Progress Energy

Michael J. Annacone
Vice President
Brunswick Nuclear Plant

December 14, 2011

Serial: BSEP 11-0108

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit No. 2
Renewed Facility Operating License No. DPR-62
Docket No. 50-324
Response to Integrated Inspection Report Nos.: 05000325/2011004 and 05000324/2011004

Reference: Letter from Randall A. Musser, Chief Reactor Projects Branch 4 Division of Reactor Projects (U.S. NRC) to Michael Annacone, Vice President - Brunswick Steam Electric Plant, "Brunswick Steam Electric Plant - NRC Integrated Inspection Report Nos.: 05000325/2011004 and 05000324/2011004," dated November 14, 2011

Ladies and Gentlemen:

Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., contests the licensee identified violation (LIV), concerning Technical Specification 3.3.6.1, Primary Containment Isolation Instrumentation, discussed in section 4OA7 of Integrated Inspection Report Nos.: 05000325/2011004 and 05000324/2011004, dated November 14, 2011. The basis for this disagreement is provided in the enclosure to this submittal.

No regulatory commitments are contained in this submittal. Please refer any questions regarding this submittal to Ms. Annette Pope, Supervisor - Licensing/Regulatory Programs, at (910) 457-2184.

Sincerely,

Michael J. Annacone

Progress Energy Carolinas, Inc.
P.O. Box 10429
Southport, NC 28461

T > 910.457.3698

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Enclosure:
Denial of Licensee Identified Violation
Technical Specification 3.3.6.1, Primary Containment Isolation Instrumentation

cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Victor M. McCree, Regional Administrator
245 Peachtree Center Avenue, NE, Suite 1200
Atlanta, GA 30303-1257

U. S. Nuclear Regulatory Commission
ATTN: Director, Office of Enforcement
Washington, DC 20555-0001

U. S. Nuclear Regulatory Commission
ATTN: Mr. Philip B. O'Bryan, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission **(Electronic Copy Only)**
ATTN: Mrs. Farideh E. Saba (Mail Stop OWFN 8G9A)
11555 Rockville Pike
Rockville, MD 20852-2738

Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

Denial of Licensee Identified Violation
Technical Specification 3.3.6.1, Primary Containment Isolation Instrumentation

Licensee Identified Violation (LIV) Details

Section 4OA7 of Integrated Inspection Report Nos.: 05000325/2011004 and 05000324/2011004, dated November 14, 2011, contains the following LIV.

> Technical Specification (TS) 3.3.6.1, Primary Containment Isolation Instrumentation, requires that the RWCU high differential flow instrumentation be operable in modes 1, 2, or 3. If the instrumentation is not operable, then TS 3.3.6.1 requires that the RWCU penetration flow path be isolated within 1 hour. Contrary to the above, the licensee identified that the RWCU high differential flow instrumentation was not operable and the penetration flow path was not isolated when the unit entered mode 1 on April 16, 2011 until August 2, 2011, because the RWCU inlet flow sensing element was installed backwards, causing the flow sensing element to be inaccurate. The resulting inaccuracy caused the instrumentation to be unable to isolate within the required TS limit of less than or equal to 73 gallons per minute differential flow. The finding was determined to be of very low safety significance per Appendix A of Inspection Manual Chapter 0609, Significance Determination Process, because the finding: 1) did not represent a degradation of the radiological barrier function provided for the control room, auxiliary building, spent fuel pool, or the standby gas treatment system, 2) did not represent a degradation of the barrier function of the control room against smoke or a toxic atmosphere, and 3) did not represent an actual open pathway in the physical integrity of reactor containment. Upon discovery of the condition, the licensee isolated the affected penetration flow path and installed the flow sensing element correctly. The issue is in the licensee's CAP as NCR #479248.

Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., is contesting the LIV.

Basis for Denial

CP&L has evaluated the impact of the improperly installed Unit 2 Reactor Water Cleanup (RWCU) inlet flow sensing element and determined that the uncertainty introduced by the condition was not sufficient to render the RWCU Differential Flow - High instrumentation (i.e., Function 5.a of TS Table 3.3.6.1-1) inoperable.

