



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 1, 1994

Docket Nos. 50-325
and 50-324

Mr. R. A. Anderson, Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

Dear Mr. Anderson:

SUBJECT: GENERIC LETTER (GL) 92-01, REVISION 1, "REACTOR VESSEL STRUCTURAL INTEGRITY", BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 (TAC NOS. M83441 AND M83442)

By letters dated July 6, 1992, and July 9, 1993, Carolina Power & Light Company (CP&L) provided its response to GL 92-01, Revision 1, for the Brunswick Steam Electric Plant, Units 1 and 2 (BSEP). The NRC staff has completed its review of your responses. Based on its review, the staff has determined that CP&L has provided the information requested in GL 92-01.

The GL is part of the staff's program to evaluate reactor vessel integrity for pressurized water reactors (PWRs) and boiling water reactors (BWRs). The information provided in response to GL 92-01, including previously docketed information, is being used to confirm that licensees satisfy the requirements and commitments necessary to ensure reactor vessel integrity for their facilities.

A substantial amount of information was provided in response to GL 92-01, Revision 1. These data have been entered into a computerized data base designated Reactor Vessel Integrity Database (RVID). The RVID contains the following tables: a pressurized thermal shock (PTS) table for PWRs, a pressure-temperature limit table for BWRs and an upper-shelf energy (USE) table for PWRs and BWR's. Enclosure 1 provides the pressure-temperature tables for BSEP, Enclosure 2 provides the USE tables for BSEP, and Enclosure 3 provides a key for the nomenclature used in the tables. The tables include the data necessary to perform USE, pressure-temperature limit, and RT_{pts} evaluations. These data were taken from your responses to GL 92-01 and other previously docketed information. The information in the RVID for BSEP will be considered accurate at this point in time and will be used in the staff's assessments related to vessel structural integrity. References to the specific source of the data are provided in the tables.

As a result of our GL 92-01 review, the NRC staff has identified one open issue for BSEP. The initial RT_{NDT} values determined by General Electric's (GE) initial methodology have not been validated and the BWR Owners Group Report, GE-NE-523-109-0893, entitled, "Basis for GE RT_{NDT} Estimation Method," did not resolve the issue. GE is in the process of validating its methodology for resolving the initial RT_{NDT} determination issue and will document the results in a topical report. The BWR Owners Group is obtaining approval from

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April 1, 1994

Mr. R. A. Anderson

- 2 -

its members to provide the GE topical report to the NRC staff for its review and approval. We request that you submit within 30 days a commitment to the BWR Owners Group effort or a schedule for a plant-specific analysis to resolve this issue. Further, we request that you provide confirmation of the plant-specific applicability of the topical report, NEDO-32205, Revision 1, (as specified in Appendix B of that report), and submit a request for approval of the topical report as the basis for demonstrating compliance with 10 CFR Part 50, Appendix G, Paragraph IV.A.1. We further request you verify the information you have provided for BSEP has been accurately entered in the data base. If no comments are made in your response to the last request, the staff will use the information in the tables for future NRC assessments of your reactor pressure vessel.

Once you have (1) confirmed the applicability of the topical report, NEDO-32205, Revision 1, to BSEP, (2) submitted the request for approval, and (3) provided your commitment to the BWR Owners Group effort or a satisfactory schedule for providing a plant-specific analysis, the staff will consider your actions related to GL 92-01, Revision 1, to be complete. Plant-specific licensing action(s) will be initiated to resolve these issues.

The information requested by this letter is within the scope of the overall burden estimated in GL 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)." The estimated average number of burden hours is 200 person hours for each addressee's response. This estimate pertains only to the identified response-related matters and does not include the time required to implement actions required by the regulations. This action is covered by the Office of Management and Budget Clearance Number 3150-0011, which expires June 30, 1994.

