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May 1, 1997

SERIAL: BSEP 97-0104

U. S. Nuclear Regulatory Commission
ATTN: 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
NUREG-0313 INSPECTION OF CATEGORY E WELDS

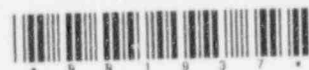
Gentlemen:

The purpose of this letter is to request NRC concurrence with Carolina Power & Light (CP&L) Company's plan to resume the examination schedule of Table IWB-2500-1 of the American Society of Mechanical Engineers (ASME) Code, Section XI, for certain Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2 reactor recirculation system welds. Currently, CP&L is following the examination schedule specified in NRC Generic Letter 88-01 and NUREG-0313 for performing augmented inspections of these welds. A discussion of the technical bases for CP&L's revised inspection plans is provided in Enclosures 1 and 2. A list of the regulatory commitments contained in this submittal is provided in Enclosure 3.

CP&L's plan for resuming the examination schedule of Table IWB-2500-1 of the ASME Code, Section XI for these welds provides an equivalent level of quality and safety while significantly reducing personnel radiation exposure. CP&L considers this request to revert back to the original weld examination interval in the ASME Code, Section XI to be a regulatory burden reduction item with anticipated savings in excess of \$1,000,000 for the remaining period of operation currently authorized by the operating licenses.

Approval of this plan to resume the examination schedule of the identified reactor recirculation system welds in accordance with the ASME Code, Section XI instead of the schedule for performing augmented inspections of these welds specified in NRC Generic Letter 88-01 and NUREG-0313 is requested by August 1, 1997, in order to support planning activities for the next BSEP Unit No. 2 refuel outage. The next BSEP Unit No. 2 refuel outage is scheduled to commence on September 13, 1997.

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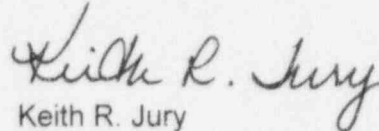


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Please refer any questions regarding this submittal to Mr. Mark Turkal, Supervisor - Licensing,
at (910) 457-3066.

Sincerely,



Keith R. Jury
Manager - Regulatory Affairs
Brunswick Steam Electric Plant

WRM/wrm

Enclosures:

1. Summary of Technical Basis
2. Structural Integrity Associates Report SIR-96-114

pc (with enclosures):

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The Honorable J. A. Sanford
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ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
NRC DOCKET NOS. 50-325 AND 50-324
OPERATING LICENSE NOS. DPR-71 AND DPR-62
NUREG-0313 INSPECTION OF CATEGORY E WELDS

SUMMARY:

The purpose of this submittal is to request U.S. Nuclear Regulatory Commission (NRC) concurrence with Carolina Power & Light (CP&L) Company's plan to discontinue the schedule for augmented inspections of Category E weld overlay repairs in accordance with NRC Generic Letter 88-01, "NRC Position On IGSCC In BWR Austenitic Stainless Steel Piping" and NUREG-0313, Revision 2, "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping" at the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. Instead, CP&L proposes to resume the examinations for these welds in accordance with the schedule specified in Table IWB-2500-1 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI.

DISCUSSION:

On January 25, 1988, the NRC issued Generic Letter 88-01, "NRC Position On IGSCC In BWR Austenitic Stainless Steel Piping." Subsequently, Supplement 1 of NRC Generic Letter 88-01 was issued on February 4, 1992. The NRC staff's positions on intergranular stress corrosion cracking (IGSCC) in boiling water reactor (BWR) austenitic stainless steel piping were provided in Attachment A to the Generic Letter supplement. The technical bases for these positions were detailed in NUREG-0313, Revision 2, "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping."

Section 5.3 of NUREG-0313, Revision 2 defines the categories of piping welds that are considered susceptible to degradation mechanisms such as IGSCC (e.g., Categories A through G). Category E welds are defined as those with known cracks, but which have been reinforced by an acceptable weld overlay or have been mitigated by a stress improvement treatment (inductive heat stress improvement or mechanical stress improvement process) with subsequent examination by qualified examiners and procedures to verify the extent of cracking. A summary of the NRC staff position on inspection schedules for each of these categories is given in Section 5.3.2.5 and Table 2 of NUREG-0313, Revision 2. For Category E welds, these were to be inspected at least once every two refueling cycles following the repair.

