CP&L
A Progress Energy Company

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U. S. Nuclear Regulatory Commission
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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 REQUEST FOR ADDITIONAL INFORMATION REGARDING
REQUEST FOR LICENSE AMENDMENTS TO ADOPT ALTERNATIVE
RADIOLOGICAL SOURCE TERM (NRC TAC NOS. MB2570 AND MB2571)

Ladies and Gentlemen:

On August 1, 2001 (Serial: BSEP 01-0063), Carolina Power & Light (CP&L) Company submitted a license amendment application to allow a full-scope implementation of an Alternative Radiological Source Term (AST) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. Subsequently, on December 20, 2001, the NRC provided an electronic version of a request for additional information (RAI) regarding the meteorological data and physical characteristics used as inputs for the AST dose assessment. The response to this RAI is enclosed.

Please refer any questions regarding this submittal to Mr. Leonard R. Beller, Manager - Regulatory Affairs, at (910) 457-2073.

Sincerely,

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WRM/wrm

Enclosure: Response to Request For Additional Information (RAI) AST 4

John S. Keenan, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, and agents of Carolina Power & Light Company.

Notary (Seal)

My commission expires: 8/29/04

cc: U. S. Nuclear Regulatory Commission, Region II
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Response to Request For Additional Information (RAI) AST 4

Background

On August 1, 2001 (Serial: BSEP 01-0063), Carolina Power & Light (CP&L) Company submitted a license amendment application to allow a full-scope implementation of an Alternative Radiological Source Term (AST) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. Subsequently, on December 20, 2001, the NRC provided an electronic version of a RAI regarding the meteorological data and physical characteristics used as inputs for the AST dose assessment. The responses to these questions follow.

NRC Question 4-1

Confirm that, overall, the meteorological data used in the assessment are of high quality and suitable for use in the assessment of atmospheric dispersion to which it was applied. During the period of data collection, was the tower base area on the natural surface (e.g., short natural vegetation) and tower free from obstructions (e.g., trees, structures) and micro-scale influences to ensure that the data were representative of the overall site area? Did the measurement program meet the guidelines of Regulatory Guide 1.23, "Onsite Meteorological Programs," and maintain good siting, instruments within specifications, and adequate data recovery and quality assurance checks? If deviations occurred, describe such deviations and why the data are still deemed to be adequate. What types of quality assurance checks were performed on the meteorological measurement systems prior to and during the periods of collection to assure that the data are of high quality? Were calibrations properly performed and systems found to be within guideline specifications for the use of the data? What additional checks and at what frequency were the checks performed on the data following collection and prior to input into the atmospheric dispersion calculations to assure identifying any problems in a timely manner and flagging data of questionable quality? Were data measured in the same units during the entire period of measurement, checks made to assure that any conversions were properly performed, and it was clear in what units the data were being given? Were the data compared with other site historical or regional data? If so, what were the findings? The intent of these questions is to assess the overall quality of the meteorological data. A detailed response for each individual data point is not expected.

CP&L Response

As discussed in Section 2.3.3.1 of the Updated Final Safety Analysis Report (UFSAR), BSEP's meteorological monitoring station meets the recommendations of NRC Regulatory Guide 1.23, Revision 0, "Onsite Meteorological Programs," and provides the meteorological parameters for the locations specified in NRC Regulatory Guide 1.97, Revision 2, Table 1. A guyed, open-latticed tower supports the lower (i.e., 10 meter) and upper (i.e., 100 meter) level instrumentation. Wind direction, wind speed, and wind variance (i.e., sigma theta) are recorded at both levels. The differential temperature between the upper and lower levels is measured by twin, redundant delta temperature systems operating simultaneously. The wind sensors are mounted on 12-foot booms oriented perpendicular to the general north-east/south-west prevailing wind flow to minimize tower shadow effects. The temperature probes are housed in aspirated shields mounted on 8-foot booms.

The meteorological tower is located approximately 1400 feet northeast of the reactor complex. The base of the tower is at the plant grade level of approximately 20 feet above mean sea level. The tower is located in an area which has been cleared of natural vegetation, and no man-made structures interfere with the tower instrumentation.

The Regulatory Guide 1.23 guidelines for 90 percent data recovery and outage minimization are met by performing scheduled calibrations carried out on a semi-annual basis such that:

1. The wind systems are changed and replaced, in accordance with Regulatory Guide 1.23, with National Institute of Science and Technology (NIST) traceable calibrated sensors.

2. The ambient and differential temperature systems are changed and replaced with NIST traceable calibrated systems.

3. Other onsite sensor equipment is calibrated or its calibration is verified.

An off-site meteorological vendor accesses the meteorological tower data daily and compares that data with other local weather observation sites for data consistency. The vendor is usually able to identify instrument problems within 24 hours. This is in addition to the daily observations logged by plant personnel once every 12 hours. The meteorological tower system has been included in the scope of the Maintenance Rule due to its use in conjunction with BSEP's Emergency Operating Procedures. Several system health screens have been developed to assist the System Engineer in determining system health through data observation. The checks described ensure that data obtained from the system is reliable.

Consistent with recovery statistics provided by the meteorological vendor, BSEP has maintained a greater than 90 percent recovery rate since the time a new meteorological system was installed in 1996. This availability number includes periods of down time due to loss of wind speed and direction during the numerous hurricanes experienced on-site.

