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Carolina Power & Light Company
Robinson Nuclear Plant
3581 West Entrance Road
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Robinson File No.: 13510I
Serial: RNP-RA/95-0205

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United States Nuclear Regulatory Commission
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1, SUPPLEMENT 1
"REACTOR VESSEL STRUCTURAL INTEGRITY"

Gentlemen:

The NRC issued Generic Letter (GL) 92-01, Revision 1, Supplement 1, "Reactor Vessel Structural Integrity," dated May 19, 1995, with responses required within 90 days from the date of the GL (i.e., by August 17, 1995) and within 6 months from the date of the GL (i.e., by November 20, 1995). Our 90-day response providing the information requested by Part (1) of the GL was submitted by letter dated August 7, 1995. The 6-month response is enclosed for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, that provides the information requested by Parts (2), (3), and (4) of the GL.

Questions regarding this matter may be referred to me at (803) 857-1802.

Very truly yours,

R. M. Krich
Manager - Regulatory Affairs

JSK/klb
Enclosures
c: Mr. S. D. Ebneter, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. W. T. Orders, USNRC Senior Resident Inspector, HBRSEP

Affidavit

State of South Carolina
County of Darlington

C. S. Hinnant, having been first duly sworn, did depose and say that the information contained in letter RNP-RA/95-0205 is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

C S Hinnant

Sworn to and subscribed before me

this 20th day of November 1995

(Seal) Albert L Cannon
Notary Public for South Carolina

My commission expires: March 22, 2005

H. B. Robinson Steam Electric Plant, Unit No. 2
6-Month Response to NRC Generic Letter 92-01, Revision 1, Supplement 1
"Reactor Vessel Structural Integrity"

The NRC issued Generic Letter (GL) 92-01, Revision 1, Supplement 1, "Reactor Vessel Structural Integrity," dated May 19, 1995. The GL requested the following information.

(1) A description of those actions taken or planned to locate all data relevant to the determination of reactor pressure vessel integrity, or an explanation of why the existing database is considered complete as previously submitted.

(2) An assessment of any change in best-estimate chemistry based on consideration of all relevant data.

(3) A determination of the need for use of the ratio procedure in accordance with Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," Position 2.1, "Adjusted Reference Temperature," for those licensees that use surveillance data to provide a basis for Reactor Pressure Vessel (RPV) integrity evaluation.

(4) A written response providing any newly acquired data as specified above and (1) the results of any necessary revisions to the evaluation of RPV integrity in accordance with the requirements of 10 CFR 50.60, "Acceptance criteria for fracture prevention measures for lightwater nuclear power reactors for normal operation," 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," 10 CFR 50, Appendix G, "Fracture Toughness Requirements," 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," and any potential impact on the Low Temperature Overpressure Protection (LTOP) or Pressure-Temperature (P-T) limits in the Technical Specifications, or (2) a certification that the previously submitted evaluations remain valid. Revised evaluations and certifications should include consideration of Position 2.1 of RG 1.99, Revision 2, as applicable, and any new data.

The GL required written responses as discussed below.

(1) A written response providing the information requested in Part (1), above, within 90 days from the date of the GL. This response was provided by letter dated August 17, 1995.

(2) A written response providing the information requested in Parts (2), (3), and (4), above, within 6 months from the date of the GL.

The following information is provided in response to Parts (2), (3), and (4) of GL 92-01, Revision 1, Supplement 1.

Summary

As we indicated in our response to Part (1) of the GL, dated August 17, 1995, we have reviewed RPV data and communicated with personnel from other plants possessing the same weld heats as those contained within the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 RPV. Furthermore, we have participated in a cooperative data sharing activity with these plants in an effort to establish "best estimate chemistries" and mechanical properties for the materials contained within the HBRSEP, Unit No. 2 RPV.

As described below, this effort has resulted in the establishment of different chemistries and initial Reference Temperature - Nil Ductility Transition (RT_{NDT}) values for the materials in some cases. However, none of these changes will result in projections exceeding NRC screening criteria specified in 10 CFR 50.61 for Pressurized Thermal Shock (PTS) considerations through end-of-license (EOL), nor do they necessitate a change to the current P-T or LTOP limits.

A marked-up copy of the NRC Reactor Vessel Integrity Database (RVID) pages for HBRSEP, Unit No. 2 that has been annotated to show necessary changes based on the results of this effort is attached to this response.

