

UNITED STATES NUCLEAR REGULATORY COMMISSION REGION II 101 MARIETTA STREET, N.W. ATLANTA, GEORGIA 30323

Report Nos.: 50-325/93-06 and 50-324/93-06

Licensee: Carolina Power and Light Company P. O. Box 1551 Raleigh, NC 27602

Docket Nos.: 50-325 and 50-324 Facility Name: Brunswick Electric Generating Plant Inspection Conducted: February 8 - March 26, 1993

Examiner:

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Other Inspectors/Examiners:

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- J. H. Bartley
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Approved by:

T. A. Peebles. Chief Operations Branch. Division of Reactor Safety

SUMMARY

Scope: An announced inspection was conducted at the Brunswick Electric Generating Plant in the area of licensed operator requalification training. The purpose of the inspection was to observe and assess the effectiveness of training provided to the plant operating crews in preparation for Unit 2 restart. The inspectors observed five shifts of operators during classroom and simulator training. The inspection included a review of operator training on recent plant modifications and the licensee's response to Generic Letter (GL) 92-04, "Resolution of the Issues Related to Peactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54 (f)." The inspectors also reviewed the licensee's method for verifying that all on shift licensed operators satisfied the requirements specified in 10 CFR 55.

Date Signed

Results:

The inspectors concluded that the startup training provided to the plant operating crews was satisfactory for Unit 2 restart. The inspectors identified several weak areas. Areas of weakness included: crew communications (paragraph 2.a), instructor inconsistencies (paragraph 2.b), lack of control by the Operations Department over the quality and content of training (paragraph 2.c), and lack of formal prestartup simulator evaluations of crew capabilities (paragraph 2.d). The licensee adequately addressed most of these concerns once identified by the inspectors. The inspectors noted improvement in the quality of training observed during the final weeks of the inspection.

The inspectors concluded that operator training on recent plant modifications (paragraph 3), and the licensee's response to GL 92-04 (paragraph 4) were adequate. The licensee's new program for tracking operators' hours on shift in a licensed position effectively tracked the active/inactive license status of each licensed operator. However, the program did not adequately track other license conditions such as requalification status, medical exams, and individual license restrictions (paragraph 5).

REPORT DETAILS

1. Persons Contacted

*M. D. Bradley, Manager, Nuclear Assurance Department
*T. Eason, Manager, Quality Control
*R. C. Godley, Manager, Regulatory Programs
*C. S. Hinnant, Director, Site Operations
*W. J. Leininger, Manager, Nuclear Engineering
W. Levis, Manager, Regulatory Compliance
*J. F. McGowan, Regulatory Compliance
*G. D. Miller, Manager, Technical Support
W. T. Noland, Manager, Operations Support
*R. M. Poulk, Manager, License Training
*J. G. Tittrington, Manager, Unit 2 Operations
*W. O. Turner, Nuclear Engineering
M. Williams, Lead Instructor

Other licensee employees contacted included: instructors, operators and office personnel.

NRC Representatives

- P. Byron, Resident Inspector
- D. Nelson, Resident Inspector
- *T. Peebles, Chief, Operations Branch, DRS
- *D. Prevatte, Senior Resident Inspector (SRI)

*Attended Exit Interview

2. Observation of Operator Training (41500)

The inspectors observed licensed operator and instructor activities during simulator and classroom training. Each crew received 24 hours of simulator training and 24 hours of classroom training in preparation for Unit 2 restart. During simulator training, operating crews consisted of two Reactor Operators (RO), two Senior Reactor Operators (SRO), and a Shift Technical Advisor (STA). Staff crews were primarily composed of SROs, performing both RO and SRO duties. Classroom lectures included regular requalification topics as well as specialized topics on plant and procedure modifications, industry events and issues, and the start up program for Brunswick Unit 2 restart. Though weaknesses were identified, the inspectors concluded that the operators were adequately trained and prepared for Unit 2 restart. Detailed observations are provided below.