Sincerely,

Original Signed by:
Patrick D. Milano, Sr. Project Manager
Project directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Pressure-Temperature Limit Tables
2. Upper-Shelf Energy Tables
3. Nomenclature Key

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cc w/enclosures:

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OFFICE	LA:PD2-1	PM:PD2-1	(A)D:PD2-1
NAME	PAnderson	PMilano/rsi	SBajwa
DATE	4/1/94	4/1/94	4/1/94

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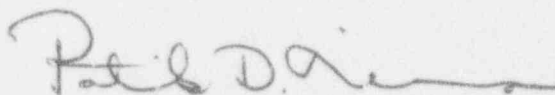
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Sincerely,



Patrick D. Milano, Sr. Project Manager
Project directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Pressure-Temperature Limit Tables
2. Upper-Shelf Energy Tables
3. Nomenclature Key

cc w/enclosures:
See next page

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Brunswick Steam Electric Plant
Units 1 and 2

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DISTRIBUTION:

Docket File
NRC & Local PDRs
PD2-1 Reading File
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ACRS (10)
S. Bajwa

Summary File for Pressure-Temperature Limits

Plant Name	Beltline Ident.	Heat No. Ident.	ID Neut. Fluence at EDL/EPY	IRT _{min}	Method of Determin. IRT _{min}	Chemistry Factor	Method of Determin. CP	%Cu	%Ni
Brunswick 1 EOL: 9/8/2016	Lower Shell	C4500-2	1.95E18	10°F	Plant Specific	106.7	Table	0.15	0.54
	Lower Shell	C4550-2	1.95E18	10°F ¹	Plant Specific	74	Table	0.11	0.60
	Lower Int. Shell	C4489-1	1.95E18	10°F ¹	Plant Specific	83	Table	0.12	0.60
	Lower Int. Shell	C4500-2	1.95E18	10°F ¹	Plant Specific	82.4	Table	0.12	0.57
	Nozzle N15A	Q2Q1W	1.60E17	40°F	Plant Specific	123	Table	0.16	0.82
	Nozzle N16B	Q2Q1W	1.60E17	40°F	Plant Specific	123	Table	0.16	0.82
	Axial Welds	S3986	1.95E18	10°F	Plant Specific	68	Table	0.05	0.96
	Circ. Weld	3P4000	1.95E18	10°F	Plant Specific	27	Table	0.02	0.90

REFERENCES FOR BRUNSWICK 1:

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

Fluence is from February 15, 1990, letter from N.B. Le (USNRC) to L.W. Ewy (CP&L), Subject: Issuance of Amendment 140 to DPR-71 and Amendment 172 to DPR-62.

Chemical composition and IRT data are from WEDC-24161, "Brunswick Steam Electric Station, Unit 1, Information on Reactor Vessel Surveillance Program.

Enclosure 1

¹Additional information required to confirm value.

Summary File for Pressure-Temperature Limits

Plant Name	Beltline Ident.	Heat No. Ident.	ID Neut. Fluence at EOL/EFPY	IRT _{max}	Method of Determin. IRT _{max}	Chemistry Factor	Method of Determin. CF	XCu	XNi
Brunswick 2 EOL: 12/27/2014	Lower Shell	C4535-2	1.95E18	10°F ¹	Plant Specific	82.6	Table	0.12	0.58
	Lower Shell	C4550-1	1.95E18	10°F ¹	Plant Specific	74	Table	0.11	0.60
	Lower Int. Shell	C4487-1	1.95E18	10°F ¹	Plant Specific	82.2	Table	0.12	0.56
	Lower Int. Shell	B8496-1	1.95E18	10°F ¹	Plant Specific	139.8	Table	0.19	0.58
	Nozzle N16A	Q201W	1.60E17	40°F ¹	Plant Specific	123	Table	0.16	0.82
	Nozzle N16B	Q201W	1.60E17	40°F ¹	Plant Specific	123	Table	0.16	0.82
	Axial Welds	S3986	1.95E18	10°F	Plant Specific	68	Table	0.05	0.96
	Circ. Weld	1P4218	1.95E18	10°F	Plant Specific	82	Table	0.06	0.87

REFERENCES FOR BRUNSWICK 2:

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

Fluence is from February 15, 1990, letter from N.B. Le (USNRC) to L.W. Ewy (CP&L), Subject: Issuance of Amendment 140 to DPR-71 and Amendment 173 to DPR-62.

