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JUL 29 2004

SERIAL: BSEP 04-0093

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Subject: 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 Generic Letter 2003-01, "Control Room Habitability"

Reference: Letter from John S. Keenan to the United States Nuclear Regulatory Commission (Serial: BSEP 03-0116) "Sixty-Day Response to Generic Letter 2003-01, Control Room Habitability," dated August 11, 2003

Letter from Cornelius J. Gannon to the United States Nuclear Regulatory Commission (Serial: BSEP 03-0164) "180-Day Response to Generic Letter 2003-01, Control Room Habitability," dated December 9, 2003

Ladies and Gentlemen:

On June 12, 2003, the NRC issued Generic Letter 2003-01, "Control Room Habitability" which requested licensees to submit information demonstrating that control rooms comply with the current licensing and design bases, and applicable regulatory requirements, and that suitable design, maintenance and testing control measures are in place for maintaining this compliance. The generic letter requested that this information be provided within 180-days or, if unable to meet this schedule, notification be made within 60-days.

Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (PEC), provided our plans for submitting the requested information in a 60-day response to Generic Letter 2003-01 for the Brunswick Steam Electric Plant, (BSEP) Unit Nos. 1 and 2 on August 11, 2003. The response included a commitment to provide all requested information in the 180-day response for BSEP, with the exception of tracer gas testing results requested in items 1(a) and 1(b) of Generic Letter 2003-01. PEC committed to provide the testing results by July 31, 2004.

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Testing results for the radiological and hazardous chemical analyses confirm that the inleakage rates at BSEP are acceptable, relative to the design basis values. Enclosed are the results of the tracer gas testing, which complete the PEC response to requested information of items 1(a) and 1(b) of Generic Letter 2003-01.

Please refer any questions regarding this submittal to Mr. Edward T. O'Neil, Manager - Support Services, at (910) 457-3512.

Sincerely,

FWR

Cornelius J. Gannon

GLM/glm

Enclosure:

Results of Tracer Gas Testing in Response to Generic Letter 2003-01 for the Brunswick Steam Electric Plant Unit Nos. 1 and 2

cc:

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Results of Tracer Gas Testing in Response to Generic Letter 2003-01 for the Brunswick Steam Electric Plant Unit Nos. 1 and 2

Background

On June 12, 2003, the NRC issued Generic Letter 2003-01, "Control Room Habitability." Generic Letter 2003-01 requested licensees to submit information demonstrating that control rooms comply with the current licensing and design bases, and applicable regulatory requirements, and that suitable design, maintenance and testing control measures are in place for maintaining this compliance. The generic letter requested that this information be provided within 180-days or, if unable to meet this schedule, notification be made within 60-days.

Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (PEC), provided our plans for submitting the requested information in a 60-day response to Generic Letter 2003-01 for the Brunswick Steam Electric Plant, (BSEP) Unit Nos. 1 and 2 on August 11, 2003. The response included a commitment to provide all requested information in the 180-day response for BSEP, with the exception of tracer gas testing results requested in items 1(a) and 1(b) of Generic Letter 2003-01. PEC committed to provide the testing results by July 31, 2004. Enclosed are the results of the tracer gas testing, which complete the PEC response to requested information of items 1(a) and 1(b) of Generic Letter 2003-01.

Committed Response

In the 60-day response to Generic Letter 2003-01, PEC made a commitment to perform air inleakage testing in accordance with ASTM E741 and submit the results of this testing by July 31, 2004. The testing confirms the adequacy of inleakage values assumed in the design basis radiological analyses and hazardous chemical analyses for control room habitability.

The bounding inleakage rate assumed in the BSEP design basis analyses for radiation events is 10,000 cfm. Note that in the BSEP 60-Day Response letter, PEC stated that the unfiltered inleakage rate assumed in the current radiological analyses is 3,000 cfm. With implementation of Alternative Source Term (AST), the assumed unfiltered inleakage rate in the radiological analyses was increased to 10,000 cfm. The NRC approved AST for BSEP on May 30, 2002, and final implementation was completed during the spring 2003 refueling outage on Unit 2.