NRC Question 4-2

It appears that invalid meteorological data in the BSEP files are input as "0". If this is the case, provide a revised data file in ARCON96 format with invalid data designated by completely filling the field for that parameter with 9's (i.e., wind direction as "999," wind speed as "9999" and atmospheric stability as "9"). Wind direction designated as "0" could be interpreted as North and wind speed as zero. This could help account for what may appear to be a relatively high occurrence of calm conditions. Note that relative concentration (χ/Q) estimates may be impacted by a computer code's inability to distinguish between valid data having values of zero and invalid data designated as zero. [The] Staff may make comparative estimates following receipt of a response to this question.

CP&L Response

The "0" values in the BSEP files do not constitute invalid meteorological data. The ARCON96 computer code will automatically substitute the nines (i.e., "9") for zero values in the azimuth and stability categories, since it is considered out of range in either case. To demonstrate, "9999" values were substituted for zero wind speed values if there were non-zero values for azimuth and/or stability category.

χ/Q values for the "Unit 2 Reactor Building nearest wall to the Control Room" case were run using the revised met data, with the following results:

Time	Current χ/Q Values (sec/m^3)	Revised χ/Q Values (sec/m^3)
0 - 2 hours	4.05E-03	4.05E-03
2 - 8 hours	3.67E-03	3.67E-03
8 - 24 hours	1.74E-03	1.73E-03
1 - 4 days	1.44E-03	1.44E-03
4 - 30 days	1.02E-03	1.00E-03

NRC Question 4-3

Why are there so few valid atmospheric stability measurements in the months of June in 1998 and October 1999? If there were other periods of data outage of relatively long duration (e.g., more than a week), when did they occur and what was the cause? What corrective actions were taken to minimize recurrence?

CP&L Response

A detailed review of meteorological data for the period from 1996 through 1999 was completed. During the period, there were 13 instances of data loss with an average loss of 5.41 hours and the longest loss being 17 hours. These data losses are generally attributable to regularly scheduled quarterly calibrations and bi-annual sensor change-outs. Additional downtime associated with the differential temperature (i.e., delta-T) instrumentation was experienced in October 1996 (i.e., 39 hours) and December 1999 (i.e., 85 hours). These losses were due to instrument failure and are generally longer due to the availability of climbers to complete repairs. The tower wind speed and direction instrumentation was impacted three times during the period due to hurricanes. Hurricane Bertha impacted the BSEP site in July 1996 concurrent with activities associated with replacing the meteorological tower instrumentation with upgraded versions. This period lasted from July 6 through 23, 1996. The next impact was due to Hurricane Bonnie in August 1998. Upper and lower wind data was lost from August 26 through 29, 1996. The last storm impact was Hurricane Floyd in 1999, which resulted in wind data loss during the period from September 15 through 17, 1999. As indicated in the response to NRC Question 4-1, the meteorological tower system is now included in the scope of the Maintenance Rule due to its use in conjunction with BSEP's Emergency Operating Procedures. As such, future unavailability of meteorological tower instrumentation, whether attributable to hurricanes or other causes, will be monitored under the Maintenance Rule. According to the CP&L off-site meteorological vendor, valid data for the months of June in 1998 and October 1999 was collected, but for reasons that CP&L could not determine, this data was not transferred into the WTHX database. CP&L believes that the use of 46 months versus 48 months of meteorological data does not negatively affect the results of the AST dose assessment.

NRC Question 4-4

The choice of wind speed categories used in the PAVAN calculations seem to skew much of the data into the lower categories. This may affect the resultant relative concentration (χ/Q) estimates. [The] Staff expects to make comparative estimates following resolution of the question concerning the designation used to represent invalid data.

CP&L Response

The standard wind speed bins in NRC Regulatory Guide 1.21, "Measuring and Reporting of Effluents from Nuclear Power Plants," were used. These categories are consistent with most plant data gathering practices. In the past, sensitivity calculations have shown that these wind speed categories provide essentially the same PAVAN computer code results as compared to a data set with double the amount of bins.

NRC Question 4-5

For postulated releases from the plant stack to the control room, were calculations performed for all directions? Effluent originally blowing in any direction could, in theory, return to the control room intake regardless of whether it passed over the control room intake initially. How was the distance at which the maximum χ/Q values occurred determined? Was the effective height of release assumed to be the stack height minus the height of the control room rather than the distance to the ground?

CP&L Response

The calculations from the plant stack to the control room were determined from the stack to the Control Room in the Southeast (SE) and South-Southeast (SSE) sectors. For the 0 to 2 hour period, these sectors provided the maximum χ/Q values.

The actual distance from the stack to the control room was used.

Yes, the effective stack height relative to the control room intake was used. The stack height from grade was not used.

NRC Question 4-6

In the case of effluent releases such as from the "white elephants" to the control room intake do distances include slant range, as opposed to being measured only along building surfaces? Further, unless only horizontal distance was input, were the release and receptor heights input as the same value? The shortest distance would be a minimum "stretched" string distance that would be in contact with building surfaces at times but might also pass through air.

CP&L Response

The minimum "stretch-string" distance from the Turbine Building exhaust to the Control Room intake was used. The release and receptor heights were input at the same elevation.

NRC Question 4-7

In an enclosure to the August 1, 2001 submittal, exclusion area boundary (EAB) χ/Q values are given for time periods to 30 days duration. Was the EAB dose assessment based upon use of the "0 - 2 hour" χ/Q value for all two hour time periods that could occur during the course of the postulated accident to determine the limiting two hour dose? This is consistent with 10 CFR 50.67(b)(2)(i) regarding the requirement that an individual located at any point on the

EAB for any 2-hour period following the onset of the postulated fission product release would not receive a radiation dose in excess of 25 rem TEDE.

CP&L Response

The 0 to 2 hour χ/Q was used to determine the limiting 2-hour dose at the EAB. The fumigation value was used, where appropriate, for stack releases.