CP&L

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NOV 16 1995

SERIAL: BSEP 95-0572

U. S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1, SUPPLEMENT 1
REACTOR PRESSURE VESSEL INTEGRITY

Gentlemen:

The purpose of this letter is to provide Carolina Power & Light Co's. (CP&L) response to Parts 2, 3, and 4 of Generic Letter 92-01, Revision 1, Supplement 1, for Brunswick Steam Electric Plant, Units 1 and 2. On May 19, 1995, the NRC issued Supplement 1 to Generic Letter 92-01, Revision 1. This supplement requested licensees to identify, collect, and report any new data pertinent to the analysis of structural integrity and to assess the impact of that data on their Reactor Pressure Vessel's (RPVs) integrity analyses relative to the requirements of 10 CFR 50.60, 10 CFR 50.61 and 10 CFR Part 50 Appendices G and H, as applicable. On August 17, 1995, CP&L provided the response to Part 1 of Generic Letter 92-01, Revision 1, Supplement 1 for Brunswick Steam Electric Plant, Units 1 and 2 (Serial: BSEP 95-0381). The attachments provide CP&L's response to the remaining parts of Generic Letter 92-01, Revision 1, Supplement 1.

Please refer any questions regarding this submittal to Mr. George Honma at (910) 457-2741.

Sincerely,

William R Campbell

William R. Campbell

GMT/

Enclosures:

1. Response to NRC Generic Letter 92-01, Revision 1, Supplement 1
2. Submerged Arc Weld Chemistries
3. RPV Unirradiated RT_{NDT} Values and Basis Of Determination
4. NRC Reactor Vessel Integrity Database For BSEP Unit 1 and Unit 2
5. List of Regulatory Commitments

A028 1/1

Tel 910 457-2496 Fax 910 457-2803

William R. Campbell, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, and agents of Carolina Power & Light Company.

Dean S. Mason
Notary (Seal)

My commission expires: August 21, 1999

cc: Mr. S. D. Ebneter, Regional Administrator, Region II
Mr. D. C. Trimble Jr., NRR Project Manager - Brunswick Units 1 and 2
Mr. C. A. Patterson, NRC Senior Resident Inspector - Brunswick Units 1 and 2
The Honorable H. Wells, Chairman - North Carolina Utilities Commission

ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1, SUPPLEMENT 1
REACTOR PRESSURE VESSEL INTEGRITY

Introduction:

On March 6, 1992, the Nuclear Regulatory Commission (NRC) issued Generic Letter 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)." This generic letter requested licensees provide to the NRC specific information relative to reactor vessel integrity. Carolina Power & Light Company (CP&L) provided a response for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2, in letters dated July 6, 1992, (Serial: NLS 92-180) and July 9, 1993, (Serial: BSEP 93-0110).

By letter dated April 1, 1994, the NRC requested CP&L to verify certain information contained in the Reactor Vessel Integrity Database (RVID) for materials properties used in the determination of Pressure-Temperature Limits and Upper Shelf Energy (USE) parameters. CP&L provided a response in a letter dated May 13, 1994 (Serial: BSEP 94-0179).

On May 19, 1995, the NRC issued Supplement 1 to Generic Letter 92-01, Revision 1. This supplement requested licensees to identify, collect, and report any new data pertinent to the analysis of structural integrity and to assess the impact of that data on their Reactor Pressure Vessel's (RPV's) integrity analyses relative to the requirements of 10 CFR 50.60, 10 CFR 50.61 and 10 CFR Part 50 Appendices G and H, as applicable.

The BWR Vessel & Internals Project (BWRVIP) recently furnished the NRC with its plan for addressing those issues identified in Supplement 1 to Generic Letter 92-01, Revision 1 (Reference: BWRVIP letter 95-404 dated August 10, 1995). This BWRVIP plan includes identification of sister plants, comprehensive RPV data retrieval, determination of "best estimate" weld chemistries, consideration of "ratio procedure" application as established in Position 2.1 of Regulatory Guide 1.99 Revision 2, and an assessment of any necessitated changes to pressure-temperature (P-T) limits and/or upper shelf energy (USE) projections based on newly acquired chemistry data. As noted in the coordinated BWRVIP Generic Letter response, completion of these activities will take approximately 24 months. However, the BWRVIP will be providing a preliminary assessment by November 20, 1995, based on available data at the time.

CP&L will continue to follow the future progress of the BWRVIP activities focused on addressing the Generic Letter issues. However, since these BWRVIP activities have not been completed, CP&L has conducted its own assessments (as outlined below) to ensure that a response to Generic Letter Parts 2, 3, and 4 for the Brunswick Steam Electric Plant (BSEP) could be provided by November 19, 1995 as required by the Generic Letter.

