safety against fracture equivalent to those required by Appendix G of the ASME Code.

RESPONSE TO 2a.2

Pre-irradiated USE data were not available from the vendor's Material Certification for these welds. Per your request, data from comparable welds for 3-042 A and B are presented in the revised Table 1. The comparable welds are identified as the surveillance weld material and the weld material of intermediate shell longitudinal welds (2-042 A, B & C).

All these welds were made with the same weld wire (RACO 3, heat no. W5214 + Ni200) and Flux Linde 1092 with the same post weld heat treatment. The only difference is the flux lot number (3576 for welds 3-042 A & B and 3600 for surveillance and 2-042 A, B & C). We believe that the flux lot number is not a major parameter that has the potential to affect the upper shelf energy, and therefore the subject welds 3-042 A & B are sufficiently similar to the surveillance weld and intermediate shell longitudinal welds to make data from the latter useable for analytical purposes. Table 1 is revised accordingly.

The lower shell has only two longitudinal welds (A & B); there is no weld designated 3-042C.

Intermediate to lower shell girth weld (9-042):

Pre-irradiation USE data are not available. However, the subject weld has a higher pre-irradiation impact toughness and comparable chemistry (copper and nickel) to the surveillance weld metal as follows:

	9-042 weld	Surveillance weld
CvN (ft-lbs) at +10F (Average of values from Table 9 & 10 of original submittal)	81.7	77.8
Copper (Table 17)	0.19	0.20
Nickel (Table 17)	0.92	1.03

Therefore, 9-042 weld is not the limiting material, and an evaluation of that weld based on the surveillance weld metal is conservative.

QUESTION 2a IN GL 92-01

3. The unirradiated USE values provided in the response to GL 92-01 for the surveillance materials (plates B2002-1, B2002-2 and weld 2-042A, B, and C) differ from the values provided in surveillance reports SwRI 02-4531 and SwRI 17-2108 (see tables below). Resolve this discrepancy.

Material	GL 92-01 initial USE	SwRI 02-4531 initial USE
B2002-1	70 ft-lb	118 ft-lb longitudinal (76.7 ft-lb transverse)
B2002-2	73 ft-lb	116 ft-lb longitudinal (75.4 ft-lb transverse)

Material	GL 92-01 initial USE	SwRI 17-2108 initial USE
2-042A, B & C	121 ft-lb	118 ft-lb

RESPONSE TO 2a.3

The reason for the difference is as follows: The response to GL 92-01 was based on the data from Combustion Engineering's material certification, which had limited data points at the upper shelf but was very conservative. The data reported in the SwRI surveillance report came from the extensive testing performed by Westinghouse as part of the pre-irradiation material qualification portion of the surveillance program (Reference 6). The latter data characterized the upper shelf with more data points in the upper shelf region (3 Charpy tests at 210F whereas Combustion Engineering's data had no tests above 160F). Accordingly, Table 1 of the previous submittal is revised with data from Reference 6, because it characterizes the USE with more data points in the upper shelf region. Note that the SwRI value is 117 not 118 for B2002-1.

Regarding the intermediate shell longitudinal welds (2-042 A, B & C), the 121.0 ft-lb value reported in our previous submittal was the average of 3 data points at 210F, whereas the 118 ft-lb reported in the SwRI reports was the average of 6 data points (3 at 160F and 3 at 210F) from the same test data (Reference 6). While both methods of averaging are acceptable, an average of the 3 data points at 210F is used in the revised Table 1. This is consistent with the method of averaging for the base metal as described above.

QUESTION 2b IN GL 92-01

1. Table 17 in the response to GL 92-01 lists two chemical compositions for surveillance materials: "overall average" and "average use for the last capsule test." The latter values were calculated by excluding some of the listed copper and nickel values, given in parentheses. Table IV-11 of the footnote referenced ("Reactor Vessel Material Surveillance Program for Indian Point 2 - Analysis of Capsule V," SwRI 17-2108) states, "values in parentheses discarded because of excessive deviation or were WCAP values." Provide a basis for discarding each copper and nickel value, including specific bases for discarding WCAP values and values considered to have "excessive deviation". Provide a single chemical composition (copper and nickel), and the basis for the composition, for each of the intermediate shell plates B2002-1, B2002-2, and B2002-3, and the surveillance weld that will characterize these materials.

