Progress Energy

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

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 Request for Additional Information
Core Flow Operating Range Expansion
(NRC TAC No. MB6692 and MB6693)

Reference: Letter from John S. Keenan to the U. S. Nuclear Regulatory Commission (Serial: BSEP 02-0169), "Request for License Amendments - Core Flow Operating Range Expansion," dated November 12, 2002

Ladies and Gentlemen:

On November 12, 2002, Progress Energy Carolinas, Inc. (PEC) requested a revision to the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendments revise TSs, as necessary, to support an expansion of the core flow operating range (i.e., Maximum Extended Load Line Limit Analysis Plus (MELLLA+)).

On October 28, 2003, the NRC provided an electronic request for additional information (RAI) concerning the human factors and operator training aspects of MELLLA+. The response to this RAI is enclosed.

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

Sincerely,

Cornelius J. Gannon

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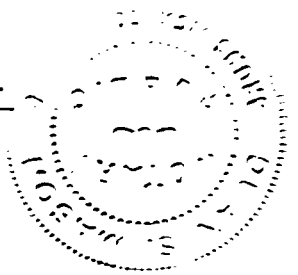
MAT/mat

Enclosure:

Response to Request for Additional Information (RAI) 6

Cornelius J. Gannon, 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.

Dean S. Mash
Notary (Seal)



My commission expires: August 29, 2004

cc:

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Response to Request for Additional Information (RAI) 6

Background

On November 12, 2002, Progress Energy Carolinas, Inc. (PEC) requested a revision to the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendments revise TSs, as necessary, to support an expansion of the core flow operating range (i.e., Maximum Extended Load Line Limit Analysis Plus (MELLLA+)).

On October 28, 2003, the NRC provided an electronic request for additional information (RAI) concerning the human factors and operator training aspects of MELLLA+. The response to this RAI follows.

NRC Question 6-1

With regard to operator responses, the report states that a plant specific anticipated transient without scram (ATWS) evaluation is required for MELLLA+, which may impose new boron injection requirements. Please describe the manual actions required for these boron injection requirements including the indications required to recognize that the actions are necessary, the procedural steps involved in these actions, and the indications of successful completion.

Response to NRC Question 6-1

Section 6.5, "Standby Liquid Control System," of GE Nuclear Energy Report NEDC-33063, "Safety Analysis Report for Brunswick Steam Electric Plant Units 1 and 2 Maximum Extended Load Line Limit Analysis Plus," dated November 2002 (i.e., M+SAR), states that the Standby Liquid Control (SLC) System maintains the capability to mitigate an ATWS and that the current boron injection rate is sufficient relative to the peak suppression pool temperature. Consistent with the generic disposition of the SLC System evaluation for MELLLA+ presented in GE Nuclear Energy Report NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus Licensing Topical Report," (i.e. M+LTR), the SLC System shutdown margin is evaluated for the reload core, not as part of the MELLLA+ evaluation. Since boron injection requirements are not affected by implementation of MELLLA+, operator response to an ATWS remains the same.

When a failure to scram condition is identified and manual scram actions are not successful, then the operator would identify that reactor power is above the Average Power Range Monitor (APRM) downscales (i.e., 2 percent) and would enter 1/2EOP-01-LPC, "Level/Power Control." This is a flowchart type procedure, based on the Boiling Water Reactor Owners' Group Emergency Procedure Guidelines. This procedure directs concurrent control of reactor power, reactor water level, and reactor pressure. The power leg of the procedure directs insertion of a scram signal, initiation of Alternate Rod Insertion (ARI), tripping of the reactor recirculation pumps, verification of reactor power and, if still greater than 2 percent, initiating SLC and the inhibiting of the ADS. The level leg of the procedure requires determination of the availability of reactor water level instrumentation, availability of the main condenser (i.e., MSIVs remaining

open), the ability to determine water level, as well as the inhibiting of the ADS and the determination of reactor power. If reactor power exceeds 2 percent, water injection is stopped and reactor water level is lowered to 90 inches above top of active fuel. When reactor vessel water level is less than 90 inches above the top of active fuel, reactor power and containment conditions are assessed. If heat is being added to the containment from the Safety/Relief Valves (SRVs) and reactor power is greater than 2 percent, reactor water level reduction continues to reach top of active fuel or power less than 2 percent. Level is maintained low to reduce the heat input into the containment until the Hot Shutdown Boron Weight (i.e., level has dropped to 32 percent in SLC tank) has been reached; at that time, reactor water level is raised to promote mixing of the boron in the reactor core. This provides additional power reduction.