Part (2) - Assessment of Any Change in Best-Estimate Chemistry

The chemistry variability observed in some submerged arc welds has been attributed primarily to two past practices by weld wire manufacturers and RPV fabricators for some early RPVs; (1) the addition of a copper coating/"flashing" to the Submerged Arc Welding (SAW) weld wire which has now been determined to contribute to copper variability in the welds, and (2) the inclusion of a cold wire nickel feed, separate from the primary electrode, in some past SAW processes which has been determined to contribute to nickel variability in the welds.

The HBRSEP, Unit No. 2 RPV was fabricated by Combustion Engineering (CE) using welding materials and processes that employed both the copper coating/"flashing" on the primary electrodes for circumferential and longitudinal beltline welds, and the separate cold wire nickel feed for circumferential beltline welds only.

Through the use of the recently issued NRC RVID and an industry-developed RPV materials database (i.e., RPVDATA), we have identified several plants having the same SAW weld wire heat numbers as those used in the HBRSEP, Unit No. 2 RPV (i.e., "sister plants"). Furthermore, we have both communicated with, and shared records supporting previously specified chemistries with these "sister plants." Through the course of these activities, the "sister plants" and we have established new "best estimate chemistries" for those materials considered, as discussed below.

1. Weld Heat #34B009 - (i.e., HBRSEP, Unit No. 2 RPV Lower Circumferential Weld 11-273)

   The controlling RPV beltline material had been previously determined to be the lower circumferential weld joint (i.e., Heat #34B009). Current P-T limits are based on this weld. We had previously established the Chemistry Factor for this weld as 197.8 °F based on a 0.17% Cu content, and a 0.92% Ni content, in accordance with available industry data for the #34B009 material heat. However, subsequent to our establishing this Chemistry Factor for the HBRSEP, Unit No. 2 weld material, Consumers Power Co. (i.e., licensee for the Palisades Plant) obtained additional chemistry data for this weld heat through the recently completed weld chemistry testing activities conducted on their retired steam generators. This new data has been factored into other available industry data for this weld heat, and a new "best estimate chemistry" of 0.19% Cu content and 0.98% Ni content has been established with a Chemistry Factor of 217 °F as derived from RG 1.99, Revision 2, Table 1, "Chemistry Factor For Welds, ° F." In establishing this "best estimate chemistry," the copper content was established using a coil weighted approach, while the nickel content was determined using an average of the nickel values from each weld.

   While this newly established chemistry factor is higher than the 197.8 °F value that has been used since 1992, the current P-T limit curves in the Technical Specifications were based on a chemistry factor of 230 °F which was used prior to 1992 and, therefore, remain conservative even with consideration of the newly established initial RT_{NDT} for this weld joint discussed below in our response to Part 4 - "Impact Of Newly Acquired Data."

2. Weld Heat #W5214 - (i.e., HBRSEP, Unit No. 2 RPV Upper Circumferential Weld 10-273)

   The HBRSEP, Unit No. 2 RPV contains Heat #W5214 in the upper circumferential weld joint which is represented by a surveillance weld. Chemistry measurements result in a Chemistry Factor of 217.7 °F derived from RG 1.99, Revision 2, Table 1, based on a 0.34% Cu content and a 0.66% Ni content. While we have previously used the surveillance weld chemistry measurements, solely, as representative of the RPV upper circumferential weld joint, Consumers Power Co. has recently acquired additional chemistry data for this weld heat through the recently completed weld chemistry testing activities conducted on their retired steam generators. This new data has been factored into other available industry data for this weld heat, and a new industry "best estimate chemistry" of 0.208% Cu and 1.01% Ni has been established resulting in a Chemistry Factor of 229 °F as derived from Table 1 of RG 1.99, Revision 2. Again, in establishing this "best estimate chemistry," the copper content was established using a coil weighted approach, while the nickel content was determined using an average of the nickel values from each weld.

While a new industry "best estimate chemistry" has been established for this weld heat, as noted above, we have a different chemistry measured for our surveillance weld. Therefore, in establishing a plant specific Chemistry Factor for the upper circumferential weld joint, we have applied the ratio method as prescribed in RG 1.99, Revision 2, Position C.2, "Surveillance Data Available," and established a Chemistry Factor of 225.1°F.

The upper circumferential weld joint is currently accumulating fluence at a faster rate than the lower circumferential weld joint (i.e., Weld 11-273). Therefore, accounting for this new chemistry data, the upper circumferential weld joint will eventually become the limiting/controlling beltline material for the RPV for both EOL PTS and P-T considerations. However, the calculated 1/4t and 3/4t Adjusted RT_{NDT} for this weld joint through 24 effective full power years (EFPYs) remains below that value used in the development of the current P-T curves for operation through 24 EFPY. Therefore, the current P-T and LTOP limits remain conservative.