a. Operator Performance

Inspectors observed a weakness in crew communications during each week of simulator training. The lack of routine, thorough information exchange among the operators sometimes affected the successful and timely completion of simulator tasks. As detailed in paragraph 2.b, this problem continued through the week of training due to the lack of

an effective critique by the instructors. During the week of March 22, 1993, the instructors became more proactive in demanding proper communications. Though crew communications errors continued to be observed, improvement was noted as the week of training progressed. Based on discussions with the Senior Resident Inspector, examiner observations from previous regualification and initial examinations, and inspector observations from these training sessions, the inspectors concluded that the operators had three different standards for communications. One standard was for communications in the main control room, one was for NRC conducted examinations and another was for routine training sessions. Operations management had not provided sufficient guidance to the Training Department regarding their expectations in adhering to the site communications standards as specified in BSP-50, "Site Command, Control, and Communications Manual." Also, Operations management did not adequately monitor operator performance in this area and thus did not identify the problem to the Training Department as a weakness.

The following are examples of problems created during training due to poor communications practices:

- During a simulated reactor startup in accordance with GP-03, Unit Startup and Synchronization, the RO did not keep the crew informed of reactor power increases. Attachment 1 of GP-03, was required to be performed when power level was 10%. However, because the RO did not provide adequate information concerning reactor power, the crew did not perform Attachment 1 of GP-03 at the specified power level.
- 2) While performing turbine overspeed testing, the SRO and the STA did not coordinate well the main turbine vibration readings at various turbine speeds. The time lapse between the request for a reading by the SRO and when it was provided by the STA, resulted in an unsatisfactory test.
- At one point, during a simulated startup, the Shift Supervisor (SS) and the RO decided to stop pulling rods. They did not inform other crew members of the decision to stop pulling rods.
- An RO noticed a recorder was not working properly. He did not pass along information concerning recorder problems to the SS for ten minutes.

These issues were discussed with Operations and Training management. As a result, later weeks of training showed a conscientious effort by the SS and instructors to demand improved communications from the shifts. However, the SS had to continue soliciting information on plant status from the crew while the ROs frequently slipped back into poor communications habits requiring reminders from the SRO for adherence to BSP-50 communications standards. Crews were occasionally lax in monitoring their panels, particularly during crew briefings for upcoming evolutions. The inspectors observed several crews not monitoring the 603 panel (the rod control and reactor power monitoring panel) for up to two minutes during startup activities where continuous monitoring would have been appropriate. Additionally, operators would gather around the RO's desk with their backs turned from the panel or gather around other panels, such as UX-51, without monitoring the others. Recognizing this weakness, one SS directed an instructor to place an alarm on the HPCI annunciator panel as an awareness test of his crew. Twenty minutes passed before the Balance of Plant operator noted the alarm. Though this test highlighted a plant monitoring concern to be addressed with further crew training, the creativeness and initiative of both the SS and the instructor in this situation were considered a strength.

Three crews did not take adequate actions to identify an uncoupled control rod though procedural steps were in place to allow recognition of the problem. The ROs were not fully aware of plant parameters, especially neutron monitoring, while withdrawing control rods to bring the reactor critical. The crews failed to observe the lack of neutron response while withdrawing an uncoupled rod. The instructors were effective in emphasizing this important aspect by placing the simulator in freeze and conducting a crew brief. One RO was easily distracted from monitoring neutron instrumentation during control rod withdrawal on two separate occasions. Another RO left the control panel to obtain a procedure from a nearby file cabinet. The instructor again froze the simulator and held a crew brief to caution against such actions. Later operator performance showed improvement in this area.

b. Instructor Performance

The inspectors found that the instructors were generally not proactive in ensuring procedure, BSP-50, "Site Command, Control, and Communications," was consistently followed during the simulator sessions. The standard for acceptable communications varied from crew to crew and instructor to instructor. Most instructors did not correct operators who demonstrated poor command, control or communication skills. The instructors relied heavily on the SS to control the actions of the crew and rarely intervened to correct communication errors. Moreover, there were occasions that the SS did not provide direction or control over the crew, and the instructors failed to provide immediate feedback. By the final week of observations, the instructors were taking a mode active role is demanding proper communications.