Indication of reactor power, reactor vessel water level, SRV status, and SLC tank level are available in the control room. Successful completion occurs when indicated reactor power is less than 2 percent.

NRC Question 6-2

With regard to operator responses, the report states that the minimum operator action time to initiate the standby liquid control system (SLC) is 2 minutes and the minimum operator action time to inhibit the automatic depressurization system (ADS) and start water level reduction is 90 seconds in the ATWS analyses. Please provide the bases for these minimum limits and the consequences of completing the actions before the stated minimums. The submittal should also address the maximum times available to complete these actions, the consequences if those limits are exceeded, and verification that they can be met.

Response to NRC Question 6-2

The minimum operator action times to initiate SLC (i.e., 120 seconds) and to inhibit ADS and start water level reductions (i.e., 90 seconds) are based on the guidelines contained in the NRC-approved, GE Licensing Topical Reports (LTRs) for Extended Power Uprate (EPU) Safety Analysis: NEDC-32424P-A (ELTR-1), February 1999. For BSEP, Section 10.5.3, "Operator Response," of the M+SAR, states that there are no new operator actions and no significant reduction in the time available for operator actions resulting from implementation of MELLLA+. It also states that the MELLLA+ operating range expansion does not significantly affect the requirements for operator actions in response to ATWS and ATWS instability events.

For worst-case ATWS events (i.e., involving the loss of the main condenser), the BSEP EPU analysis predicts an initial pressure increase with a peak steam dome pressure of between 1450 psig and 1485 psig. For these events, the reactor dome pressure remains above 1194 psig (i.e., the maximum expected reactor vessel pressure after safety/relief valve operation) for 20 to 28 seconds. Based on the SLC discharge relief valve nominal trip setpoint, diversion of injection flow due to SLC discharge relief valve lifting is not expected at a steam dome pressure of 1194 psig or less. Therefore, initiation of the SLC System at the ELTR-1 assumed 120 seconds

is not a concern. Additionally, plant procedures direct operators to inject SLC in accordance with Emergency Operating Procedure (EOP) charts. An informal test in the plant simulator, performed in support of the BSEP EPU, found that the required sequence is not expected to result in SLC initiation in less than 79 seconds. Since this is more than double the time required for pressure to return to 1194 psig, SLC pump discharge relief valve opening during an ATWS is not considered credible.

ELTR-1 describes a water level reduction assumed to occur 90 seconds into an MSIV closure event, based on the Boron Injection Initiation Temperature (BIIT) being reached. The BSEP specific ATWS response does not rely on the approach to the BIIT limit but, rather, responds to the ATWS event in a symptom-based sequence. This symptom-based sequence was described in response to NRC Question 6-1, above. Operators receive extensive simulator training on ATWS scenarios and the above level control actions can be initiated within the 90 second assumption of ELTR-1.

The BSEP response methodology for plant transients/accidents is symptom-based and does not rely on maximum available time for actions to be taken. Decisions relating to the initiation of the SLC System are made shortly after the ATWS condition is identified. Evaluation of the performance of the SLC System has resulted in the assumption that Hot Shutdown Boron Weight (HSDBW) will be achieved in 20.06 minutes, with single SLC pump operation. The ATWS rule provides for operation of two SLC pumps, resulting in HSDBW being achieved in approximately 10 minutes. This performance, in itself, establishes a time buffer of approximately 10 minutes. Additionally, operator action to initiate SLC is directed by symptom-based EOPs which supports early initiation of SLC during an ATWS event.

