October 04, 2001

Mr. J. S. Keenan, Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2 - SAFETY EVALUATION FOR PROPOSED ALTERNATIVE IN ACCORDANCE WITH 10 CFR 50.55a(a)(3)(i) FOR SURVEILLANCE TESTING FREQUENCY OF EXCESS FLOW CHECK VALVES (TAC NOS. MB1046 AND MB1047)

Dear Mr. Keenan:

By letter dated January 17, 2001, you requested that the NRC approve an alternative to the testing frequencies of the excess flow check valves (EFCVs) on instrument process lines that penetrate the primary containment and are part of the reactor coolant pressure boundary at the Brunswick Steam Electric Plant, Units 1 and 2. These surveillance tests are required by Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Subarticle IWV-11, "Valve Testing." The alternative was proposed pursuant to the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i) and is consistent with the guidance provided in Technical Specification Task Force (TSTF)-334.

The NRC staff has determined that you have provided an acceptable alternative examination frequency for inservice testing of EFCVs. The staff further finds that authorization of your alternative examination would provide assurance of structural integrity and, therefore, an acceptable level of quality and safety. Accordingly, pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) and 10 CFR 50.55a(a)(3)(i), your proposed alternative examination is authorized. The staff's Safety Evaluation is enclosed.

Please contact Donnie Ashley at (301) 415-3191 if you have any questions regarding this matter.

Sincerely,

/RA/
Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-324 and 50-325

Enclosure: As stated

cc w/encl: See next page

Mr. J. S. Keenan, Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

October 04, 2001

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2 - SAFETY EVALUATION FOR PROPOSED ALTERNATIVE IN ACCORDANCE WITH 10 CFR 50.55a(a)(3)(i) FOR SURVEILLANCE TESTING FREQUENCY OF EXCESS FLOW CHECK VALVES (TAC NOS. MB1046 AND MB1047)

Dear Mr. Keenan:

By letter dated January 17, 2001, you requested that the NRC approve an alternative to the testing frequencies of the excess flow check valves (EFCVs) on instrument process lines that penetrate the primary containment and are part of the reactor coolant pressure boundary at the Brunswick Steam Electric Plant, Units 1 and 2. These surveillance tests are required by Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Subarticle IWV-11, "Valve Testing." The alternative was proposed pursuant to the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i) and is consistent with the guidance provided in Technical Specification Task Force (TSTF)-334.

The NRC staff has determined that you have provided an acceptable alternative examination frequency for inservice testing of EFCVs. The staff further finds that authorization of your alternative examination would provide assurance of structural integrity and, therefore, an acceptable level of quality and safety. Accordingly, pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) and 10 CFR 50.55a(a)(3)(i), your proposed alternative examination is authorized. The staff's Safety Evaluation is enclosed.

Please contact Donnie Ashley at (301) 415-3191 if you have any questions regarding this matter.

Sincerely,

/RA/
Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-324 and 50-325

Enclosure: As stated

cc w/encl: See next page

Distribution:

File Center	DAshley	EDunnington	DTerao	BBonser, RII
PUBLIC	PDII R/F	EDO	ACRS	HBerkow
YSHuang	RCorreia	OGC	GHill (4)	

DOCUMENT NAME: C:\Program Files\Adobe\Acrobat 4.0\PDF Output\Brunswick - Relief request-~.wpd
*No substantive change to SE Accession Number ML012830504

OFFICE	PDII-2\PM	PDII-2\LA	DSSA	OGC	PDII-2\SC
NAME	DAshley	EDunnington	RBarrett*	DCummings	RCorreia
DATE	9/27/01	9/27/01	9/15/01	9/28/01	10/4/01

cc:

Mr. William D. Johnson
Vice President and Corporate Secretary
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Mr. Donald E. Warren
Brunswick County Board of Commissioners
Post Office Box 249
Bolivia, North Carolina 28422

Resident Inspector
U.S. Nuclear Regulatory Commission
8470 River Road
Southport, North Carolina 28461

Mr. John H. O'Neill, Jr.
Shaw, Pittman, Potts & Trowbridge
2300 N Street, NW.
Washington, DC 20037-1128