Since the BWRVIP effort is not scheduled for completion until late 1997, it is possible that additional weld data may become available to CP&L in the future. If new data becomes

available through the BWRVIP effort, which significantly impacts past reported chemistry and/or mechanical properties values, CP&L will report this information to the NRC.

The following information is provided in response to Parts 1, 2, 3, and 4 of Generic Letter 92-01, Revision 1, Supplement 1:

NRC Request Part 1:

a description of those actions taken or planned to locate all data relevant to the determination of RPV integrity, or an explanation of why the existing data base is considered complete as previously submitted (due 90 days from Generic Letter issuance);

CP&L Response

A response to Part 1 of the Generic Letter was provided to the NRC by letter dated August 17, 1995 (Serial: BSEP 95-0381).

NRC Request Part 2:

an assessment of any change in best estimate chemistry based upon consideration of all relevant data (due 6 months from Generic Letter issuance);

CP&L Response

One of the main considerations discussed in Supplement 1 of Generic Letter 92-01, Revision 1, is the subject of chemistry variability of submerged arc (SAW) weld joints used in the fabrication of RPVs. The chemistry variability observed in some SAW welds has been attributed primarily to two past practices by weld wire manufacturers and RPV fabricators for some early vintage RPVs: (1) the addition of a copper coating/"flashing" to the 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.

Based on a review of reactor vessel fabricator welding procedure specifications and welding filler material test reports, CP&L has concluded that neither copper coated SAW weld wire nor the cold nickel wire feed were used in the SAW fabrication of the BSEP RPV weldments. CP&L is not aware of any significant chemistry variability issues reported for SAW weld joints fabricated using un-coated weld wire and without the separate nickel wire addition. Through the use of the recently issued NRC Reactor Vessel Database (RVID) and an industry developed Reactor Vessel Materials Database (RPVDATA), CP&L has identified several sister plants having the same SAW weld wire heat numbers as those used in the BSEP vessels. Furthermore, CP&L shared records supporting previously docketed chemistries with those sister plants. CP&L has also compared reported chemistry data within RPVDATA to determine an average chemistry for each of the reactor vessel weld heat numbers used in the BSEP-1 and BSEP-2 beltline welds. As expected, very little variability in copper and nickel values was observed for these weld heats (see Enclosure 2 of this response).

Although the "mean" chemistries for the different weld heats vary slightly from those values previously docketed for the BSEP-1 and BSEP-2 reactor weld joints (Enclosure 3), CP&L is not changing the weld chemistries previously reported for these weld heats at this time based on the following:

1. For some of the reported chemistries noted in Enclosure 2, actual test reports were not acquired. Therefore, it is possible that some of the reported chemistries could be based on previously reported tests (i.e., not a separate test).

2. With the ongoing BWRVIP effort, it is possible that additional test data will be acquired in the near future which could either raise or lower these average chemistries slightly.

3. The CP&L docketed chemistries are within plus or minus one standard deviation for the considered chemistry values, and;

4. The minor differences in chemistry would not impact the limiting beltline RT_{NDT} values for BSEP-1 and BSEP-2 (vessels are base metal limited).

NRC Request Part 3:

a determination of the need for use of the ratio procedure in accordance with the established Position 2.1 of Regulatory Guide 1.99, Revision 2, for those licensees that use surveillance data to provide a basis for the RPV integrity evaluation (due 6 months from Generic Letter issuance);

CP&L Response

Regulatory Guide 1.99, Revision 2, Position C2 states; "When two or more credible surveillance data sets become available from the reactor in question..." consideration for applying the ratio procedure for the surveillance weld would apply. Presently, only one (1) surveillance capsule has been tested for the BSEP units. The first surveillance report for BSEP-1 was submitted to the NRC in August, 1994. The first surveillance capsule for BSEP-2 will be tested in 1996. Therefore, at present, there is no reason for CP&L to apply the ratio procedure.

NRC Request Part 4:

a written report 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, 10 CFR 50.61, Appendices G and H to 10 CFR Part 50, and any potential impact on the LTOP or P-T limits in the technical specifications or (2) a certification that previously submitted evaluations remain valid. Revised evaluations and certifications should include consideration of Position 2.1 of Regulatory Guide 1.99, Revision 2, as applicable, and any new data (due 6 months from Generic Letter issuance).

CP&L Response:

Beltline Materials Mechanical Properties:

1. Upper Shelf Energy (USE)

In February 1994, General Electric (GE) issued NEDO-32205-A, Revision 1 entitled, "Equivalent Margin Analysis for Low Upper Shelf Energy in BWR/2-6 Vessels," on behalf of the BWR Owners' Group. The purpose of the report was to demonstrate the existence of equivalent margins of safety as those required by 10 CFR 50, Appendix G for BWR vessels assuming materials with USE less than the screening criterion of 50 ft-lbs. This report addressed both plate and weld materials, but did not cover materials fabricated by the forging process.