The calibration of this instrumentation, in accordance with Surveillance Requirement (SR) 3.3.6.1.6, does not include "unmeasurable" uncertainties that are related to effects that will not be present during surveillance testing (e.g., flow orifice effects). Rather, these unmeasurable uncertainties are accounted for in the margin between the TS allowable value and the analytical limit. The allowable value for the RWCU Differential Flow - High instrumentation, per TS Table 3.3.6.1-1, "Primary Containment Isolation Instrumentation," is $\leq$ 73 gpm. The analytical limit,

per Updated Final Safety Analysis Report (UFSAR) Table 7-9, "Isolation Signals and Setpoints," is ≤ 300 gpm. The RWCU Differential Flow - High instrumentation allowable value of ≤ 73 gpm was established in Amendments 166 and 197 to the Unit 1 and 2 TSs, respectively, issued October 14, 1993 (i.e., ADAMS Accession Number ML020350482). The Safety Evaluation (SE) for these amendments specifically addresses the application of measurable and unmeasurable uncertainties. Section 2.6.4 of the SE states:

> The licensee's calculation 0RWCU-0010 defines the magnitude of the uncertainty associated with the reactor water cleanup system isolation differential flow trip function setpoint. The uncertainties are characterized as either "measurable" or "unmeasurable." The measurable uncertainties are those attributable to effects that may be present during surveillance testing. The unmeasurable uncertainties are those related to effects that will not be present during surveillance testing (e.g., flow orifice effects, seismic events, post-accident environmental conditions).
>
> The requested increase in the TS allowable value is intended to establish a difference between the actual field calibration setpoint and the new allowable value that is large enough to bound the sum of the measurable uncertainties present during surveillance testing conditions and a nominal additional "LER avoidance" margin. The licensee's calculation demonstrates that satisfaction of the proposed allowable value during surveillance testing will assure that the 300 gal/min analytical limit will not be exceeded during any postulated plant events.
>
> The staff has reviewed the licensee's submittal as discussed above and finds the proposed changes to the RWCU system high differential flow, time-delay trip setpoint and allowable value will have no adverse impact on safety and will not pose an undue risk to the public because the calculated offsite and control room doses continue to be less than the limits of 10 CFR Part 100 and GDC 19.
>
> The staff has determined that this analysis is satisfactory.

Surveillance testing can only confirm a limited number of uncertainty components. The acceptable band between a setpoint and an allowable value only addresses uncertainties associated with the specific devices included within the bounds of the test and, even for those included devices, only the specific uncertainties that are expected to be applicable at the time of the test. Performance of the flow element is not included in surveillance testing of the instrument channel. Current industry guidance documents support the treatment of uncertainties as measureable or unmeasurable. Annex I, "Recommendations for inclusion of instrument uncertainties during normal operation in the as-found tolerance determination," of ISA-RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," states, in part:

> Therefore, of the uncertainties listed in ANSI/ISA-67.04.01-2006, 4.4(b), only those associated with events expected to cause changes that would be discernible during those periodic surveillances should be included in the AFT [as-found tolerance] allowance.

The flow element contribution to overall function uncertainty is a process-dependent effect not present during surveillance testing.

This treatment of uncertainties is also consistent with the Bases for TS 3.3.6.1, for Units 1 and 2. The "Applicable Safety Analyses, LCO, and Applicability" section of the Bases states, in part:

> Trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device (e.g., trip unit) changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The trip setpoints are determined from the analytic limits, corrected for process, calibration, and instrument errors. The Allowable Values are then determined, based on the trip setpoint values, by accounting for calibration based errors. These calibration based instrument errors are limited to instrument drift, errors associated with measurement and test equipment, and calibration tolerance of loop components. The trip setpoints and Allowable Values determined in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for and appropriately applied for the instrumentation.

The above discussion of setpoint methodology is also contained in Revision 3 of NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4."

After it was discovered that the flow element was incorrectly installed, the SR 3.3.6.1.6 calibration of the associated flow instrument channel was performed satisfactorily and demonstrated to be within the TS allowable value.

