



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W., SUITE 2900  
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-325/94-27 and 50-324/94-27

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

Docket No.: 50-325 and 50-324

Licensee Nos: DPR-71 and DPR-62

Facility Name: Brunswick Steam Electric Plant

Inspection Conducted: September 26-30, 1994

Lead Inspector: W. T. Orders  
W. T. Orders, Senior Resident Inspector

10/27/94  
Date Signed

Other Inspectors: P. Byron, Resident Inspector  
S. Sanders, Operations Inspector, NRR RSIB

Approved by: H. O. Christensen  
H. O. Christensen, Acting Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

10/28/94  
Date Signed

#### SUMMARY

##### Scope:

This special, announced inspection was conducted to review the deficiency identification and corrective action process. Additionally, to determine the effectiveness of the corrective action program in preventing the recurrence of problems.

##### Results:

No violations or deviations were identified.

Two weaknesses were identified. The first weakness was in the area of training of personnel who perform root cause analysis, paragraph 4. The second weakness was in the area of OEF program administration, paragraph 6.

An appropriate threshold has been established for deficiency identification, paragraph 3. Additionally, deficiency/event evaluations were considered to be adequate although some root cause determinations were inaccurate, paragraphs 3 and 4.

The corrective action program procedural guidance was marginal, paragraph 5.

Corrective actions for selected evaluations were found to be marginal. In some cases, the corrective actions were inexact and based on the inaccurate root cause determination, paragraphs 3 and 4.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

K. Ahern, Acting Manager - Training  
\*R. Anderson, Vice President - Brunswick Nuclear Plant  
G. Barnes, Manager - Maintenance, Unit 2  
A. Brittain, Manager - Security  
J. Cowan, Director - Site Operations  
D. Eng, Manager - Projects and Engineering Services  
N. Gannon, Manager - Maintenance, Unit 1  
J. Gawron, Manager - Environmental & Radiological Control  
\*R. Grazio, Manager - Brunswick Engineering Support Section  
G. Honma, Supervisor - Licensing  
\*W. Levis, Plant Manager - Unit 1  
\*R. Lopriore, Manager - Regulatory Affairs  
D. McCloskey, Manager - Site Support Services  
C. Pardee, Manager - Technical Support  
\*N. Schlichter, Acting Manager - Brunswick Project Assessment  
J. Tittrington, Manager - Operations, Unit 2  
\*M. Turkal, Supervisor - Regulatory Compliance  
\*C. Warren, Plant Manager - Unit 2  
G. Warriner, Manager - Control and Administration

Other licensee employees or contractors contacted included licensed reactor operators, auxiliary operators, craftsmen, technicians, and public safety officers, in addition to quality assurance, design, and engineering personnel.

#### NRC Personnel

\*C. Patterson, Senior Resident Inspector - Brunswick  
\*W. Orders, Senior Resident Inspector - Robinson  
\*S. Sanders, Operations Engineer - NRR  
\*P. Byron, Resident Inspector - Brunswick  
\*M. Janus, Resident Inspector - Brunswick

\*Attended exit interview.

Acronyms and initialisms used in the report are listed in the last paragraph.

### 2. General Program Evaluation (92720)

The sources of input into the site CAP program, such as testing and operating events, NAD reports, self assessments, NRC findings, NRC generic communication and industry operating experience were evaluated. On a selective basis, the inspectors investigated the licensee's response to the problems identified, focusing on corrective action, reportability determination, classification of the significance of the problem, determination of generic concerns and evaluation of the

licensee's ability to determine the fundamental root cause of the problems. For these evaluations, the inspectors reviewed the process implementation to determine if the licensee's program contained adequate controls such as procedures and training. The inspection was performance based, in that the inspectors examined the products of the program for anomalies, then scrutinized the program for the causes.

Early in the inspection, the inspectors reviewed data which indicated repetitive problems in the areas of plant equipment control, clearances, and work practices. This determination was based primarily upon sub-program and program trend data, licensee self analyses, and NAD evaluations. The inspection scope was altered slightly to devote more analysis to Level I and Level II ACRs, the accompanying root cause determination, corrective actions taken, and associated trending.

The inspectors detected cases of apparent inaccurate root cause determinations, which resulted in mis-focused corrective actions, and misleading trends. Further, the inspectors detected a number of root cause determinations which appeared to have been performed and/or approved by personnel who had not been trained in root cause analysis. The inspectors also noted that improvement in the OEF program could be attained by disseminating the information embodied in Level III ACRs.

### 3. Deficiency Identification (92720)

The inspectors reviewed the licensee's deficiency identification procedures, including AI-65, Incident Reporting and Control. Selected ACRs were reviewed to determine appropriate priority assignment. As part of this review, several ACR sub-program data bases were reviewed to ensure that significant and important ACRs were appropriately identified.

Unlike CP&L's two other nuclear facilities, which employ four levels of ACR hierarchy Brunswick does not employ Level IV ACRs but terms issues in this classification as "improvement items". Investigations are conducted for Level I (significant) and Level II (important) ACRs, whereas Level III (minor) and improvement items are delegated to sub-programs. The licensee established sub-programs for security, project management, operations, maintenance, technical support, work control, environmental and radiation control, regulatory affairs, plant support, training, and engineering. The licensee reviews sub-program data bases on a quarterly basis for adverse trends. For any adverse trends identified, a Level II ACR is to be generated.