Mr. Mel Fry, Director
Division of Radiation Protection
N.C. Department of Environment
and Natural Resources
3825 Barrett Dr.
Raleigh, North Carolina 27609-7721

Mr. C. J. Gannon
Plant Manager
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10429
Southport, North Carolina 28461

Public Service Commission
State of South Carolina
Post Office Drawer 11649
Columbia, South Carolina 29211

Ms. Margaret A. Force
Assistant Attorney General
State of North Carolina
Post Office Box 629
Raleigh, North Carolina 27602

Mr. Robert P. Gruber
Executive Director
Public Staff - NCUC
Post Office Box 29520
Raleigh, North Carolina 27626-0520

Mr. J. J. Lyash
Director - Site Operations
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10429
Southport, North Carolina 28461

Mr. Norman R. Holden, Mayor
City of Southport
201 East Moore Street
Southport, North Carolina 28461

Mr. Dan E. Summers
Emergency Management Coordinator
New Hanover County Department of
Emergency Management
Post Office Box 1525
Wilmington, North Carolina 28402

Mr. Terry C. Morton
Manager
Performance Evaluation and
Regulatory Affairs CPB 7
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602-1551

Mr. David C. DiCello
Manager - Regulatory Affairs
Carolina Power & Light Company
Post Office Box 10429
Southport, NC 28461

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST FOR EXCESS FLOW CHECK VALVE TESTING FREQUENCY

BRUNSWICK STEAM ELECTRIC PLANT UNIT NOS. 1 AND 2

CAROLINA POWER & LIGHT COMPANY

DOCKET NOS. 50-324 AND 325

1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves are performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. Guidance related to the development and implementation of IST programs is given in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," issued April 3, 1989, and its Supplement 1 issued April 4, 1995. Also see NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," and NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements."

The 1989 Edition of the ASME Code is the applicable Code of record for the third 10-year interval IST program at the Brunswick Steam Electric Plant (BSEP). Subsection IWV of the 1989 Edition, which gives the requirements for IST of valves, references Part 10 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-10) as the rules for IST of valves. OM-10 replaces specific requirements in previous editions of Section XI, Subsection IWV, of the ASME Code. Subsection IWP of the 1989 Edition, which gives the requirements for IST of pumps, references Part 6 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-6) as the rules for IST of pumps. OM-6 replaces specific requirements in previous editions of Section XI, Subsection IWP, of the ASME Code.

By letter dated January 17, 2001, Carolina Power & Light Company (CP&L) submitted a valve relief request (VRR-14) for BSEP. CP&L requests relief for excess flow check valves (EFCVs) from ASME Code inservice tests that are required to be performed every refueling outage, and from the bienniel requirement to verify that the valve position is accurately indicated. The staff has completed its review of the relief request and is providing the following evaluation.

2.0 RELIEF REQUEST VRR-14 (REV. 0)

The licensee requests relief for the following EFCVs from the ASME Code inservice tests that are required to be performed every refueling outage as specified in OM-10 Code, Paragraph 4.3.2.2, and from the bienniel requirements (Paragraph 4.1 of OM-10 Code) of verifying that the valve position is accurately indicated. The relief request allows that a representative sample of the affected EFCVs be tested each refueling cycle such that each EFCV will be tested at least once every 10 years.