RESPONSE TO 2b.1

For purposes of completeness, two methods of obtaining the chemical compositions were reported. As requested, Table 17 has been revised to provide a single chemical composition (copper and nickel) for each beltline material. An overall average is taken using all datapoints. Note also an error in the vendor supplied original Table 17; overall average of nickel should have been .62 not .63. Attached Table 16 has also been revised to provide single RTNDT and USE for each material.

QUESTION 2b IN GL 92-01

2. In the response to GL 92-01, the copper and nickel composition of intermediate shell axial welds 2-042A, B and C are listed in Table 7 as 0.26% and 1.02%,and in Table 17 as 0.19% and 1.03%, respectively. Resolve this discrepancy. Provide a single chemical composition (copper and nickel), and the basis for the composition, that will characterize these welds.

RESPONSE TO 2b.2

Copper and nickel content were not measured as part of the original Combustion Engineering Material Certification for this material. The vendor supplied data for copper and nickel in Table 7 is incorrect, and should not have been included. Since this incorrect data was not used, it does not affect our original submittal.

QUESTION 2b IN GL 92-01

3. The copper and nickel content of the intermediate to lower shell circumferential weld is not provided in the response to GL 92-01. Provide a single chemical composition (copper and nickel) that will characterize this weld.

RESPONSE TO 2b.3

Lower shell circumferential weld (9-042) is similar to weld metal analyzed at the HB Robinson plant and the surveillance weld metal in Millstone 1. The data is given in the revised Table 17. Applicability of the HB Robinson data to Indian point 2 was previously accepted by NRC (Reference 5).

QUESTION 2b IN GL 92-01

4. Phosphorous and sulfur values are not provided for plates B2003-1 and B2003-2, or lower and intermediate axial welds and the intermediate to lower shell girth weld. Provide phosphorous and sulfur chemical composition values, and the bases for these compositions, that characterize each of these materials.

RESPONSE TO 2b.4

Phosphorous and sulfur data for these materials were given in Table 5, 6 and 7 of the original response to GL 92-01. For ease of review, these data are repeated in a new Table 18.

Table 1 (Revised 10/93)

Indian Point Unit 2
Calculated Upper Shelf Energy (USE) Values

Material Description	USE (ft-lbs) Unirradiated	USE (ft-lbs) December 16, 1991 (1)	EOL USE (ft-lbs) September 28, 2013 (1)
Intermediate Shell Plate B2002-1	76.2	58.7	54.9
Intermediate Shell Plate B2002-2	75.3	60.7	58.7
Intermediate Shell Plate B2002-3	73.5	57.3	52.9
Intermediate Shell Long. Weld 2-042A	121.0	76	69
Intermediate Shell Long. Weld 2-042B	121.0	76	69
Intermediate Shell Long. Weld 2-042C	121.0	76	69
Lower Shell Plate B2003-1	71.0	55.4	51.8
Lower Shell Plate B2003-2	88.0	68.6	65.1
Lower Shell Long. Weld 3-042A	121.0	76	69
Lower Shell Long. Weld 3-042B	121.0	76	69
Intermediate to Lower Shell Girth Weld 9-042	N/A	N/A	N/A

N/A - unirradiated upper shelf energy not available (tests were not performed).

EOL USE calculated at 1/4T location, based on fluences from Con Edison internal Memorandum Indian Point Unit 2 reactor vessel fluence value, NAF-2-039, dated June 16, 1992.

December 16, 1991 USE calculated at 1/4T location, based on fluences from Con Edison internal memorandum Indian point Unit 2 reactor vessel fluence values, NAF-2-039, Date June 16, 1992.

(1) Based on the overall average value of the available Cu and Ni chemistry as shown on Table 17.