3. Weld Heat #86054B - (i.e., HBRSEP Unit No. 2 RPV Longitudinal Welds 1-273A,B,C; 2-273A,B,C; 3-273A,B,C)

   Other submerged arc weld materials in the RPV beltline include Heat #86054B which is located in the RPV longitudinal welds. Although this weld wire heat included the copper coating/"flashing," the welding process used by Combustion Engineering for the fabrication of these welds did not employ the separate cold nickel wire feed. As noted in our previous letter, dated November 29, 1993, we have adopted the chemistry obtained from the Connecticut Yankee Surveillance weld which included the same weld heat. Using Table 1 of RG 1.99, Revision 2, and a chemistry of 0.22% Cu content and 0.054% Ni content, this weld has a Chemistry Factor of 101.5 °F.

Part (3) - Determation of the Need To Use Ratio Procedure

As stated in Section C Position 2 of RG 1.99, Revision 2, consideration for applying the ratio procedure for the surveillance weld only becomes necessary once "two or more credible surveillance data sets become available from the reactor in question," and "if there is clear evidence that the copper or nickel content of the surveillance weld differs from that of the vessel weld." Accordingly, the need to use the ratio procedure applies to the RPV upper circumferential weld only, as discussed above. Since actual chemistry measurements have not been acquired from the HBRSEP, Unit No. 2 upper circumferential weld joint (i.e., RPV Weld 10-273), there is no clear evidence that the copper or nickel for the RPV weld differs from that measured on the surveillance weld. However, there is clear evidence that the surveillance weld chemistry that results in a Chemistry Factor of 217.7 °F, derived from Table 1 of RG 1.99, Revision 2, based on a 0.34% Cu content and a 0.66% Ni content differs from the industry "best estimate chemistry" for this weld heat that results in a

Chemistry Factor of 229 °F derived from Table 1 of RG 1.99, Revision 2, based on a 0.208% Cu content and a 1.01% Ni content. Therefore, we have applied the ratio method, as prescribed in RG 1.99, Revision 2, to establish a Chemistry Factor of 225.1 °F for the RPV weld 10-273.

Part (4) - Impact Of Newly Acquired Data

Impact of Higher Neutron Fluence

In April 1994, Westinghouse Electric Corporation reanalyzed the dosimetry data from previously tested RPV surveillance capsules which had been removed from Westinghouse plants located in the U.S. The goal of the analysis was to produce accurate and consistent fluence values for previously tested surveillance capsules.

As a part of this activity, dosimetry data from the previously tested HBRSEP, Unit No. 2 Surveillance Capsules S, V, and T were reanalyzed, resulting in updated fluence values for each capsule. The Westinghouse work resulted in increased fast neutron fluence estimates for HBRSEP, Unit No. 2 surveillance capsules previously removed from the RPV. The results are summarized below in Table 1, "Updated Capsule Fluence Values."

Table 1
Updated Capsule Fluence Values

CAPSULE	YEAR REMOVED FROM RPV	OLD FLUENCE (NVT)	NEW FLUENCE (NVT)
S	1973	3.69E18	5.06E18
V	1975	4.51E18	6.01E18
T	1982	4.11E19	4.42E18

Since the surveillance weld is representative of the HBRSEP, Unit No. 2 upper circumferential weld (i.e., Weld 10-273), these updated fluence values have been applied in the determination of a Chemistry Factor for this RPV weld by application of the ratio method prescribed in RG 1.99, Revision 2. The HBRSEP, Unit No. 2 surveillance capsules also contain base metal (i.e., plate) samples which are not limiting relative to Adjusted RT_{NDT}; however, Upper Shelf Energy (USE) is a matter of concern. Since the new surveillance capsule fluences have been obtained at the same loss of ductility assumed for the old fluences, a longer life can be projected for the plates using the new capsule fluence values. Therefore, previously specified USE data for these base metal surveillance samples remain conservative.

Impact of Beltline Materials Mechanical Property Changes

1. Initial RT_{NDT} Determination for RPV Materials (i.e., Weld Heat #34B009 - Lower Circumferential Weld 11-273)

During the NRC review of the most recent HBRSEP, Unit No. 2 P-T limit curve Technical Specifications change request, dated September 15, 1993, the NRC questioned our use of -80°F for the initial RT_{NDT} of weld material Heat #34B009. In Section 3.0 of the NRC Safety Evaluation that accompanied the issuance of Amendment 149 to the HBRSEP, Unit No. 2 Operating License, dated July 29, 1994, the NRC indicated that "the discrepancy between the licensee's and the NRC staff's unirradiated RT_{NDT} . . . would be resolved during the current staff review of the licensee's responses to GL 92-01."