In the Generic Letter 92-01 response dated July 9, 1993 (Serial: BSEP 93-0110), CP&L indicated that each of the Brunswick Units had two forged instrument nozzles located at the approximate top of the beltline in the RPVs. While CP&L does not have measured unirradiated USE data for these nozzle materials, it was predicted that the end-of-license (EOL) mechanical properties changes due to radiation would be minimal for these components based on a very low predicted EOL 1/4t fluence [reported as 1.6E17 n/cm^2 (E > 1MeV)].

In the Generic Letter 92-01 response dated May 13, 1994 (Serial: BSEP 94-0179), CP&L adopted the BWR Owners' Group report (NEDO-32205-A, Revision 1) demonstrating compliance with 10 CFR 50, Appendix G, paragraph IV.A.1. Furthermore, CP&L demonstrated the applicability of the BWR Owners' Group report to the vessel welds and plates based on copper contents and end-of-license (EOL) fluence projections which remain conservative based on current EOL fluence projections.

In 1994, CP&L completed testing of the first BSEP-1 surveillance capsule and subsequently updated vessel fluence projections. The results of these surveillance tests and the updated vessel fluence projections were reported to the NRC in Table 1 of the BSEP-1 surveillance report entitled, "Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program, Summary Report SR-BNP1-1005-001." This surveillance report was submitted to the NRC on August 17, 1994 (Serial: BSEP 94-0316).

In Table 1 of the surveillance report, the updated EOL 1/4t fluence projection for the N16A and B instrument nozzles was reported as 3.4E17 n/cm^2 (E > 1MeV). Although the referenced report only addressed BSEP-1, the projected EOL 1/4t fluence for the BSEP-2 nozzles would be nearly identical due to similarities in vessel design, operation, and fuel loading patterns. With implementation of current plans for power uprate and extended fuel cycles, this 1/4t fluence projection would be increased to 3.7E17 n/cm^2 (E > 1MeV)].

Both BSEP-1 and BSEP-2 have currently operated approximately 10 effective full power years (EFPY). The predicted 1/4t fluence at the nozzles for 10 EFPY is 1.22E17 n/cm^2 (E > 1 MeV).

While the updated EOL fluence projections for the forged nozzles are higher than those reported in the July 9, 1993, letter to the NRC, both the current fluence (for 10 EFPY) and the EOL fluence projections remain well below the 1E18 n/cm^2 fluence limit shown for the USE drop trend curves in Figure 2 of Regulatory Guide 1.99, Revision 2.

Since the August 17, 1995, response to Part 1 of this Generic Letter, CP&L has interfaced with the forging manufacturer, but no additional historical data on the unirradiated mechanical properties for these forgings was available. Therefore, CP&L will be performing a plant-specific USE equivalent margins analysis on these nozzles in 1996, the results of which will be reported to the NRC upon completion (expected January 1997).

2. Initial RT_{NDT} Determination for BSEP Reactor Vessel Materials

When the BSEP vessel materials were fabricated (prior to 1972), the Code requirements for Charpy testing/reporting were different from those in the current ASME Code and NRC regulations. Therefore, like many early plants, Brunswick has limited unirradiated Charpy data reported for the beltline materials. Although the beltline materials do have reported nil-ductility transition temperature (drop weight NDT) test and Charpy test results, in most cases the reported data are not sufficient to establish Initial RT_{NDT} in accordance with current ASME Code practices.

In an effort to resolve such questions regarding Initial RT_{NDT} determination, GE submitted to the NRC two reports on behalf of the BWR Owners' Group describing/justifying a methodology for use in establishing Initial RT_{NDT} (BWROG Reports GE-NE-523-109-0893 and NEDC-32399-P entitled, "Basis for GE RT_{NDT} Estimation Method").

In a letter to CP&L dated April 1, 1994, the NRC indicated that since past practices used by CP&L for establishing Initial RT_{NDT} had not been "validated," CP&L could either commit to the GE methodology (under NRC consideration/review at the time) or submit a schedule for resolving the issue. In the letter response to the NRC dated May 13, 1994 (Serial: BSEP 94-0179), CP&L indicated that unless more accurate RT_{NDT} data were derived, the GE methodology for determining Initial RT_{NDT} would be used for future submittals once it was finally approved by the NRC. In the same letter response, CP&L provided a preliminary assessment, based on application of the GE methodology to BSEP-1 and BSEP-2 beltline materials. CP&L further committed to providing a final assessment, once the NRC gave final approval of the GE methodology. The NRC provided final approval of the GE methodology on December 16, 1994.