During chlorine isolation, (i.e., toxic gas mode) the bounding inleakage rate assumed in the BSEP design basis analysis is 2000 cfm.

Based on the design basis assumptions, inleakage testing acceptance criteria are:

Radiation Protection Mode: less than 10,000 cfm
Toxic Gas Mode: less than 2,000 cfm

Testing Results

Six tracer gas air inleakage tests were performed on the control room envelope (CRE) at BSEP during June 2004, by a team of test engineers from NCS Corporation and Lagus Applied Technology, Inc. These tests were based on the methodology described in ASTM Standard E741-00, "Standard Test Method for Determining Air Change Rate in a Single Zone by Means of a Tracer Gas Dilution."

Air inleakage into the CRE was measured with the Control Room Emergency Ventilation System (CREVS) operating in the toxic gas mode for hazardous chemicals, and the radiation protection mode, for radiological analysis. For the purposes of air inleakage testing, the CRE consists of the main control room and adjacent rooms, as well as the ductwork and associated air-handling units that comprise the CREVS.

Toxic Gas Mode

Three Concentration Decay Tests, with the three different configurations of air handling units, were undertaken to determine the inleakage rate into the CRE with CREVS operating in the toxic gas mode. There are three 50% capacity air handling units in CREVS. Therefore, three tests were required to test the possible combinations of 2 units that would be running. In a Concentration Decay Test, a fixed quantity of tracer gas was injected initially into an air handling unit fan and dispersed throughout the CRE. After waiting for adequate mixing to occur, a series of concentration versus time points was obtained and a regression analysis on the logarithm of concentration versus time was performed to find the best straight-line fit to the data. The slope of this line is volume normalized air inleakage rate.

From the three tests performed in the toxic gas alignments, the combination of recirculating air handing units 1D and 2E indicated the highest inleakage rate. This combination was then used to determine the most limiting inleakage rates for the radiation protection mode.

Radiation Protection Mode

Makeup Flowrate/Concentration Decay Tests were undertaken to determine inleakage rates into the CRE with CREVS operating in a radiation protection mode. Two such tests were performed to account for the different configurations of operating air-handling units and emergency filtration trains. The BSEP design allows for manual restart of the cable spread room supply fans to control room temperatures, if required. Therefore, an additional test was performed with the

cable spread room supply fans running to account for the possible manual restart of these supply fans during a long-term radiological accident.

In the Makeup Flowrate/Concentration Decay Test, tracer gas was continuously injected into the makeup air stream of the CREVS at a constant rate while the makeup flowrate was measured. Tracer gas was then injected into the CRE for an additional period of time and was allowed to disperse throughout the CRE. After waiting for adequate mixing to occur, a series of concentration versus time points was obtained and a regression analysis was performed on the logarithm of concentration versus time to find the best straight-line fit to the data.

The slope of this line is the volume normalized air inleakage rate. Knowledge of the CRE volume allows calculation of the total air inleakage rate. For this test a CRE volume of 295,000 cubic feet was used. For the purposes of uncertainty analysis, a five percent uncertainty in the value of the CRE volume was assumed.

Makeup flowrates were measured by a tracer gas dilution technique before and after measurement of the total air inflow. The values were averaged to obtain the actual makeup flowrate extant during the testing. Knowledge of the makeup flowrate in combination with a measured total air inleakage value allowed calculation of the amount of air inleakage to the CRE that was not provided by makeup flow.

Conclusion

Testing results for the radiological and hazardous chemical analyses confirm that the inleakage rates at BSEP are well within the design basis limits. Final measured inleakage flowrate data are provided below.

Tracer Gas Test Results

Test	Mode	Fan Alignment	Inleakage (cfm)	Design Basis Inleakage (cfm)
1	Toxic Gas	1D & 2D	752 +/- 41	2,000
2	Toxic Gas	1D & 2E	762 +/- 42	2,000
3	Toxic Gas	2D & 2E	691 +/- 38	2,000
4	A Train Radiation Protection	1D & 2E	800 +/- 125	10,000
5	B Train Radiation Protection	1D & 2E	708 +/- 118	10,000
6	A Train Radiation with Cable Spread Room Supply Fans	1D & 2E	869 +/- 146	10,000