As reported in our letter dated June 13, 1994, the HBRSEP, Unit No. 2 lower circumferential weld (i.e., Weld 11-273) and Northeast Utilities' Millstone Nuclear Power Station Unit 1 surveillance weld were each made from the same weld material, RACO 3 + Ni 200, Heat # 34B009, and flux, Linde 1092. Based on our investigation, the similarities known between our RPV lower circumferential weld and the Millstone Nuclear Power Station Unit 1 surveillance weld are summarized in Table 2.

Table 2
Similarities Between HBRSEP, Unit No. 2 Weld 11-273 And Millstone Nuclear Power Station Unit 1 Surveillance Weld

WELD	MILLSTONE NUCLEAR POWER STATION UNIT 1 SURVEILLANCE WELD	HBRSEP, Unit No. 2 WELD 11-273
VENDOR	CE	CE
FABRICATION	SUBMERGED ARC, TANDEM ELECTRODE	SUBMERGED ARC, TANDEM ELECTRODE
FABRICATION TIME FRAME	APRIL 1967	JULY 1967
MATERIAL SPECIFICATION & HEAT	RACO 3 + Ni 200, LINDE 1092 HEAT # 34B009	RACO 3 + Ni 200, LINDE 1092 HEAT # 34B009

General Electric (GE) reported tests of the Millstone Nuclear Power Station Unit 1 surveillance weld in October 1983, in support of an Electric Power Research Institute (EPRI) Project. As a part of this Project, drop weight test data and a full Charpy curve were developed for the Millstone Nuclear Power Station Unit 1 surveillance weld and the RT_{NDT} was determined to be -80°F.

In recent discussions between representatives of "sister plants" for this weld heat, Carolina Power & Light (CP&L) Company, Consumers Power Co., Northeast Utilities, and Public Service Electric & Gas Co., the validity of the GE testing for weld Heat #34B009 has been accepted, although the reported initial RT_{NDT} of -80°F could not be validated based on the methodology prescribed in Paragraph NB-2331 of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III. However, an initial RT_{NDT} of -77°F has been found to be credible and appropriate for this material based on the GE test results and application of the methodology prescribed in Paragraph NB-2331(a)(4) of ASME Boiler and Pressure Vessel Code, Section III, 1989 Edition. Accordingly, the mechanical properties recently observed on the Consumers Power Co. Palisades Plant retired steam generator weld testing activities have been determined to be not representative of RPV welds. Use of an initial RT_{NDT} of -77°F will not result in exceeding the NRC screening critieria before EOL.

Impact of Changes in Reactor Vessel Fluence Projections

We continue to have excore dosimetry periodically evaluated to update RPV fluence projections. Based on the most recent cavity dosimetry results, the EOL fluence projections for the HBRSEP, Unit No. 2 RPV have been reduced slightly for each of the beltline materials (e.g., previous projection for Weld 10-273 was 1.83E19 n/cm^2, while current updated EOL projection is 1.57E19 n/cm^2). However, we choose not to change the previously specified values for fluence shown in the NRC RVID, since they remain conservative.

Impact of Capsules S and V Surveillance Report Discrepancies

To date, we have had three surveillance capsules removed and tested, i.e., Capsules S, V, and T. In the analysis of the Capsule T data, Westinghouse summarized surveillance data results from all three of the tested Capsules. In reviewing this past surveillance data, as a part of responding to this GL, we have recognized discrepancies between the data reported for Capsules S and V and the data for these same Capsules contained in the earlier surveillance reports from which it was to have been extracted. We have notified Westinghouse of these discrepancies, however, resolution of these inconsistencies has not been completed at this time.

The inconsistencies involve the reported values for 50 ft-lb transition temperature shift, 30 ft-lb transition temperature shift, and decrease in USE for surveillance plates W10201-4, W10201-5, and W10201-6 as well as the Correlation Monitor material. No inconsistencies were observed for the surveillance weld or HAZ data.

The values reported in the Capsule T analysis for the 50 ft-lb transition temperature shift and decrease in USE for the HBRSEP, Unit No. 2 surveillance plates are more conservative than the values in the earlier surveillance reports. Since neither of these materials is projected to fall below the 10 CFR 50, Appendix G screening criteria for USE of 50 ft-lbs through EOL, these inconsistencies will have no impact on safety.