CP&L has completed the final assessment based on application of the GE methodology to the Brunswick vessel materials (or other NRC approved methodologies such as that described in Branch Technical Position MTEB 5-2, etc). The results of the assessment are summarized in Enclosure 3 of this response. These initial RT_{NDT} values will be the basis for consideration of future adjusted RT_{NDT} determinations, unless more accurate data are acquired in the future.

Although the initial RT_{NDT} values and resulting adjusted RT_{NDT} values within Enclosure 3 are, in some cases, different than those previously docketed, CP&L has completed an evaluation of the current pressure-temperature limit curves and has determined that they remain conservative, based on application of these initial RT_{NDT} values. Therefore, revision of the pressure-temperature limit curves is not required at this time.

Update of NRC Reactor Vessel Integrity Database (RVID):

The NRC's Reactor Vessel Integrity Database information for Brunswick Unit 1 and Brunswick Unit 2 has been included with updates as Enclosure 4.

ENCLOSURE 2

SUBMERGED ARC WELD METAL CHEMISTRIES

HEAT	TEST #/SOURCE	TEST DATE	Cu%	Ni%	Flux Lot	Flux Run	COMMENTS
S3986	CB&I PT 200 A *	6-4-70	.05	.92	3877	934	See note 1 below.
	CB&I WO #337C (Tandem Wire) *	6-15-70	.06	.90	3878	934	See note 1 below.
	CB&I WO #337 (Single Wire) *	6-15-70	.06	.81	3878	934	See note 1 below.
	CB&I PT #200 (Tandem Wire) *	5-12-69	.06	.97	3876	934	See note 1 below.
	CB&I PT#200 (Single Wire) *	5-12-69	.05	.96	3876	934	See note 1 below.
	Brunswick 1 Surveillance *	5-24-94	.055	.96	N/A	N/A	Reference Surveillance Report SR-BNP1-1005-001.
	Brunswick 1 Surveillance *	5-24-94	.051	.98	N/A	N/A	
	Sister Plant (Peach Bottom 2)	N/A	.06	.97	N/A	N/A	Utility provided information. Could not confirm if these are separate tests (appear to be identical to CB&I weld tests PT No. 200 (single and tandem); therefore, chemistry values are not included in average.
	Sister Plant (Quad Cities2)	N/A	.05	.96	N/A	N/A	
	Sister Plant (DC Cook 2) *	N/A	.055	.97	N/A	934	Westinghouse surveillance report.
	Sister Plant Trojan Surv. Cap.	N/A	.051	.93	N/A	934	No test reports available. RPVDATA information. Values not included in chemistry average.
	Sister Plant Trojan Surv. Cap.	N/A	.06	.97	N/A	N/A	
	Adcom Metals Co. CTR	N/A	.05	1.07	N/A	N/A	Weld wire analysis - values not included in chemistry avg.
CHEMISTRY MEAN FOR HEAT S3986 (See note 2 below)			***.055***	***.934***	**Chemistry Factor 75**		
3P4000	CB&I WO #14D (Tandem Wire) *	4-15-71	.02	.96	3932	989	See note 1 below.
	CB&I WO #14D (Single Wire) *	4-15-71	.02	.90	3932	989	See note 1 below.
	CB&I 425D (Tandem Wire) *	10-14-71	.02	.95	3933	989	See note 1 below.
	CB&I 425D (Single Wire) *	10-14-71	.02	.89	3933	989	See note 1 below.
	Sister Plant (Peach Bottom 3)	N/A	.02	.96	N/A	N/A	Utility provided information. No test reports available. Values not included in chemistry average.
	Sister Plant (LaSalle 2)	N/A	.02	.89	N/A	N/A	
	Reid Avery Co. CTR	N/A	.02	.97	N/A	N/A	Weld wire analysis - values not included in chemistry avg.
CHEMISTRY MEAN FOR HEAT 3P4000 **(See note 2 below)**			***.02***	***.925***	**Chemistry Factor 27**		
1P4218	CB&I #168D (Single Wire) *	7-29-7?	.06	.89	3932	989	Full date (year) could not be read from test report. See note 1 below.
	CB&I #569C (Single Wire) *	10-16-70	.05	.83	3929	989	See note 1 below.
	CB&I #569C (Tandem Wire) *	10-16-70	.06	.87	3932	989	GE NEDO-24161.
	Sister Plant (Limerick 1)	N/A	.06	.89	N/A	N/A	Utility provided information. Could not confirm if this is a separate test (appears to be identical to CB&I Weld Test 168D). Therefore, chemistry values not included in average.
	Combustion Engineering CTR	N/A	.04	.97	N/A	N/A	Weld wire analysis - values not included in chemistry average.
CHEMISTRY MEAN FOR HEAT 1P4218 **(See note 2 below)**			***.057***	***.86***	**Chemistry Factor 78**		

1. Information taken from CB&I Report Entitled "Report in Compliance With The Regulatory Commission Bulletins 78-12 & 78-12A" dated 4-24-79.
2. Items which have asterisk (*) in "TEST #/SOURCE" column have been included in Chemistry averages.