Chemical composition and IRT data are from NEDC-24157, "Brunswick Steam Electric Station, Unit 2, Information on Reactor Vessel Surveillance Program.

Enclosure 1

¹Additional information required to confirm value.

Summary File for Upper Shelf Energy

Plant Name	Baseline Ident.	Heat No.	Material Type	1/4T USE at EOL/EFPY	1/4T Neutron Fluence at EOL/EFPY	Unirrad. USE	Method of Determin. Unirrad. USE
Brunswick 1 EOL: 9/8/2016	Lower Shell	C4500-2	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Shell	C4550-2	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Int. Shell	C4489-1	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Int. Shell	C4500-2	A 5338-1	EMA ²	1.42E18	EMA ²	
	Nozzle N16A	G201VW	A 508-2	EMA ²	1.16E17	EMA ²	
	Nozzle N16B	G201VW	A 508-2	EMA ²	1.16E17	EMA ²	
	Axial Welds	S3986	Linde 124, SAW	EMA ²	1.42E18	EMA ²	
	Circ. Weld	3P4000	Linde 124, SAW	EMA ²	1.42E18	EMA ²	

REFERENCES FOR BRUNSWICK 1:

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

Fluence for all other materials is from February 15, 1990, letter from W. B. Le (USNRC) to L. W. Eury (CP&L), subject: Issuance of Amendment 140 to DPR-71 and Amendment 172 to DPR-62.

Chemical composition data for all other materials are from NEDC-24161, "Brunswick Steam Electric Station, Unit 1, Information on Reactor Vessel Surveillance Program.

²Licensee must confirm applicability of Topical Report NEDO-32205, Rev. 1
Enclosure 2

Summary File for Upper Shelf Energy

Plant Name	Beltline Ident.	Heat No.	Material Type	1/4T USE at EOL/EFPY	1/4T Neutron Fluence at EOL/EFPY	Unirrad. USE	Method of Determin. Unirrad. USE
Brunswick 2 EOL: 12/27/2014	Lower Shell	C4535-2	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Shell	C4550-1	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Int. Shell	C4487-1	A 5338-1	EMA ²	1.42E18	EMA ²	
	Lower Int. Shell	BB496-1	A 5338-1	EMA ²	1.42E18	EMA ²	
	Nozzle #16A	Q201W	A 508-2	EMA ²	1.16E17	EMA ²	
	Nozzle #16B	Q201W	A 508-2	EMA ²	1.16E17	EMA ²	
	Axial Welds	83986	Linde 124, SAW	EMA ²	1.42E18	EMA ²	
	Circ. Weld	1P4218	Linde 124, SAW	EMA ²	1.42E18	EMA ²	

REFERENCES FOR BRUNSWICK 2:

Fluence and chemical composition data for #16A and #16B are from July 7, 1993 letter to NRC (Response to GL 92-01 RAI).

Fluence for all other materials is from February 15, 1990, letter from W. B. Le (USNRC) to L. W. Eury (CP&L), subject: Issuance of Amendment 140 to DPR-71 and Amendment 172 to DPR-62.

Chemical composition data for all other material are from NEDC-24157, "Brunswick Steam Electric Station, Unit 2, Information on Reactor Vessel Surveillance Program.

²Licensee must confirm applicability of Topical Report NEDO-32205, Rev. 1
Enclosure 2

Nomenclature and TablesPRESSURE-TEMPERATURE LIMIT TABLES AND USE TABLES FOR ALL BWR PLANTSNOMENCLATURE

Pressure-Temperature Limits Table

- Column 1: Plant name and date of expiration of license.
- Column 2: Beltline material location identification.
- Column 3: Beltline material heat number; for some welds that a single-wire or tandem-wire process has been reported, (S) indicates single wire was used in the SAW process, (T) indicates tandem wire was used in the SAW process.
- Column 4: End-of-life (EOL) neutron fluence at vessel inner wall; cited directly from inner diameter (ID) value or calculated by using Regulatory Guide (RG) 1.99, Revision 2 neutron fluence attenuation methodology from the quarter thickness (T/4) value reported in the latest submittal (GL 92-01, PTS, or P/T limits submittals).
- Column 5: Unirradiated reference temperature.
- Column 6: Method of determining unirradiated reference temperature (IRT).