Table 16 (Revised 10/93)

Indian Point Unit 2
Measured Versus Predicted 30 ft-lb Temperature Increases
and Upper Shelf Energy Decreases

Material	Capsule	Fluence (10^{19} n/cm2)	ΔRT_{NDT} (°F) Measured	ΔRT_{NDT} (°F) Predicted (1)	Upper Shelf Energy Decrease (%) Measured	Upper Shelf Energy Decrease (%) Predicted (1)
B2002-1 (long.)	T	0.2	55	123	15	21
B2002-1 (long.)	Z	1.2	125	199	21	31
B2002-2 (long.)	T	0.2	95	92	11	16.5
B2002-2 (long.)	Z	1.2	120	140	23	25
B2002-2 (long.)	V	0.457	80*	111	5	20
B2002-3 (long.)	T	0.2	110	118	22	20
B2002-3 (long.)	Y	0.472	145	151	29	25
B2002-3 (long.)	Z	0.962	180	180	28	29
Weld Metal	Y	0.589	195	246	42	30
Weld Metal	V	0.559	204	243	36	29
Correlation Material	T	0.2	70	108	13	22
Correlation Material	Y	0.472	70	137	nil	28
Correlation Material	Z	0.962	130	163	51.7	32
	V	0.457	104*	135	41	27

Predicted values are based on Regulatory Guide 1.99, Rev. 2 methodology.
Predicted ΔRT_{NDT} includes $2\sigma\Delta$ as defined in Regulatory Guide 1.99, Rev. 2.

* Temperature increase at 46 ft. lb.

(1) Based on the overall average value of the available Cu and Ni chemistry as shown on Table 17.

Table 17 (Revised 10/93)

Summary of Chemistry Values for Indian Point Unit No. 2 Materials

Material	Source of Data	Cu W%	Ni W%
Plate B2002-1	Combustion Engineering Certification		.58
	PVRC Heavy Section Steel Testing	.25	.60
	Capsule-Z: Cv Specimen 1-33	.22	.62
	Capsule-Z: Cv Specimen 1-38	.19	.71
	Capsule-Z: Tensile Specimen 1-5	.29	.61
	Capsule-T: Cv Specimen 1-2	.17	--
	Capsule-T: Cv Specimen 1-3	.15	--
	Capsule-T: Tensile Specimen 1-1	.21	--
	Overall Average	.21	.62
Plate B2002-2	Combustion Engineering Certification		.46
	PVRC Heavy Section Steel Testing	.14	.45
	Capsule-V: Cv Specimen 2-44	.17	.46
	Capsule-V: Cv Specimen 2-44	.15	.41
	Capsule-V: Tensile Specimen 2-6	.06	.27
	Capsule-V: Tensile Specimen 2-7	.08	.42
	Capsule-Z: Cv Specimen 2-33	.19	.47
	Capsule-Z: Cv Specimen 2-36	.17	.46
	Capsule-Z: Cv Specimen 2-40	.20	.50
	Capsule-Z: Tensile Specimen 2-5	.15	.52
	Capsule-T: Cv Specimen 2-2	.18	--
	Capsule-T: Cv Specimen 2-3	.17	--
	Capsule-T: Tensile Specimen 2-1	.13	--
	Overall Average	.15	.44
Plate B2002-3	Combustion Engineering Certification		.57
	PVRC Heavy Section Steel Testing	.14	.55
	Capsule-Z: Cv Specimen 3-33	.30	.64
	Capsule-Z: Cv Specimen 3-38	.27	.59
	Capsule-Z: Tensile Specimen 3-5	.23	.58
	Capsule-Y: Cv Specimen 3-41	.21	--
	Capsule-Y: Cv Specimen 3-45	.22	--
	Capsule-Y: Tensile Specimen 3-6	.11	--
	Capsule-Y: Tensile Specimen 3-7	.10	--
	Capsule-T: Cv Specimen 3-2	.27	--
	Capsule-T: Cv Specimen 3-3	.23	--
	Capsule-T: Tensile Specimen 3-1	.09	--
	Overall Average	.20	.59
HAZ	Capsule-V: Cv Specimen H-16	.08	1.2
	Capsule-V: Cv Specimen H-12	.06	1.2
	Capsule-Y: Cv Specimen H-21	.15	--
	Capsule-Y: Cv Specimen H-23	.20	--
	Overall Average	.12	1.2

Table 17 Continued (Revised 10/93)