Currently, Technical Specification 4.0.5.f for each BSEP unit requires the in-service inspection program for piping identified in NRC Generic Letter 88-01 to be performed in accordance with the staff positions on schedule, methods, and sample expansion included in this generic letter.

Weld overlays have been in service at BSEP Unit Nos. 1 and 2 since 1984. Weld overlays were applied to various locations in the reactor recirculation system, including the 4-inch recirculation bypass lines, the 12-inch risers, the 22-inch ring header, and the 28-inch

recirculation suction and discharge piping. The 12-inch riser piping has since been replaced on both BSEP Unit No. 1 and BSEP Unit No. 2 with corrosion resistant nuclear-grade stainless steel. BSEP Unit No. 1 has 10 Category E weld overlays in service; BSEP Unit No. 2 has 14 Category E weld overlays in service.

At the time these overlays were applied, the applicable construction code (i.e., ANSI B31.1.0) and the ASME Code, Section XI, did not address weld overlay reinforcement. Therefore, weld overlay reinforcements were considered an interim repair to the IGSCC-affected location with an indeterminate service life. For this reason, successive inspections were required consistent with the ASME Code, Section XI methodology (i.e., IWB-2420), for operation with defects which were shown to be acceptable for continued operation.

Since the Category E weld overlays repairs were placed in service at BSEP Unit Nos. 1 and 2, they have been examined numerous times using ultrasonic techniques, inspection criteria, and examination frequencies which meet the criteria of NUREG-0313 and applicable EPRI guidance. Category E weld overlay repairs have been examined at least three times using qualified methods with the exception of one weld, 2B32-RR-28-B-10, which has had only two augmented examinations. None of these examinations have identified evidence of flaw propagation into the weld overlay repair or within the outer 25 percent of the component base metal. Thus, applying the methodology of the ASME Code, Section XI (e.g., IWB-2420), reverting back to the original examination schedule for those components which have been examined at least three times with no evidence of flaw propagation, would be acceptable. With respect to the 2B32-RR-28-B-10 weld, the results of the two augmented inspections for this weld and the inspection results for the other 23 welds show no change and demonstrate that IGSCC is either no longer active or is not propagating in the weld overlay repairs. Therefore, CP&L intends to include the 2B32-RR-28-B-10 weld with the group of 23 other welds that will be returned to the examination schedule of Table IWB-2500-1 of the ASME Code, Section XI.

In addition to these welds being examined with no evidence of degradation, the weld overlay repairs applied at BSEP Unit Nos. 1 and 2 are in accordance with applicable ASME Codes and NRC-approved industry practices. Applying the recognized methods of ASME Code, Section III and Section XI, during the analysis and design of these weld overlay repairs, the reactor recirculation piping was restored to its original design requirements. However, the weld overlay as a repair was not addressed in the construction code or Section XI at the time they were applied. For this reason, a review was performed to demonstrate that the existing weld overlay repairs at BSEP Unit Nos. 1 and 2 are equivalent to current Code standards (i.e., ASME Code Case N-504) with regards to structural capability and material.

In 1992, the application of weld overlay repairs on austenitic stainless steel was accepted as an ASME Code approved repair through Section XI Code Case N-504, "Alternative Rules for Repair of Class 1, 2 and 3 Austenitic Stainless Steel Piping." ASME Code Case N-504 was accepted by the NRC staff in Regulatory Guide 1.147, Revision 11. Applying the criteria outlined in ASME Code Case N-504, the existing weld overlay repairs in their as-built condition (i.e., structural capability and material), are equivalent to an ASME Code acceptable repair if they were designed today.

In addition to CP&L's reviews, Structural Integrity Associates was contracted to perform an independent review of the existing weld overlay repairs. The purpose of this independent review was to demonstrate that each weld overlay repair had been examined consistent with

the requirements of the governing regulatory guidance (i.e., NUREG-0313, Revision 2) and was adequate with regard to structural capability and materials compared to the current design basis standards (e.g., NUREG-0313, Revision 2 and ASME Code, Section XI Case N-504). A report for the Structural Integrity Associates evaluations has been prepared (Report Number SIR-96-114, Revision 1) and is attached as Enclosure 2 to this letter.