The inspectors also observed inconsistencies in training content and methods between the various instructors. Experience level of the instructor appeared to dictate the amount and type of training provided to each crew. The scope and emphasis of instruction varied from instructor to instructor even though a lesson plan was being used. Training Department management did not audit the training that was administered during the course of this inspection and thus had no means of identifying this weakness. The inspectors discussed with the Manager, Licensed Training, the need to identify weaknesses and inconsistencies in training content and techniques through a regular instructor auditing process. The manager agreed with the inspector's observations and discussed plans for auditing instructor activities during operator training sessions. If properly carried out, improvement in instructor consistency and quality of instruction should be realized.

The following are examples of the instructor training inconsistencies noted during the inspection:

- One instructor provided excellent industry events information to the crew during the pre-exercise brief. Other instructors did not discuss such information with their crews.
- 2) One instructor discussed several simulator upgrades that had been installed since the crew's last simulator session and walked down the boards with the crew. Other instructors did not conduct such a brief or walkdown. The Manager, Licensed Training, stated that the first simulator session of a requalification cycle for all operators should consist of a similar type briefing if changes to the simulator had occurred.
- 3) One crew received indepth instruction concerning the coordination of reports during turbine overspeed test training on the simulator, while other crews did not receive similar information. The crews not receiving the training were observed having difficulty with the test, as discussed above.

Following the simulator training sessions, performance feedback to the operators was prompt and accurate. However, the instructors generally stressed many more positive attributes of the crews and individuals while deemphasizing the weaknesses that were identified. Only one instructor provided a review of the training objectives at the end of the training session. It was not clear whether the operators understood their performance was adequate or in need of improvement.

During simulator sessions early in the inspection, one of the two assigned instructors ran the simulator from the control booth and provided little input during the training sessions. This resulted in a five to one instructor to student ratio. Following NRC comments regarding this concern, a third instructor was added to later simulator sessions. The additional instructor actively participated in the training with direct observation and questioning of the operators. As a result, improved and immediate feedback to the operators concerning their performance on operator actions, manipulations, and procedural steps was provided The inspectors noted that during some simulator training sessions the SROs would control plant evolutions in very close proximity to the board operators. This approach hampered the SRO's ability to overview all control room activities. The Manager, Unit 2 Operations, concluded that the SROs were too close to the boards when supervising operations to maintain an overview perspective on shift activities. However, an instructor's evaluation report stated that he disagreed with this philosophy. This was another example of the Operations Department failure to define management expectations and operator performance requirements and, then, to coordinate with the Training Department to ensure the operators were trained in the manner desired.

c. Adequacy of Startup Training

The simulator (generally modeled after Unit 2) was recently upgraded to model a new digital feedwater control system recently installed on Unit 1. Unit 2 still has an analog control system and will not install the new digital system until its next outage in the spring 1994. The Training Department obtained a tabletop analog control system from Peachbottom Nuclear Station but had difficulty making it operable. Ultimately, five Job Performance Measures were developed to use along with the Peachbottom trainer to prepare the operators for Unit 2 restart. Given that analog controllers were still in use for HPCI and RCIC on the simulator, the inspectors determined this approach was adequate.

The crews used draft procedures for turbine testing during the simulator training sessions to validate the procedure's test method and to help identify procedural deficiencies prior to actual performance of the tests during unit startup. During the course of the inspection, these draft procedures were revised several times as improvements were identified. While this practice was commendable, it was noted that the crews early in the training cycle may not receive as effective training as the crews at the end of the training cycle. Indeed, the potential existed for negative training of the early crews. The licensee indicated that the final approved version of the procedures would be compared with all versions of the draft procedures used during the course of training. If significant changes occurred between the draft and final versions, additional training would be provided to those crews needing it. The final version of these procedures were issued during the last week of the inspection and the inspector compared the final version of the procedure to the draft versions. He determined that the licensee's training for the earlier crews was adequate.

d. Crew Startup Evaluations

The inspectors determined that no formal, management evaluation of crew competence on startup activities was planned following the completion of training. Operations management, therefore, did not take advantage of a performance-oriented basis for determining that the operators were ready for unit startup. Crew readiness for startup was instead to be determined by a written affirmation from each shift's SS.

Investigation by the inspectors found that after each simulator training session, the instructors performed an evaluation and critique of the crew and each operator's performance. Though formally documented, this evaluation process was biased by the fact that these were teaching and training sessions. However, this process did not involve Operations management nor did they later receive a copy of the evaluation report for review.