ENCLOSURE 3
RPV UNIRRADIATED RT_{NDT} VALUES AND BASIS OF DETERMINATION

BSEP UNIT 1 (30.5 EOL EFPY [5])

BELTLINE MATERIAL ID	HEAT NUMBER	%CU	%NI	CHEM. FACTOR*	INITIAL RT_{NDT} (°F)	EOL FLUENCE n/cm^2 (E>1 Mev)	INSIDE SURFACE EOL ART_{NDT} (°F)
Lower Shell	C4535-2	0.12	0.58	82.6	34 [1]	1.1E+18	103
Lower Shell	C4550-1	0.11	0.60	74.0	10 [1]	1.1E+18	73
Lower Intermediate Shell	C4487-1	0.12	0.56	82.2	10 [3]	1.4E+18	84
Lower Intermediate Shell	B8496-1	0.19	0.58	139.8	10 [1]	1.4E+18	111
Nozzle N16A	Q2Q1VW	0.16	0.82	123.2	48 [1,4]	5.2E+17	119
Nozzle N16B	Q2Q1VW	0.16	0.82	123.2	48 [1,4]	5.2E+17	119
Axial Welds G1 & G2	S3986	0.05	0.96	68.0	10 [2]	7.3E+17	59
Axial Welds F1 & F2	S3986	0.05	0.96	68.0	10 [2]	9.3E+17	65
Circumferential Welds	1P4218	0.06	0.87	82.0	10 [2]	1.1E+18	80

BSEP UNIT 2 (29.3 EOL EFPY [5])

BELTLINE MATERIAL ID	HEAT NUMBER	%CU	%NI	CHEM. FACTOR*	INITIAL RT_{NDT} (°F)	EOL FLUENCE n/cm^2 (E>1 Mev)	INSIDE SURFACE EOL ART_{NDT} (°F)
Lower Shell	C4500-2	0.15	0.54	106.7	10 [1]	1.0E+18	89
Lower Shell	C4550-2	0.11	0.60	74.0	10 [1]	1.0E+18	72
Lower Intermediate Shell	C4489-1	0.12	0.60	83.0	10 [1]	1.3E+18	83
Lower Intermediate Shell	C4521-2	0.12	0.57	82.4	10 [1]	1.3E+18	83
Nozzle N16A	Q2Q1VW	0.16	0.82	123.2	40 [2,4]	5.0E+17	110
Nozzle N16B	Q2Q1VW	0.16	0.82	123.2	40 [2,4]	5.0E+17	110
Axial Welds G1 & G2	S3986	0.05	0.96	68.0	10 [2]	7.1E+17	58
Axial Welds F1 & F2	S3986	0.05	0.96	68.0	10 [2]	8.9E+17	64
Circumferential Welds	3P4000	0.02	0.90	27.0	10 [2]	1.0E+18	33

* Chemistry Factor taken from Table 1 or Table 2, as applicable, of Regulatory Guide 1.99, Revision 2.

[1] GE Topical Report NEDC-32399-P, *Basis For GE RT_{NDT} Estimation Method.*

[2] MTEB 5-2, Estimation Method 4.

[3] Based on CP&L Testing of Archive Material.

[4] Although the chemistries for the N16A and N16B nozzles are the same, the Charpy impact values for the Unit 1 and Unit 2 nozzle forgings are different. This accounts for the difference in the initial RT_{NDT} values between the two units.

[5] End of License EFPY values are current best estimates based on 24 month fuel cycles, power uprate, and a thermal load factor of 97%.

ENCLOSURE 4

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1, SUPPLEMENT 1
REACTOR PRESSURE VESSEL INTEGRITY

NRC REACTOR VESSEL INTEGRITY DATABASE FOR BSEP UNIT 1 AND UNIT 2

(SEVEN PAGES ENCLOSED)