However, the 30 ft-lb shift data for surveillance plates W10201-5 and W10201-6 have been applied in the past for calculating material Chemistry Factors in accordance with Section C, Position 2 of RG 1.99, Revision 2. While the Chemistry Factor within the NRC RVID for Plate W10201-6 remains conservative regardless of how the values are resolved, the calculated Chemistry Factor for plate W10201-5 could increase beyond the value indicated in the NRC RVID depending upon how these data inconsistencies are resolved. In any case, neither of these plate materials would become limiting relative to EOL Adjusted RT_{NDT} for the HBRSEP, Unit No. 2 RPV. Until these inconsistencies can be resolved with Westinghouse, we will apply the most conservative Chemistry Factor for each of these plates, as derived from the most conservative surveillance data in accordance with Position 2 of RG 1.99, Revision 2, or Table 2 of RG 1.99, Revision 2 as shown below.

Table 3
Chemistry Factors For Surveillance Plate

Plate	Updated Capsule Fluence	Chemistry Factor (Derived solely from frpm Capsule T analysis)	Chemistry Factor (Derived from applying Capsules S and V shift data and Capsule T shift data)	Chemistry Factor (Table 2 of Regulatory Guide 1.99, Revision 2)
W10201-5	S - 5.06E18 V - 6.01E18	39.4	45.2	51.2
W10201-6	S - 5.06E18 T - 4.42E19	45.2	46.8	44.2

ATTACHMENT

MARK-UP OF REACTOR VESSEL INTEGRITY DATABASE FOR
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

Plant Name	Beltline Ident.	Heat No Ident.	RTpts @ EOL	ID Neut. Fluence @ EOL	IRTndt	Method of Determin. IRTndt	ΔRTndt at EOL	Fluence Factor @ EOL	Chemistry Factor	Method of Determin. CF	Margin	Method of Determin. Margin	Cu%	Ni%
Robinson 2	EOL: 07/31/10	Docket No.: 50-261												
	LOWER SHELL W9807-5	A5891-1	151	2.00000	33	PLANT SPEC	83.8	1.189	70.50	Table	34.00	TABLE	0.150	0.100
	UPPER SHELL W10201-2	A6520-1	162	1.80000	30	PLANT SPEC	98.4	1.161	84.75	Table	34.00	TABLE	0.150	0.250
	INTERMEDIATE SHELL W10201-4	A6604-1	134	4.80000	20	PLANT SPEC	79.6	1.394	57.10	Table	34.00	TABLE	0.120	0.090
	UPPER SHELL W10201-1	A6623-1	176	1.80000	69	PLANT SPEC	73.0	1.161	62.90	Table	34.00	TABLE	0.130	0.110
	LOWER SHELL W9807-3	B0650-1	153	2.00000	50	PLANT SPEC	69.0	1.189	58.00	Table	34.00	TABLE	0.120	0.100
	INTERMEDIATE SHELL W10201-6	B1250-1	~~129~~ 127	4.80000	45	PLANT SPEC	~~66.6~~ 65.25	1.394	~~47.70~~ 46.8	Calculated	17.00	TABLE	0.090	0.090
	UPPER SHELL W10201-3	B1255-1	130	1.80000	36	PLANT SPEC	60.1	1.161	51.80	Table	34.00	TABLE	0.110	0.080
	INTERMEDIATE SHELL W10201-5	B1256-1	~~96~~ 125	4.80000	20	PLANT SPEC	~~59.4~~ 71.4	1.394	~~42.50~~ 51.2	~~Calculated~~ Table	~~17.00~~ 34	TABLE	0.100	0.120
	LOWER SHELL W9807-9	P1444-1	127	2.00000	9	PLANT SPEC	83.8	1.189	70.50	Table	34.00	TABLE	0.140	0.150
	LOWER CIRC WELD 11-273	34B009	237 ~~245~~	2.000 ~~2.01000~~	-77 ~~-56~~	Sister Plant ~~GENERIC~~	258.04 ~~235.4~~	1.189 ~~1.190~~	217 ~~197.80~~	Table	56 ~~65.54~~	TABLE	0.19 ~~0.170~~	0.98 ~~0.920~~
	LOWER SHELL AXIAL SEAMS 3-273A, B, C	86054B ~~RA00-3~~	130 ~~129~~	2.00000	-56	GENERIC	120 ~~149.0~~	1.189	101.05 ~~100.75~~	Table	65.51	TABLE	0.220	0.054