The inspectors noted that plant senior management provided management representatives to observe and evaluate operator simulator training on a scheduled basis. When conducted, plant management auditing of simulator training was generally good. Management representatives completed facility training evaluation forms and provided these forms to the SS for his review and dissemination to the crew. However, the use of this process was limited. During the first 2 weeks of March, Operations management observed only 30 of the 144 hours of simulator training that was conducted. Of these 30 hours, only 12 had any documented feedback evaluating the training that was given. The inspectors concluded that this level of effort was inadequate to make any meaningful determination as to crew readiness for Unit 2 startup.

As with other items noted in this report, the licensee was very reactive to the inspectors' concerns resulting in improved participation by plant management in later training sessions. The licensee also implemented a limited, formal evaluation process. The evaluations initially lasted about thirty minutes. The inspectors considered any benefit gained from these evaluations to be insignificant due to the short duration of the evaluation. The inspectors expressed concern over management's ability to detect weak areas of operator performance. Later evaluations were somewhat greater in depth, but still of minimal value. The lack of formal, performanceoriented startup training evaluations was considered by the inspectors to be a weakness in the Brunswick restart process.

3. Hardened Wetwell Vent Modifications

During the outage, the Hardened Wetwell Vent System plant modification was installed on Unit 2. This new system will allow direct venting of the containment to the environment via a hardened vent line if containment pressure exceeds 55 psig during severe accident conditions. The procedure changes associated with this modification were incorporated in the plant Emergency Operating Procedure (EOP) EOP-O1-SEP-O1, Primary Containment Venting, Rev. 9, dated 2/16/93. The inspector reviewed this procedure and P&ID D-02515, Containment Atmospheric Control System, Unit 2. He found that changes had been made to account for this modification and that they appeared to be adequate. The simulation facility was not scheduled to be upgraded to reflect this modification until June 1993. The operators were briefed on the modification and reviewed the procedure change as part of regular requalification training. The degree of training was judged to be adequate given the simplicity of the system and the relatively minor change made to the EOP. The inspector did not review the changes made to maintenance and I&C procedures to account for this plant modification during this inspection. This item is satisfactory for Unit 2 restart.

4. Reactor Water Level Training (GL 92-04, TI 2515/119)

The inspector followed up on the licensee's response to GL 92-04, "Resolution of the Issues Related to Reactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54 (f)." The inspection consisted of monitoring classroom training, review of classroom attendance records, and discussions with licensed operators. Also, discussions were held with the licensee's site coordinator for this issue to determine proposed plant modifications and procedural changes. The inspector noted that plant management was responsive to issues and actions generated by the NRC and the Boiling Water Reactor Owners Group (BWROG). The licensee demonstrated, by inspector review of actions taken to date and activities planned as well as discussions with the technical staff, the intention to be an industry leader for corrective action in this area.

The inspector used Appendix A of TI 2515/119 as a checksheet of licensee activities. Based on this checksheet, the inspector identified no negative findings. Since this issue was still under investigation by the BWROG, the licensee had not developed simulator software to model the phenomenon. Thus, no specific simulator exercise guides had been written to practice or evaluate operator response concerning GL 92-04. Training management stated that guides would be written once software modeling had been developed. The licensee did have simulator exercise guides for the general inability to determine RWL due to elevated temperatures in the drywell. The licensee's current EOPs provide the necessary guidance for operators to respond to this phenomenon.

The inspector noted that the augmented lesson plan for reactor vessel level instrumentation, LOI-CIS-LP-118-A-AG-931, dated February 2, 1993, did not contain learning objectives. As a result, the required knowledge items were not identified. Also, none of the weekly segment examinations contained questions to test operator understanding of this phenomenon. However, based on interviews with a sampling of licensed operators, the inspector determined that the training conducted was effective. The information contained in this augmented lesson plan will be incorporated into the normal RWL indication lesson plan during June 1993.