Plant Name	Beltline Ident.	Heat No Ident.	RTpts @ EOL	ID Neut. Fluence @ EOL	IRTndt	Method of Determin. IRTndt	aRTndt at EOL	Fluence Factor @ EOL	Chemistry Factor	Method of Determin. CF	Margin	Method of Determin. Margin	Cu%	Ni%
Brunswick 1	EOL: 09/08/16	Docket No.: 50-325												
	NOZZLE FORGING N16A	Q201VW	~~78~~ 119	~~0.01690~~ 0.05196	~~40~~ 48	PLANT SPEC	~~19.1~~ 36.8	~~0.155~~ 0.299	123.20	Table	~~19.80~~ 34.00	TABLE	0.160	0.820
	NOZZLE ~~BELT~~ Forging N16B	Q201VW	~~78~~ 119	~~0.01690~~ 0.05196	~~40~~ 48	PLANT SPEC	~~1.9~~ 36.8	~~0.155~~ 0.299	~~12.00~~ 123.2	Table	~~19.09~~ 34.00	TABLE	0.160	0.820
	LOWER INTERMEDIATE SHELL	B8496-1	~~114~~ 111	~~0.15000~~ 0.13556	10	PLANT SPEC	~~79.3~~ 67.2	~~0.503~~ 0.480	139.80	Table	34.00	TABLE	0.190	0.580
	LOWER INTERMEDIATE SHELL	C4487-1	~~85~~ 84	~~0.15000~~ 0.13556	10	PLANT SPEC	~~41.3~~ 39.5	~~0.503~~ 0.480	82.20	Table	34.00	TABLE	0.120	0.560
	LOWER SHELL	C4535-2	103 ~~82~~	0.10619 ~~0.12300~~	34 ~~10~~	PLANT SPEC	35.4 ~~38.0~~	0.429 ~~0.460~~	82.60	Table	34.00	TABLE	0.120	0.580
	LOWER SHELL	C4550-1	73 ~~78~~	0.10619 ~~0.12300~~	10	PLANT SPEC	31.7 ~~34.0~~	0.429 ~~0.460~~	74.00	Table	31.75 ~~34.00~~	TABLE	0.110	0.600
	CIRC WELD	1P4218	80 ~~83~~	0.10619 ~~0.12300~~	10	PLANT SPEC	35.2 ~~37.7~~	0.429 ~~0.460~~	82.00	Table	35.18 ~~37.72~~	TABLE	0.060	0.870
	AXIAL WELDS	S3986	65 ~~73~~	0.09263 ~~0.12300~~	10	PLANT SPEC	27.3 ~~31.3~~	0.402 ~~0.460~~	68.00	Table	27.32 ~~31.28~~	TABLE	0.050	0.960

References for Brunswick 1

Fluence from May 13, 1994 letter from R. A. Anderson to the NRC (Response to the NRC closeout letter). These data will appear in NEDO-22161, Rev. 1 and NEDO-24157, Rev. 2, scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRT data are from NEDC-24157, "Brunswick Steam Electric Station, Unit 1, Information on Reactor Vessel Surveillance Program.

Brunswick 2	EOL: 12/27/14	Docket No.: 50-324												
	NOZZLE ~~BELT~~ Forging N16A	Q201VW	110 ~~79~~	0.04992 ~~0.01720~~	40	PLANT SPEC	36.0 ~~19.3~~	0.292 ~~0.157~~	123.20	Table	34.0 ~~19.34~~	TABLE	0.160	0.820
	NOZZLE ~~BELT~~ Forging N16B	Q201VW	110 ~~79~~	0.04992 ~~0.01720~~	40	PLANT SPEC	36.0 ~~19.3~~	0.292 ~~0.157~~	123.20	Table	34.0 ~~19.34~~	TABLE	0.160	0.820

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-1005-001 extrapolated to 30.5 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24161, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 1," Revision 1. IRTndt data determined using NRC approved methodologies.

Plant Name	Beltline Ident.	Heat No Ident.	RIpts @ EOL	ID Neut. Fluence @ EOL	IRTndt	Method of Determin. IRTndt	σRTndt at EOL	Fluence Factor @ EOL	Chemistry Factor	Method of Determin. CF	Margin	Method of Determin. Margin	Cu%	Ni%
Brunswick 2	(Continued)	Docket No.: 50-324												
	Intermediate LOWER ~~INT~~ SHELL	C4489-1	83 ~~86~~	0.13022 ~~0.15500~~	10	PLANT SPEC	39.2 ~~42.3~~	0.472 ~~0.510~~	83.00	Table	34.00	TABLE	0.120	0.600
	LOWER SHELL	C4503-2	89 ~~96~~	0.10201 ~~0.12700~~	10	PLANT SPEC	44.9 ~~49.7~~	0.421 ~~0.466~~	106.70	Table	34.00	TABLE	0.150	0.540
	LOWER INTERMEDIATE SHELL	C4521-2	83 ~~86~~	0.13022 ~~0.15500~~	10	PLANT SPEC	38.9 ~~42.0~~	0.472 ~~0.510~~	82.40	Table	34.00	TABLE	0.120	0.570
	LOWER SHELL	C4550-2	72 ~~78~~	0.10201 ~~0.12700~~	10	PLANT SPEC	31.1 ~~34.5~~	0.421 ~~0.466~~	74.00	Table	31.14 ~~34.00~~	TABLE	0.110	0.600
	CIRC WELD	3P4000	33 ~~35~~	0.10201 ~~0.12700~~	10	PLANT SPEC	11.4 ~~12.4~~	0.421 ~~0.466~~	27.00	Table	11.36 ~~12.50~~	TABLE	0.020	0.900
	AXIAL WELDS	S3986	64 ~~73~~	0.08899 ~~0.12700~~	10	PLANT SPEC	26.8 ~~31.7~~	0.394 ~~0.466~~	68.00	Table	26.79 ~~31.68~~	TABLE	0.050	0.960