Excess Flow Check Valves Included in Relief Request VRR-14

1/2-B21-F008	1/2-B-21-F049C	1/2-B21-F058G	1/2-E51-F043A
1/2-B21-F014A	1/2-B-21-F042B	1/2-B21-F058H	1/2-E51-F043B
1/2-B21-F014B	1/2-B-21-F044B	1/2-B21-F058L	1/2-E51-F043C
1/2-B21-F014C	1/2-B-21-F046B	1/2-B21-F058M	1/2-E51-F043D
1/2-B21-F014D	1/2-B-21-F047D	1/2-B21-F058N	
1/2-B21-F014E	1/2-B-21-F048B	1/2-B21-F058P	1/2-B32-F042A
1/2-B21-F014F	1/2-B-21-F049D	1/2-B21-F058R	1/2-B32-F041A
1/2-B21-F014G	1/2-B-21-F050A	1/2-B21-F058S	1/2-B32-F042B
1/2-B21-F014H	1/2-B-21-F050B	1/2-B21-F058T	1/2-B32-F041B
1/2-B21-F014K	1/2-B-21-F050D	1/2-B21-F058U	1/2-B32-F058A
1/2-B21-F014J	1/2-B-21-F052A	1/2-B21-F060	1/2-B32-F039C
1/2-B21-F014L	1/2-B-21-F052B		1/2-B32-F039A
1/2-B21-F014M	1/2-B-21-F052C	1/2-B21-IV-2149	1/2-B32-F006A
1/2-B21-F014N	1/2-B-21-F050C	1/2-B21-IV-2455	1/2-B32-F005A
1/2-B21-F014P	1/2-B-21-F052D	1/2-B21-IV-2456	1/2-B32-F042D
1/2-B21-F014R	1/2-B-21-F054	1/2-B21-IV-2196	1/2-B32-F041D
1/2-B21-F014S	1/2-B-21-F056		1/2-B32-F042C
1/2-B21-F040	1/2-B-21-F058A	1/2-E21-F017A	1/2-B32-F041C
1/2-B21-F042A	1/2-B-21-F058B	1/2-E21-F017B	1/2-B32-F058B
1/2-B21-F044A	1/2-B-21-F058C		1/2-B32-F039B
1/2-B21-F046A	1/2-B-21-F058D	1/2-E41-F023A	1/2-B32-F039D
1/2-B21-F047C	1/2-B-21-F058E	1/2-E41-F023B	1/2-B32-F005B
1/2-B21-F048A	1/2-B-21-F058F	1/2-E41-F023C	1/2-B32-F006B
		1/2-E41-F023D	

2.1 Basis for Relief

The licensee states:

> An excess flow check valve is provided in each instrument process line that penetrates the primary containment and is part of the reactor coolant pressure boundary. The excess flow check valve is designed so that: (1) it will not close accidentally during normal operation, (2) [it] will close if a rupture of the instrument line is indicated downstream of the valve, (3) [it] can be re-opened when appropriate, and (4) [it] has its status indicated in the control room.
>
> Because of the design of excess flow check valves, verifying their closure indication requires a simulated instrument line break. Based on the burden and costs associated with testing these excess flow check valves, CP&L is proposing to perform the exercise

tests and valve position verification test on a sampling basis (i.e., approximately an equal number of excess flow check valves every 24 months such that each excess flow check valve is tested at least once every 10 years).

CP&L has determined that alternative excess flow check valve testing will provide an acceptable level of quality and safety for the following reasons:

1. Excess flow check valves are a simple and reliable device. The major components are a poppet and spring. The spring holds the poppet open only under static conditions, such that the valve will close upon sufficient differential pressure across the poppet. Functional testing of the valve is accomplished by venting the instrument side of the tube. The resultant increase in flow imposes a differential pressure across the poppet, which compresses the spring and decreases flow through the valve.

2. The Boiling Water Reactor Owners' Group (BWROG) has developed a basis, documented in Topical Report B21-00658-01, "Excess Flow Check Valve Testing Frequency Relaxation," dated November 1988, for reducing the EFCV testing frequency. The report was initially submitted to the NRC as part of a Duane Arnold Energy Center proposed license amendment on April 12, 1999. The BWROG report was supplemented by BWROG letter dated January 6, 2000, "Generic Response to NRC Request for Additional Information on Lead Plant Technical Specification Change Request Regarding Excess Flow Check Valve Surveillance Requirements." The report was approved for use by an NRC Safety Evaluation dated March 14, 2000. Additionally, issues raised by the NRC in the March 14, 2000, Safety Evaluation were addressed in the issuance of General Electric Topical Report NEDO-32977-A (i.e., BWROG Topical Report B21-00658-01), "Excess Flow Check Valve Testing Relaxation," dated June 2000. Technical Specification Task Force (TSTF) Item Number 334 (i.e., TSTF-334) was previously submitted to the NRC and was approved on September 18, 2000.

   The BWROG topical report concluded that the change in excess flow check valve test frequency has an insignificant impact on excess flow check valve reliability. The topical report evaluated the reliability of excess flow check valves at various boiling water reactor plants, including BSEP, based on information covering a 10-year period. Industry experience with excess flow check valves indicate that they have very low failure rates. A large portion of the reported test failures at other plants was related to test methodologies and not actual valve failures.