The inspector expressed concern about the licensee's proposed definition of conditions where RWL indication could not be determined because of noncondensible gases coming out of solution. The licensee indicated any condition resulting in plant depressurization below 450 psig or a cooldown rate greater than 100°F would warrant the conclusion that RWL indication was faulty and the loss of RWL indication part of the EOPs should be followed. While possibly conservative, this broad set of initiating conditions appeared to go beyond the documented intent of the owner's group

guidance. Discussions with Operations management indicated that they, too, were not completely comfortable with this approach. By the end of the inspection, the licensee received preliminary test results from the BWROG indicating the severity of the phenomenon was less significant than previously thought. As a result, the licensee modified their approach to this phenomenon by providing the operators the above criteria as symptoms of potential RWL indication problems and issued guidance for the operators to use their judgement as to whether RWL indication was faulty.

The licensee did not take nor planned to take any additional action to minimize the likelihood of level indication errors beyond current operational monitoring practices. The System Engineer and other plant personnel conduct periodic walk downs of the reactor instrument racks. The licensee had not previously observed leakage from the RWL instrumentation nor had prior experience with "notching" or significant level mismatches between level instruments. However, during future shutdowns, the licensee plans to record and evaluate RWL variations during plant depressurization to reaffirm there is not a problem in this area. This effort will be tracked by the licensee via Engineering Work Request (EWR) 11232.

Since Unit 2 was not refueled and because the BWROG is still investigating the phenomenon, long term corrective action to ensure a reliable source of RWL indication was not implemented by the licensee during this outage. The inspector determined the actions taken by the licensee were adequate and met the criteria of GL 92-04 and TI 2515/119. This item is satisfactory for Unit 2 restart.

- 5. Action on Previous Inspection Findings (92701)
 - a. (Open) Inspection Follow-up Item (IFI) 50-325,324/90-19-04. The inspector reviewed licensee progress associated with this item. This IFI tracks Brunswick's Integrated Action Plan (IAP) item D33-S and deals with long-term corrective actions in the area of operator training. The inspector reviewed lesson plans and procedures and determined that many had been revised, updated, or augmented by additional materials. However, numerous lesson plans remain to be updated. The licensee had a program and defined schedule for completion. The inspector determined adequate progress was being made. The current schedule indicated these updates would be completed in June 1993. The licensee was also in the process of conducting additional job task analyses, thus training materials will continue to be expanded or updated as necessary, even beyond June 1993. The revision and upgrade program is dynamic and adapts to changing needs. This is a good approach and should be continued after the current effort is completed. This item is satisfactory for Unit 2 restart, however, remains open for review following the June 1993 completion date.
 - b. (Closed) Violation 50-325,324/92-34-01. The inspector reviewed the licensee's corrective action associated with a licensed operator having taken the shift with an inactive license. To maintain an active license, 10 CFR 55.53 (e) requires each operator to actively perform

the functions of an operator or senior operator on a minimum of seven 8 hour or five 12 hour shifts per calendar quarter. In response, the Operations Department instituted a tracking and record keeping process to monitor and control the number of hours an operator spends actively performing the functions of a RO or SRO. The licensee's program identified those operators about to go inactive and those already inactive to Operations management, the shift scheduler, the individual operator, and the SS. While this program should prevent recurrence of the events leading to the above violation, it was not comprehensive and did not account for all the conditions an operator must meet to hold an active license. It failed to ensure the operator had successfully passed regualification training, that the operator was medically fit. and that specific conditions of his license were being followed (e.g., wearing corrective lenses). The Manager, Unit 2 Operations, acknowledged this weakness in the program and showed the inspector a revised qualified operator list that addressed the concerns listed above. The inspector determined that this improved licensed operator tracking system was adequate. The Resident Inspector verified the improved tracking system was in place and being used by the SROs in the main control room. Licensed operator gualification status will be managed and manually updated on at least a quarterly basis or whenever

information changes. The licensee indicated plans to upgrade the process to an on-line computer database, tied directly to the control room for SRO use. Also, the Director of Site Operations issued a memorandum to each licensed operator making him or her directly responsible for ensuring their qualifications are current. This item is closed and considered to be satisfactory for Unit 2 restart.

6. Exit Meeting

Each of the inspector/examiners summarized the inspection scope and results at the end of each week of the inspection with representatives of licensee management. The Chief, Operations Branch, Division of Reactor Safety, conducted a comprehensive final exit on March 26, 1993 with the persons indicated in paragraph 1. Proprietary information is not contained in this report. The final exit described the areas inspected and discussed in detail the inspection results. There were no dissenting comments received from the licensee.