Plant Name	Beltline Ident.	Heat No Ident.	RTpts @ EOL	ID Neut. Fluence @ EOL	IRTndt	Method of Determin. IRTndt	ΔRTndt at EOL	Fluence Factor @ EOL	Chemistry Factor	Method of Determin. CF	Margin	Method of Determin. Margin	Cu%	Ni%
Robinson 2 (Continued) Docket No.: 50-261														
	INTERMEDIATE SHELL AXIAL WELDS 2-273A, B, C	86054B ~~RA80~~	~~146~~ 147	3.93000	-56	GENERIC	~~136.2~~ 137	1.352	~~100.75~~ 101.05	Table	65.51	TABLE	0.220	0.054
	UPPER SHELL AXIAL WELDS 1-273ABC	86054B ~~RA80~~	~~118~~ 119	1.34000	-56	GENERIC	~~108.9~~ 109	1.081	~~100.75~~ 101.05	Table	65.51	TABLE	0.220	0.054
	UPPER CIRC WELD 10-273	W5214	~~247~~ 249	1.80000	-56	GENERIC	~~259.2~~ 261.42	1.161	~~223.23~~ 225.1 *	Calculated	44.04	TABLE	~~0.280~~ .208	~~1.020~~ 1.01

References for Robinson 2

>>>>>GL 92-01 References<<<<<

Fluence and chemistry for welds 1-273, 2-273, and 3-273A.B.C were taken from the April 21, 1995 letter to USNRC.

IRTndt data are from February 4, 1986, letter from S. R. Zimmerman (CP&L) to L. S. Rubinstein (USNRC), subject: Pressurized Thermal Shock; Correction to Response to Final Rule 10 CFR 50.61

Fluence and chemistry data are from July 6, 1992, letter from R. B. Starkey (CP&L) to USNRC Document Control Desk, subject: Response to Generic Letter 92-01, Revision 1, Reactor Vessel Structural Integrity

~~Chemical composition for welds fabricated using weld wire (heat no. W5214) is reported in a February 23, 1994 letter from D. W. Rogers (Consumers Power) to USNRC. Subject: Palisade Response to GL 92-01.~~

Unirrad use for axial welds are from letter dated Nov. 2, 1993 from CP&L to USNRC, page 1

Unirrad use for lower circ. weld is from the above letter, page 2

Unirrad use for upper circ. weld is from "Reactor Vessel Material Surveillance Program for H.B. Robinson Unit No. 2 Analysis of Capsule V," SWRI Report 02-4397, page 31

In a letter dated June 13, 1994, the licensee stated that IRT for weld 11-273, heat number 34B009 is -80oF and weld W5214 has copper of 0.34% and nickel of 0.66%. Also, for weld 10-273, heat W5214, the licensee indicated that cu=.034, and ni=0.66 and a chemistry factor of 217.7 using RG 1.99. These data may be revised when the differences between the licensee and NRC data set are resolved .

Irtndt, fluence, and chemistry data can also be found in a submittal dated Sept. 15, 1993 from C. R. Dietz to USNRC, subject: Pressure-Temperature curves.

The licensee calculated a chemistry factor of 51.2 for plate W10201-5 based on RG 1.99. The chemistry factor is higher than that calculated by the surveillance data as shown in table. See June 13, 1994 submittal.
~~For plate W10201-6, the licensee calculated a chemistry factor of 44.2 and a margin of 34, and did not use surveillance data. This gives higher RTpts than RVID2 calculated values. See submittal June 13, 1994.~~

* Surveillance weld has chemistry of .34% Cu and .66% Ni. Chemistry factor for W5214 (weld 10-273) based on "industry best estimate" chemistry for W5214 of .208% Cu and 1.01% Ni and application of ratio method prescribed in position C2 of Regulatory Guide 1.99, Revision 2.

Plant Name	Beltline Ident.	Heat No Ident.	RTpts @ EOL	ID Neut. Fluence @ EOL	IRTndt	Method of Determin. IRTndt	ΔRTndt at EOL	Fluence Factor @ EOL	Chemistry Factor	Method of Determin. CF	Margin	Method of Determin. Margin	Cu%	Ni%