   Excess flow check valves have been extremely reliable throughout the industry. At BSEP, since 1995, no excess flow check valves have failed to close due to actual valve failure.

3. An orifice is installed on each of the affected instrument lines. The orifice limits leakage to a quantity where the integrity and functional performance of secondary containment and the associated safety systems are maintained. The process fluid loss for a postulated rupture of an instrument line is within the capability of the reactor coolant makeup systems.

4. The reduced testing associated with the alternative will result in an increase in the availability of the associated instrumentation during plant refueling outages. The

reduced testing associated with the alternative will also reduce occupational radiological exposure.

5. The relief request will match the IST Program requirements to those of the Surveillance Requirement in the proposed license amendments accompanying this relief request.

2.2 Alternative Testing

The licensee states:

> CP&L proposes to test a representative sample of excess flow check valves consisting of an approximately equal number of excess flow check valves every 24 months, such that each excess flow check valve will be tested at least once every 10 years.
>
> In addition, CP&L proposes to verify the open position indication at a frequency more often than what the ASME Code requires, but verify the close position indication in conjunction with excess flow check valve tests.

3.0 EVALUATION

EFCVs are installed on boiling-water reactor instrument lines to limit the release of fluid in the event of an instrument line break. Examples of EFCV installations include reactor pressure vessel level and pressure instrumentation, main steam line flow instrumentation, recirculation pump suction pressure, and reactor core isolation cooling steam line flow instrumentation. EFCVs are not required to close in response to a containment isolation signal and are not required to operate under post loss-of-coolant accident conditions.

The BSEP technical specification (TS) surveillance requirement (SR 3.6.1.3.7) requires the EFCVs to be tested for proper operation every 24 months. The BSEP IST program has deferred the quarterly testing of these valves to refueling outage. The proposed TS amendment and the relief request VRR-14 revise the test frequency by allowing a "representative sample" of EFCVs to be tested every 24 months. The "representative sample" is based on approximately 20 percent of the EFCVs being tested each refueling outage such that each valve is tested at least once every 10 years.

The licensee's justification for the TS amendment and the relief request is based on General Electric Nuclear Energy (GE) Topical Report NEDO-32977-A, "Excess Flow Check Valve Testing Relaxation" dated June 2000. The topical report provided: (1) an estimate of steam release frequency (into the reactor building) due to a break in an instrument line concurrent with an EFCV failure to close and (2) an assessment of the radiological consequences of such a release. The staff reviewed the GE topical report and issued its evaluation on March 14, 2000. In its evaluation, the staff found that the test interval may be extended up to a maximum of 10 years. In conjunction with this finding, the staff noted that each licensee that adopts the relaxed test interval program for EFCVs must have a failure feedback mechanism and corrective action program to ensure EFCV performance continues to be bounded by the topical report results. Also, each licensee is required to perform a plant-specific radiological dose assessment, EFCV failure analysis, and release frequency analysis to confirm that they are bounded by the generic analyses of the topical report.

In this Safety Evaluation, the staff reviewed the licensee's proposal for its applicability to GE Topical Report NEDO-32977-A and conformance with staff's guidance regarding radiological dose assessment, EFCV failure rate and release frequency, and the proposed failure feedback mechanism and corrective action program. Based on its review, the staff concludes that the radiological consequences of an EFCV failure are sufficiently low and acceptable, and that the alternative testing in conjunction with the corrective action plan provides a high degree of valve reliability and operability. Additionally, an orifice is installed upstream of the EFCVs to limit reactor water leakage in the event of rupture. The orifice limits leakage to a level where the integrity and functional performance of secondary containment and associated safety systems are maintained. Therefore, the staff finds that the licensee's proposed test alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

Based on the above evaluation, the staff finds the proposed extension of the BSEP test frequency allowing a representative sample of EFCVs to be tested every 24 months with all EFCVs being tested at least once every 10 years to be acceptable. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), relief request VRR-14 is authorized for use on the basis that the proposed alternative provides an acceptable level of quality and safety.

Principal Contributor: Y. S. Huang, EMEB/DE

Date: October 04, 2001