NRC Question 6-3

With regard to operator training, the report states that the classroom training will address "various aspects of MELLLA+." Although examples of training topics are provided, it is not clear what selection criteria would be used to identify the issues that need to be addressed in training. Please describe the criteria for selecting the training topics or how the guidance to be provided by GE will be consistent with the selection of training topics in accordance with a systems approach to training.

Response to NRC Question 6-3

To determine the training content and setting, applicable materials are analyzed to determine new/revised tasks and the supporting knowledge. The related objectives are revised and/or new objectives are added to support the changes. Classroom instruction, required reading, simulator training, job performance measures, or any other combination of these instructional methods may be used to cover such items. Criteria to be considered when selecting objectives for Licensed Operator Continuing Training (LOCT) are; (1) whether the objective supports a task selected for continuing training, (2) whether the objective was taught the last time the lesson was presented,

(3) utility commitments, (4) identified weaknesses, (5) recent plant/industry events, and (6) input from the Licensed Operator Training Program Committee (LOTPC), operations management, line input, or other appropriate resources.

To prepare the operators for the MELLLA+, Detect and Suppress Solution/Confirmation Density (DSS/CD), and Backup Stability Protection (BSP) implementation, classroom and simulator training will be conducted during LOCT. The LOCT classroom training is planned for the first two training cycles in 2004 (i.e., cycle 04-1 and 04-2), and the LOCT simulator training is planned for cycle 04-2 after completion of the simulator outage. Training for on-shift operators will be completed prior to operation within the MELLLA+ region.

Planned classroom training includes a workbook with sample exercises and solutions to reinforce an understanding of the operational implications of MELLLA+, DSS/CD, and BSP. A written examination will be given to evaluate this knowledge. Currently planned classroom topics include:

MELLLA+

- MELLLA+ region/license basis
- Technical Specification changes and operational restrictions within the MELLLA+ region
- Power/flow map changes and application of plant procedure 1/2AOP-04.0, "Low Core Flow"
- Reactor Recirculation pump flow limiter changes
- Defense in depth stability option and related changes
- ATWS analysis and response

DSS/CD

- Reason for change from Stability Option 3
- Impacts to plant
- Algorithm
- Failure modes

Backup Stability Protection (BSP)

- Enabling and disabling BSP
- Flow-biased scram and rod block lines changes
- Basis for BSP
- Failure modes

NRC Question 6-4

With regard to operator training, the report states that the classroom training may be combined with simulator training for operational sequences that are unique to MELLLA+. Please describe how required simulator training will be determined and the schedule and implementation process of the associated training, if such training is required. In addition, please state how the operational sequences unique to MELLLA+ will be identified and implemented into simulator training, if such training is required.

Response to NRC Question 6-4

The process for determining simulator training requirements is the same as that discussed in response to NRC Question 6-3. Planned simulator training for MELLLA+ includes demonstration and response to selected events, as well as discussion of the restrictions within the MELLLA+ region. Plant response to an ATWS from the MELLLA+ line will be compared to the plant response for an ATWS from the MELLLA line for the same initial core flow. Operating crews will respond to and control the plant for the ATWS from the MELLLA+ line. Plant response for a reactor recirculation pump trip from the MELLLA+ line will be compared to the plant response for a reactor recirculation pump trip from the MELLLA line for the same initial core flow. Operating crews will respond to and control the plant for the reactor recirculation pump trip from the MELLLA+ line.

NRC Question 6-5

The report does not identify what control room changes will be necessary to support MELLLA+. The staff will need to know the changes that will be made to control room displays, controls, and alarms and how operators will be tested to determine that they can use these instruments reliably. Please provide this information or the bases for a conclusion that necessary changes will be identified and implemented as part of a licensee's preparation for MELLLA+.

Response to NRC Question 6-5

Currently identified changes to the control room include revision of the following:

- an alarm annunciator window description,
- Plant Process Computer display screens for updated power/flow maps,
- multiple Plant Process Computer monitoring points,
- the APRM System Operator Display Assembly (ODA) screen,
- APRM Drawer Display screens,
- APRM Voter Panel Displays, and
- Reactor Recirculation System limiter setpoints.

Operators will receive training on changes to the control room, supporting the implementation of MELLLA+, prior to operation within the MELLLA+ region.