Summary of Chemistry Values for Indian Point Unit No. 2 Materials

Material	Source of Data	Cu W%	Ni W%
Welds	Capsule-V: Cv Specimen W-13	.23	1.02
(Surveillance &	Capsule-V: Cv Specimen W-12	.20	1.06
2-042 A, B & C)	Capsule_V: Tensile Specimen W-3	.20	(.69)*
	Capsule_V: Cv Tensile Specimen W-4	.12	1.00
	Capsule_Y: Cv Specimen W-17	.19	--
	Capsule_Y: Cv Specimen W-19	.22	--
	Capsule_Y: Tensile Specimen W-5	.18	--
	Capsule_Y: Tensile Specimen W-6	.20	--
	Overall Average	.19	1.03
Correlation	Capsule-V: Cv Specimen R-56	.20	.18
Monitor	Capsule-V: Cv Specimen R-52	.18	.27
	Capsule-Z: Cv Specimen R-33	.35	.28
	Capsule_Z: Cv Specimen R-36	.31	.27
	Capsule_Z: Cv Specimen R-40	.21	.21
	Capsule_Y: Cv Specimen R-60	.17	--
	Capsule_Y: Cv Specimen R-62	.19	--
	Capsule_T: Cv Specimen R-2	.25	--
	Overall Average	.23	.24
Welds (3-042A&B)	Similar to Surveillance and 2-042A B & C Welds	.19	1.03
Weld (9-042)	Similar to HB Robinson Weld Metal	.19	.80
	Similar to Millstone 1 Surveillance Weld	.18	1.03
	Overall Average	.19	.92

NOTE: ( )* is the only value discarded for the overall average values because it probably represents the base metal content of Ni. This is conservative.

Table 18

Indian Point Unit 2 Phosphorous and Sulfur Values

	Phosphorous W%	Sulfur W%
Lower Shell Plate B2003-1	0.011	0.025
Lower Shell Plate B2003-2	0.010	0.021
Lower Shell Vertical Seams, 3-042 A, B	0.021	0.012
Intermediate Shell Vertical Seams 2-042A, B, & C	0.022	0.013
Intermediate to lower Shell Circle Seam, 9-042	0.010	0.017

Table 7 (Revised 10/93)
Indian Point Unit 2
Materials Certification Information

The following information was taken from the MM-SME-2962, "NRC Request for Information on Indian Point Unit No. 2 Reactor Vessel Materials Surveillance Program" prepared by S.E. Yanichko, November 9, 1977.

Component: Intermediate Shell Vertical Seam, 2-042A,B,C, (Capsule weld)

Heat No.: W5214, Type: RACO 3 + Ni200 Flux: Linde 1092, Lot. No. 3600

MILL Chemical Analysis

	C	Mn	P	S	Si	Ni	Mo	Cu	Al	Cr
*	0.11	1.20	0.021	0.012	0.19	N/A	0.52	N/A	N/A	N/A
**	0.092	1.18	0.022	0.013	0.20	N/A	0.53	N/A	N/A	N/A

Charpy Impact and Fracture Tests

Temp °F	Ft-Lbs	% Shear	Lat. Exp. (mils)
+10	103.0	N/A	N/A
+10	93.0		
+10	95.0		
+10	70.0		
+10	63.0		
+10	67.0		

*CE Welding Material Qualification May 9, 1966, SAA-11U(1)
**CE Welding Material Qualification February 3, 1966, SAA-33H(2)

Temp. °F	Drop Weights	NDT⁺	RT_{NDT}⁺	USE
N/A	N/A	0°F	-56°F	ft-lb

⁺Estimated per NRC Standard Review Plan Section 5.3.2.

Heat Treatment

*1125°F ± 25°F, 25 hours. Furnace cooled to 600°F.
**1150°F ± 25°F. Furnace cooled to 600°F for 20 cycles.

References:

1. Branch Technical Position MTEB5-2, "Fracture Toughness Requirements".

2. 10 CFR 50.61

3. "Reactor Vessel Material Surveillance Program for Indian Point Unit No. 2 - Analysis of Capsule V", SwRI Project No. 17-2018, October 1988, Southwest Research Institute.

4. Letter from Carolina Light & Power Company to H.R. Denton, June 29, 1984.

5. Letter from Joseph D. Neighbors (NRC) to John D. O'Toole (Con Edison), dated July 22, 1985 and "Safety Evaluation by the Office of Nuclear Reactor Regulation related to Amendment No. 96 to facility operating License No. DPR-26 (Docket No. 50-247).

6. "Indian Point 2 Reactor Vessel Surveillance Program" Westinghouse Report WCAP 7323, May 1969.