REACTOR VESSEL INTEGRITY DATABASE
Summary File for Upper Shelf Energy

Plant Name	Beltline Ident.	Heat No Ident.	Material Type	USE @ EOL @ 1/4T	1/4T Neut. Flu @ EOL	Unirr USE	Method Determ Unirr USE	% Drop USE @ EOL @ 1/4T	Method Determ % Drop	Cu		
Robinson 2	EOL: 07/31/10	Docket No.: 50-261										
	LOWER SHELL W9807-5	A5891-1	A 302A	56	1.144	74	65%	24.6%	Position 1 of RG 1.99, Rev. 2	0.15		
	UPPER SHELL W10201-2	A6520-1	A 302A	61	1.030	80	65%	24.0%	Position 1 of RG 1.99, Rev. 2	0.15		
	INTERMEDIATE SHELL W10201-4	A6604-1	A 302A	EMA	2.746	EMA	65%	EMA	EMA	0.12		
	UPPER SHELL W10201-1	A6623-1	A 302A	~~EMA~~ >62	1.030	~~EMA~~ >62	~~65%~~ Surveillance DATA	~~EMA~~ Surveillance DATA	~~EMA~~ Surveillance DATA	0.13		
	LOWER SHELL W9807-3	B0650-1	A 302A	61	1.144	78	65%	21.4%	Position 1 of RG 1.99, Rev. 2	0.12		
	INTERMEDIATE SHELL W10201-6	B1250-1	A 302A	69	2.746	74	65%	7.2%	Surveillance data	0.09		
	UPPER SHELL W10201-3	B1255-1	A 302A	EMA	1.030	EMA	65%	EMA	EMA	0.11		
	INTERMEDIATE SHELL W10201-5	B1256-1	A 302A	62	2.746	64	65%	3.6%	Surveillance data	0.10		
	LOWER SHELL W9807-9	P1444-1	A 302A	59	1.144	77	65%	23.5%	Position 1 of RG 1.99, Rev. 2	0.14		
	LOWER CIRC WELD 11-273	34B009 RACO 3 + Ni 200	LINDE 1092	72	~~1.150~~ 1.144	106	SISTER PLANT	31.9%	Position 1 of RG 1.99, Rev. 2	~~0.17~~ 0.19		

Plant Name	Beltline Ident.	Heat No Ident.	Material Type	USE @ EOL @ 1/4T	1/4T Neut. Flu @ EOL	Unirr USE	Method Determ Unirr USE	% Drop USE @ EOL @ 1/4T	Method Determ % Drop	Cu		
Robinson 2 (Continued) Docket No.: 50-261												
	LOWER SHELL AXIAL SEAMS 3-273A, B, C	86054B ~~RACO-3~~ RACO 3	ARCOS-B5	66	1.144	105	SISTER PLANT	36.9%	Position 1 of RG 1.99, Rev. 2	0.22		
	INTERMEDIATE SHELL AXIAL WELDS 2-273A, B, C	86054B ~~RACO-3~~ RACO 3	ARCOS-B5	~~60~~ 59	2.248	105	SISTER PLANT	43.1%	Position 1 of RG 1.99, Rev. 2	0.22		
	UPPER SHELL AXIAL WELDS 1-273ABC	86054B ~~RACO-3~~ RACO 3	ARCOS-B5	~~70~~ 69	0.766	105	SISTER PLANT	33.7%	Position 1 of RG 1.99, Rev. 2	0.22		
	UPPER CIRC WELD 10-273	W5214 RACO 3 + Ni 200	LINDE 1092	65	1.030	112	~~SISTER PLANT~~ Surveillance Data	42.4%	Surveillance data	~~0.20~~ 0.208		

References for Robinson 2

>>>>>GL 92-01 References<<<<<

Fluence and chemistry for welds 1-273, 2-273, and 3-273A.B.C were taken from the April 21, 1995 letter to USNRC.

IRTndt data are from February 4, 1986, letter from S. R. Zimmerman (CP&L) to L. S. Rubinstein (USNRC), subject: Pressurized Thermal Shock; Correction to Response to Final Rule 10 CFR 50.61

Fluence and chemistry data are from July 6, 1992, letter from R. B. Starkey (CP&L) to USNRC Document Control Desk, subject: Response to Generic Letter 92-01, Revision 1, Reactor Vessel Structural Integrity

~~Chemical composition for welds fabricated using weld wire (heat no. W5214) is reported in a February 23, 1994 letter from D. W. Rogers (Consumer Power) to USNRC. Subject: Palisade Response to GL 92-01~~

Unirrad use for axial welds are from letter dated Nov. 2, 1993 from CP&L to USNRC, page 1

Unirrad use for lower circ. weld is from the above letter, page 2

Unirrad use for upper circ. weld is from "Reactor Vessel Material Surveillance Program for H.B. Robinson Unit No. 2 Analysis of Capsule V," SWRI Report 02-4397, page 31

In a letter dated June 13, 1994, the licensee stated that IRT for weld 11-273, heat number 34B009 is -80oF and weld W5214 has copper of 0.34% and nickel of 0.66%. Also, for weld 10-273, heat W5214, the licensee indicated that cu=.034, and ni=0.66 and a chemistry factor of 217.7 using RG 1.99. These data may be revised when the differences between the licensee and NRC data set are resolved .