References for Brunswick 2

Fluence data is from May 13, 1994, letter from R. A. Anderson to the NRC (Response to the NRC close letter). These data will appear in NEDO-24161, Rev. 1 and NEDO-24157, Rev. 2, scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRTndt data are from NEDO-24161, "Brunswick Steam Electric Station, Unit 2, Information on Reactor Vessel Surveillance Program."

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-1005-001 extrapolated to 29.3 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24157, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 2," Revision 2. IRTndt data determined using NRC approved methodologies.

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		
Brunswick 1	EOL: 09/08/16	Docket No.: 50-325										
	NOZZLE FORGING N16A	Q201VW	A 508-2	PLANT ~~EMA~~ SPECIFIC	0.037 ~~0.012~~	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	0.16		
	FORGING NOZZLE BELT N16B	Q201VW	A 508-2	PLANT ~~EMA~~ SPECIFIC	0.037 ~~0.012~~	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	PLANT ~~EMA~~ SPECIFIC	0.16		
	LOWER INTERMEDIATE SHELL	88496-1	A 533B	EMA	0.097 ~~0.109~~	EMA	EMA	EMA	EMA	0.19		
	LOWER INTERMEDIATE SHELL	C4487-1	A 533B	EMA	0.097 ~~0.109~~	EMA	EMA	EMA	EMA	0.12		
	LOWER SHELL	C4535-2	A 533B	EMA	0.076 ~~0.090~~	EMA	EMA	EMA	EMA	0.12		
	LOWER SHELL	C4550-1	A 533B	EMA	0.076 ~~0.090~~	EMA	EMA	EMA	EMA	0.11		
	CIRC WELD	1P4218	LINDE 124	EMA	0.076 ~~0.090~~	EMA	EMA	EMA	EMA	0.06		
	AXIAL WELDS	S3986	LINDE 124	EMA	0.066 ~~0.090~~	EMA	EMA	EMA	EMA	0.05		

References for Brunswick 1

Fluence from May 13, 1994 letter from R. A. Anderson to the NRC (Response to the NRC closeout letter). These data will appear in NEDO-22161, Rev. 1 and NEDO-24157, Rev. 2, scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRT data are from NEDC-24157, "Brunswick Steam Electric Station, Unit 1, Information on Reactor Vessel Surveillance Program.

EOL USE drop for nozzle forging projected to be minimal. Utility to provide plant-specific EMA by 02/97.

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-1005-001 extrapolated to 30.5 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24161, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 1," Revision 1. IRTndt data determined using NRC approved methodologies.

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		
Brunswick 2	EOL: 12/27/14	Docket No.: 50-324										
	NOZZLE ~~BELT~~ FORGING N16A	Q2Q1VW	A 508-2	~~EMA~~ PLANT SPECIFIC	0.036 ~~0.013~~	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	0.16		
	NOZZLE ~~BELT~~ FORGING N16B	Q2Q1VW	A 508-2	~~EMA~~ PLANT SPECIFIC	0.036 ~~0.013~~	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	~~EMA~~ PLANT SPECIFIC	0.16		
	~~INTERMEDIATE~~ LOWER ~~INT~~ SHELL	C4489-1	A 533B	EMA	0.093 ~~0.113~~	EMA	EMA	EMA	EMA	0.12		
	LOWER SHELL	C4500-2	A 533B	EMA	0.073 ~~0.093~~	EMA	EMA	EMA	EMA	0.15		
	LOWER INTERMEDIATE SHELL	C4521-2	A 533B	EMA	0.093 ~~0.113~~	EMA	EMA	EMA	EMA	0.12		
	LOWER SHELL	C4550-2	A 533B	EMA	0.073 ~~0.093~~	EMA	EMA	EMA	EMA	0.11		
	CIRC WELD	3P4000	LINDE 124	EMA	0.073 ~~0.093~~	EMA	EMA	EMA	EMA	0.02		
	AXIAL WELDS	S3986	LINDE 124	EMA	0.064 ~~0.093~~	EMA	EMA	EMA	EMA	0.05		

References for Brunswick 2

Fluence date is from May 13, 1994, letter from R. A. Anderson to the NRC (Response to the NRC close letter). These date will appear in NEDO-24161, Rev. 1 and NEDO-24157, Rev. 2, Scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRTndt data are from NEDC-24161, "Brunswick Steam Electric Station, Unit 2, Information on Reactor Vessel Surveillance Program."