Plant-Specific

This indicates that the IRT was determined from tests on material removed from the same heat of the beltline material.

MTEB 5-2

This indicates that the unirradiated reference temperature was determined from following MTEB 5-2 guidelines for cases where the IRT was not determined using American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section III, NB-2331, methodology.

Generic

This indicates that the unirradiated reference temperature was determined from the mean value of tests on material of similar types.

- Column 7: Chemistry factor for irradiated reference temperature evaluation.

Column 8: Method of determining chemistry factor

Table

This indicates that the chemistry factor was determined from the chemistry factor tables in RG 1.99, Revision 2.

Calculated

This indicates that the chemistry factor was determined from surveillance data via procedures described in RG 1.99, Revision 2.

Column 9: Copper content; cited directly from licensee value except when more than one value was reported. (Staff used the average value in the latter case.)

No Data

This indicates that no copper data has been reported and the default value in RG 1.99, Revision 2, will be used by the staff.

Column 10: Nickel content; cited directly from licensee value except when more than one value was reported. (Staff used the average value in the latter case.)

No Data

This indicates that no nickel data has been reported and the default value in RG 1.99, Revision 2, will be used by the staff.

Upper Shelf Energy Table

Column 1: Plant name and date of expiration of license.

Column 2: Beltline material location identification.

Column 3: Beltline material heat number; for some welds that a single-wire or tandem-wire process has been reported, (S) indicates single wire was used in the SAW process. (T) indicates tandem wire was used in the SAW process.

Column 4: Material type; plate types include A 533B-1, A 302B, A 302B Mod., and forging A 508-2; weld types include SAW welds using Linde 80, 0091, 124, 1092, ARCOS-B5 flux, Rotterdam welds using Graw Lo, SMIT 89, LW 320, and SAF 89 flux, and SMAW welds using no flux.

Column 5: EOL upper-shelf energy (USE) at T/4; calculated by using the EOL fluence and either the cooper value or the surveillance data. (Both methods are described in RG 1.99, Revision 2.)

EMA

This indicates that the USE issue may be covered by the approved equivalent margins analysis in the BWR Owners Group Topical Report: NEDO-32205, Revision 1.

Column 6: EOL neutron fluence at T/4 from vessel inner wall; cited directly from T/4 value or calculated by using RG 1.99, Revision 2 neutron fluence attenuation methodology from the ID value reported in the latest submittal (GL 92-01, PTS, or P/T limits submittals).

Column 7: Unirradiated USE.

EMA

This indicates that the USE issue may be covered by the approved equivalent margins analysis in the BWR Owners Group Topical Report: NEDO-32205, Revision 1.

Column 8: Method of determining unirradiated USE

Direct

For plates, this indicates that the unirradiated USE was from a transverse specimen. For welds, this indicates that the unirradiated USE was from test date.

65%

This indicates that the unirradiated USE was 65% of the USE from a longitudinal specimen.

Generic

This indicates that the unirradiated USE was reported by the licensee from other plants with similar materials to the beltline material.

NRC generic

This indicates that the unirradiated USE was derived by the staff from other plants with similar materials to the beltline material.

10, 30, 40, or 50 °F

This indicates that the unirradiated USE was derived from Charpy test conducted at 10, 30, 40, or 50 °F.

Surv. Weld

This indicates that the unirradiated USE was from the surveillance weld having the same weld wire heat number.

Equiv. to Surv. Weld

This indicates that the unirradiated USE was from the surveillance weld having different weld wire heat number.

Sister Plant

This indicates that the unirradiated USE was derived by using the reported value from other plants with the same weld wire heat number.

Blank

indicates that there is insufficient data to determine the unirradiated USE. These licensees will utilize Topical Report NEDO-32205, Revision 1 to demonstrate USE compliance to Appendix G, 10 CFR Part 50.