Additionally, based on observation of operating data for the period when the flow element was incorrectly installed, the most limiting error introduced by this condition was 46 gpm. The differential between the TS allowable value (i.e., 73 gpm) and the analytical limit (i.e., 300 gpm) is 227 gpm. As determined from calculation 0RWCU-0010, "U1/U2 RWCU Flow Accuracy Calculation (G31-N012, N036, & N041 loops), unmeasurable uncertainties account for 136.67 gpm, leaving a margin of 90.33 gpm. This margin more than adequately bounds the 46 gpm error introduced by the incorrectly installed flow element and ensures that the analytical limit of 300 gpm would not have been exceeded.

Operability of the RWCU Differential Flow - High instrumentation is dependent upon: (1) meeting the TS required allowable value of $\leq$ 73 gpm and (2) the overall ability of the

instrument loop to perform its intended safety function. The flow element installation error did not affect the transmitter or trip device as confirmed by a calibration that found the setpoint to be in compliance with TS allowable value requirements. The safety function of the instrument loop is met when it can be demonstrated that the analytical limit is met. In this case, a sensor (i.e., the RWCU inlet flow element) was installed backwards. This produced a non-conservative error for the differential flow setpoint. However, the above evaluation confirms that sufficient margin was available and the additional error did not prevent the loop from meeting the analytical limit for the RWCU Differential Flow - High function.

Therefore, CP&L has concluded that RWCU Differential Flow - High instrumentation was operable and no TS 3.3.6.1 violation occurred.

The improperly installed flow element is appropriately characterized as a degraded condition, as defined in NRC Inspection Manual Part 9900: Technical Guidance, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety." A degraded condition is defined as:

> A degraded condition is one in which the qualification of an SSC or its functional capability is reduced. Examples of degraded conditions are failures, malfunctions, deficiencies, deviations, and defective material and equipment. Examples of conditions that can reduce the capability of a system are aging, erosion, corrosion, improper operation, and maintenance.

CP&L's setpoint methodology provides a mechanism that is specifically intended to compensate for potential defects that result in performance outside of what is expected, while still retaining required overall loop performance. General unassigned margin is provided in addition to the assigned uncertainties for components and parameters. For this loop, operating experience from both the industry and Brunswick, prior to the 1993 amendments (i.e., the NRC approved Amendments 166 and 197, discussed above), had demonstrated that precise quantification of uncertainties associated with the combined performance of the three flow elements that input into the trip signal was more challenging than typical. As such, a large difference between the TS allowable value and the analytical value (i.e., 227 gpm total, with 136.67 unmeasurable uncertainties and 90.33 margin) was established in Amendments 166 and 167. When a defect produces an adverse impact that is less than the applicable margin, it is considered a minor defect and the instrument loop retains the performance assumed by the design, the UFSAR, and the TSs. Although the reversed flow element resulted in a 46 gpm error, similar but smaller defects such as excessive wear or gouging of a correctly installed flow element can also result in performance outside of assigned uncertainty ranges. For this event, TS surveillance requirements were met for the components associated with measureable uncertainties and the flow element error, 46 gpm, was less than the applicable margin of 90.33 gpm. The above evaluation demonstrates that, although degraded, the instrumentation remained operable.

Conclusion

In summary, CP&L has determined that the incorrectly installed flow element did not render the RWCU Differential Flow - High instrumentation (i.e., Function 5.a of TS Table 3.3.6.1-1) inoperable. Operability of the RWCU Differential Flow - High instrumentation is dependent upon: (1) meeting the TS required allowable value of ≤ 73 gpm and (2) the overall ability of the instrument loop to perform its intended safety function. The flow element installation error did not affect the transmitter or trip device and, as such, did not prevent the RWCU Differential Flow - High instrumentation to meet the TS allowable value of ≤ 73 gpm. The amount of uncertainty introduced by this condition was not sufficient to render the instrument loop incapable of performing its intended safety function (i.e., assuring that the 300 gpm analytical limit would not be exceeded). Therefore, a violation of TS 3.3.6.1 did not occur.