EOL USE drop for nozzle forging projected to be minimal. Utility to provide plant-specific EMA by 02/97.

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-1005-001 extrapolated to 29.3 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24157, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 2," Revision 2. IRTndt data determined using NRC approved methodologies.

REACTOR VESSEL INTEGRITY DATABASE
Summary File for Upper Shelf Energy

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

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
Brunswick 1	EOL: 09/08/16	Docket No.: 50-325												
	NOZZLE FORGING N16A	Q201VW	0.16					0.82					0.010	0.015
	FORGING NOZZLE ~~BELT~~ N16B	Q201VW	0.16					0.82					0.010 ~~0.006~~	0.015 ~~0.025~~
	LOWER INTERMEDIATE SHELL	B8496-1	0.19					0.58					0.013	0.016
	LOWER INTERMEDIATE SHELL	C4497-1	0.12					0.56					0.010	0.015
	LOWER SHELL	C4535-2	0.12					0.58					0.012	0.015
	LOWER SHELL	C4550-1	0.11					0.60					0.010	0.014
	CIRC WELD	1P4218	0.06					0.87					0.010 ~~0.015~~	0.015 ~~0.012~~
	AXIAL WELDS	S3986	0.05					0.96					0.019	0.016

References for Brunswick 1

Fluence from May 13, 1994 letter from E. A. Anderson to the NRC (Response to the NRC closeout letter). These data will appear in NEDO-22161, Rev. 1 and NEDO-24157, Rev. 2, scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRT data are from NEDC-24157, "Brunswick Steam Electric Station, Unit 1, Information on Reactor Vessel Surveillance Program.

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
Brunswick 2	EOL: 12/27/14	Docket No.: 50-324												
	FORGING NOZZLE ~~BELT~~ N16A	Q201VW	0.16					0.82					0.010	0.015
	FORGING NOZZLE ~~BELT~~ N16B	Q201VW	0.16					0.82					0.010 ~~0.006~~	0.015 ~~0.013~~

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-1005-001 extrapolated to 30.5 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24161, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 1," Revision 1. IRTndt data determined using NRC approved methodologies.

10/19/95
10:42:09

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
Brunswick 2 (Continued) Docket No.: 50-324														
	INTERMEDIATE LOWER SHELL	C4489-1	0.12					0.60					0.007	0.016
	LOWER SHELL	C4500-2	0.15					0.54					0.012	0.016
	LOWER INTERMEDIATE SHELL	C4521-2	0.12					0.57					0.009	0.015
	LOWER SHELL	C4550-2	0.11					0.60					0.010	0.014
	CIRC WELD	3P4000	0.02					0.90					0.015 ~~0.010~~	0.012 ~~0.015~~
	AXIAL WELDS	53986	0.05					0.96					0.019	0.016

References for Brunswick 2

Fluence data is from May 13, 1994, letter from R. A. Anderson to the NRC (Response to the NRC close letter). These data will appear in NEDO-24161, Rev. 4 and NEDO-24157, Rev. 2, Scheduled to submit to the NRC on August 17, 1994.

Chemical composition data for N16A and N16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical composition and IRTndt data are from NEDC-24161, "Brunswick Steam Electric Station, Unit 2, Information on Reactor Vessel Surveillance Program."

Fluence from Brunswick Steam Electric Plant Unit 1 Reactor Pressure Vessel Surveillance Program Summary Report SR-BNP-10u5-001 extrapolated to 29.3 effective full power years.

Chemical composition data for N16A and N16B nozzles are from July 7, 1993 letter to NRC (Response to GL 92-01 RA1).

Chemical compositions are from NEDO-24157, "Information on Reactor Vessel Material Surveillance Program Brunswick Steam Electric Plant Unit 2," Revision 2. IRTndt data determined using NRC approved methodologies.

ENCLOSURE 5

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1, SUPPLEMENT 1
REACTOR PRESSURE VESSEL INTEGRITY

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Carolina Power & Light Company in this document. Any other actions discussed in the submittal represent intended or planned actions by Carolina Power & Light Company. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Manager-Regulatory Affairs at the Brunswick Nuclear Plant of any questions regarding this document or any associated regulatory commitments.

	Commitment	Committed date or outage
1.	CP&L will report the results a plant specific USE equivalent margins analysis performed on the forged nozzles to the NRC upon completion (expected January 1997).	N/A