Irtndt, fluence, and chemistry data can also be found in a submittal dated Sept. 15, 1993 from C. R. Dietz to USNRC, subject: Pressure-Temperature curves.

The licensee calculated a chemistry factor of 51.2 for plate W10201-5 based on RG 1.99. The chemistry factor is higher than that calculated by the

Plant Name	Beltline Ident.	Heat No Ident.	Material Type	USE @ EOL @ 1/4T	1/4T Neut. Flu @ EOL	Unirr USE	Method Determ Unirr USE	% Drop USE @ EOL @ 1/4T	Method Determ % Drop	Cu		

References for Robinson 2 (continued)

surveillance data as shown in table. See June 13, 1994 submittal.
~~For plate W10201-6, the licensee calculated a chemistry factor of 44.2 and a margin of 34, and did not use surveillance data. This gives higher RTpts than RVIDs calculated values. See submittal June 13, 1994.~~

REACTOR VESSEL INTEGRITY DATABASE
Chemistry Data File Summary

Plant Name	Beltline Ident.	Heat No Ident.	% Cu	Data Source for Cu	Method of Determin. Cu	Range of Cu Values	Average Value of Cu	% Ni	Data Source for Ni	Method of Determin. Ni	Range of Ni Values	Average Value of Ni	% P	% S
Robinson 2	EOL: 07/31/10	Docket No.: 50-261												
	LOWER SHELL W9807-5	A5891-1	0.15					0.10					0.012	0.014
	UPPER SHELL W10201-2	A6520-1	0.15					0.25					0.009	0.017
	INTERMEDIATE SHELL W10201-4	A6604-1	0.12					0.09					0.007	0.019
	UPPER SHELL W10201-1	A6623-1	0.13					0.11					0.010	0.017
	LOWER SHELL W9807-3	B0650-1	0.12					0.10					0.012	0.020
	INTERMEDIATE SHELL W10201-6	B1250-1	0.09					0.09					0.010	0.015
	UPPER SHELL W10201-3	B1255-1	0.11					0.08					0.006	0.019
	INTERMEDIATE SHELL W10201-5	B1256-1	0.10					0.12					0.010	0.021
	LOWER SHELL W9807-9	P1444-1	0.14					0.15					0.015	0.020
	LOWER CIRC WELD 11-273	34B009	~~0.17~~ 0.19					~~0.92~~ 0.98						
	LOWER SHELL AXIAL SEAMS 3-273A, B, C	86054B ~~RA60-3~~	0.22					~~0.05~~ 0.054					0.016	0.017

Plant Name	Beltline Ident.	Heat No Ident.	% Cu	Data Source for Cu	Method of Determin. Cu	Range of Cu Values	Average Value of Cu	% Ni	Data Source for Ni	Method of Determin. Ni	Range of Ni Values	Average Value of Ni	% P	% S
Robinson 2	(Continued)	Docket No.: 50-261												
	INTERMEDIATE SHELL AXIAL WELDS 2-273A, B, C	86054B ~~RA60-3~~	0.22					~~0.05~~ 0.054					0.016	0.017
	UPPER SHELL AXIAL WELDS 1-273ABC	86054B ~~RA60-3~~	0.22					~~0.05~~ 0.054					0.016	0.017
	UPPER CIRC WELD 10-273	W5214	~~0.20~~ 0.208					~~1.02~~ 1.01					0.021	0.014

<u>References for Robinson 2</u>

>>>>>GL 92-01 References<<<<<

Fluence and chemistry for welds 1-273, 2-273, and 3-273A.B.C were taken from the April 21, 1995 letter to USNRC.

IRTndt data are from February 4, 1986, letter from S. R. Zimmerman (CP&L) to L. S. Rubinstein (USNRC), subject: Pressurized Thermal Shock; Correction to Response to Final Rule 10 CFR 50.61

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Plant Name	Beltline Ident.	Heat No Ident.	% Cu	Data Source for Cu	Method of Determin. Cu	Range of Cu Values	Average Value of Cu	% Ni	Data Source for Ni	Method of Determin. Ni	Range of Ni Values	Average Value of Ni	% P	% S