CONCLUSION:

Reviews of plant repair and inspection records have shown that: (1) the as-built weld overlay repairs provide structural adequacy which would meet the current design standards for such repairs, (2) inspections have been performed on existing weld overlay repairs which effectively demonstrate that the structural adequacy of the repairs has not degraded over the life of the repair, and (3) multiple inspections show no change from previous inspections. The ASME Code, Section XI, paragraph IWB-2420, specifies that a location containing a flaw which has been shown to be acceptable for three successive augmented intervals can be returned to a normal inspection interval. In the case of 23 weld overlay repairs, the equivalent of an ASME Code acceptable repair has been applied to the flaw and three or more augmented inspections have been performed. One BSEP Unit No. 2 28-inch weld (e.g., 2B32-RR-28-B-10) has had only two inspections. However, based on the results from these two augmented inspections showing no change for the 2B32-RR-28-B-10 weld, and the fact that the inspection results for the other 23 welds also showing no change, IGSCC is either no longer active or is not propagating in these 24 weld overlay repairs. Accordingly, CP&L plans to return the 24 welds to the standard ASME Code, Section XI inspection interval and requests NRC concurrence with these plans.

CP&L has concluded that continued examination of Category E weld overlay repaired locations on the augmented schedule defined in NUREG-0313, Revision 2 does not enhance the safety of the repaired location. In addition, there is significant accumulation of personnel radiation exposure associated with the augmented inspection of these welds. The personnel radiation exposure associated with these augmented inspections is dependent on the time it takes to remove and reinstall insulation and/or interferences, prepare the weld for examination, and perform the examination. Based on the current augmented inspection schedule, exposure savings of approximately 72 person-rem over the remaining period of operation authorized by the respective operating licenses, should result from the approval to revert back to the original examination interval outlined in Table IWB-2500-1 of the ASME Code, Section XI. Therefore, the continued imposition of the augmented schedule for Category E weld overlay repairs constitutes a hardship in the area of personnel exposure without a compensating increase in quality and safety.

Accordingly, CP&L plans to return to the standard ASME Code, Section XI examination interval outlined in Table IWB-2500-1 and requests NRC approval of these plans. Continued examination at the standard ASME Code, Section XI interval, along with the staff's position on inspection methods, will provide assurance of the integrity of these locations since the repairs are passive with respect to continued degradation.

BSEP Technical Specification 4.0.5.f states that the Inservice Inspection Program for piping identified in NRC Generic Letter 88-01 shall be performed in accordance with the staff positions on schedule, methods and personnel and sample expansion included in this letter. CP&L plans to return the identified welds to the standard ASME Code, Section XI examination interval. As a

result, CP&L plans to submit a license amendment request by May 30, 1997, to modify Technical Specification 4.0.5.f to allow for NRC staff approved alternatives for in-service inspection of piping addressed by NRC Generic Letter 88-01.

Approval of this plan to resume inspections of the identified reactor recirculation system welds in accordance with the Inservice Inspection Program instead of performing augmented inspections of these welds in accordance with NRC Generic Letter 88-01 and NUREG-0313 is requested by August 1, 1997, in order to support planning activities for the next BSEP Unit No. 2 refuel outage. The next BSEP Unit No. 2 refuel outage is scheduled to commence on September 13, 1997.

REFERENCES:

1. NRC Generic Letter 88-01, "NRC Position On IGSCC In BWR Austenitic Stainless Steel Piping," January 25, 1988.
2. NUREG-0313, Revision 2, "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping."
3. NRC Generic Letter 88-01, Supplement 1, "NRC Position On Intergranular Stress Corrosion Cracking (IGSCC) In BWR Austenitic Stainless Steel Piping." February 4, 1992.
4. Structural Integrity Associates Report No. SIR-96-128, "Augmented Inspection Activities of Category E Weld Overlay Repairs at Brunswick Nuclear Plant, units 1 and 2: Evaluation Report," January 1997.
5. Structural Integrity Associates report No. SIR-96-114, "Evaluation of the Design and Inspection History of Weld Overlay Repairs at Brunswick Nuclear Plant, Units 1 and 2," December 1996.

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
NRC DOCKET NOS. 50-325 AND 50-324
OPERATING LICENSE NOS. DPR-71 AND DPR-62
NUREG-0313 INSPECTION OF CATEGORY E WELDS

STRUCTURAL INTEGRITY ASSOCIATES REPORT SIR-96-114