- a. The inspectors reviewed selected ACRs generated by or delegated to the work control group sub-program since July 1993. The review indicated that the licensee had a suitable threshold for the generation of ACRs, had appropriately classified them and properly evaluated them for reportability and operability. The inspectors reviewed the trend reports from the first and second quarters of 1994 generated by the CAP organization, and detected no directly coupled negative trends.

The inspectors noted; however, that as late as April 1994, a NAD audit (94-149) found that information reflecting plant performance in the corrective action program database was not analyzed and trended to meet the objectives of Brunswick procedure RCI-06.8, Corrective Action Program Trending, in the majority of site subprograms. The NAD audit found that seven of the twelve subprograms did not meet the objectives of the procedure. Three of the subprograms provided no trending reports, one provided only ACR backlog trends, three provided data with no trends and one subprogram had just been established. Six of the twelve subprogram coordinators were not familiar with the use of the corrective action program database and had difficulty retrieving meaningful information. Based on this information, the inspectors surmised that the historic trend data may be ambiguous. It should be noted that a later NAD audit (94-272) performed in late August and early September noted that improvements had been made in this area.

- b. The inspectors examined selected ACRs generated by or delegated to the operations group sub-program since July 1992. As was the case with the work control unit the review indicated that the licensee had a suitable threshold for the generation of ACRs, had appropriately classified them and properly evaluated them for reportability and operability. This analysis also revealed repetitive problems in the areas of equipment control and clearance errors. An evaluation of operations ACRs was performed to assess the reasons for the repetitive nature of the problems being encountered. The primary emphasis was placed on root cause analysis, and the resultant corrective actions taken.

The inspectors determined that there had been 22 Level I ACRs issued to operations between May 10, 1993, and September 1, 1994. The inspectors reviewed 13 of these ACRs for root cause determination and noted that the predominant cause was failure to self-check. Failure to self-check is not a fundamental cause, but a symptom. The inspectors also noted that there was no root cause determination performed for two of these ACRs, 93-356 and 94-00781. It was noted that ACRs 93-00152, 93-90238 and 93-90356 were generated to document complacency trends, and ACRs 93-00244, 93-90320, 94-00412 and 94-00777 were generated to document clearance issues and/or trends. These ACRs, in and of themselves, are an indication that the licensee's root cause determinations, and resultant corrective actions need improvement.

In addition, the inspectors noted that the licensee had written a number of Level 3 ACRs documenting similar conditions. These ACRs should have been elevated to Level IIs.

The inspectors did not evaluate historic operations trend data, based on the aforementioned NAD findings. However, a review of operations trending for the first and second quarters of this year indicate definite continuing problems in the areas of plant equipment control and the clearance process.

- c. The inspectors reviewed selected maintenance sub-program ACRs generated during the period from July 1992, through July 1994. The review indicated that the licensee had a suitable threshold for the generation of ACRs, had appropriately classified them, and had properly evaluated them for reportability and operability. However, during this analysis, the inspectors detected what appeared to be some inaccuracies associated with root cause analyses.

The inspectors reviewed a number of maintenance ACRs for proper root cause analysis, adequate corrective actions to prevent reoccurrence, and appropriate trending codes. During the review, the inspectors noted the following as examples of root cause determinations which appeared to fail to identify the fundamental cause of the event, which in turn resulted in ineffective corrective actions and/or inappropriate cause code trending.

**ACR 94-00412** On December 17, 1993, a clearance was prepared for the feeder breaker to MCC 2TA to support routine maintenance during the Unit 2 outage. On March 30, 1994 an AO implementing the clearance, opened the feedbreaker for MCC 2TA, which resulted in an unexpected trip of Unit 1 hydrogen water chemistry.

The licensee identified one of the root causes as, "the unit SRO did not recognize the consequences associated with de-energizing 2TA." In reality, plant drawings were incorrect; hence, the SRO could not be cognizant of the effects. Since the fact that plant drawings were incorrect was not identified as a root cause, there were no corresponding corrective actions proposed. Furthermore, cause code trending was negatively effected, since document error was not reflected in the trending data for this event.

**ACR 94-00362** Radioactive material shipment (#94-015) was shipped to the burial facility at Barnwell, SC without the package being marked "Radioactive - LSA" as required.

The licensee identified the root cause as follows: (1) the first technician signed cask shipment check off form, (2) the second technician reviewed shipment paperwork and cask, and (3) the supervisor signed the shipment paperwork. These are not root causes, these are symptoms.

The corrective actions taken were to discuss prior events with the individual, explain the purpose of the check off list with the individual and discuss the availability of reference procedure. There were no corrective actions proposed to prevent reoccurrences by the individuals who failed to verify labelling as required by the procedure.

**ACR 94-00059** At the completion of Maintenance Surveillance Test (MST) IMST-RHR27M, RHR Shutdown Cooling Reactor Pressure Instrument Channel Calibration, when power was restored to valve 1-E11-F009 (Inboard Shutdown Cooling Isolation Valve), it closed, tripping the 1A RHR pump and resulting in a loss of shutdown cooling to Unit 1.

The licensee identified the root cause as the shift supervisor approving clearances I-92-00883 and I-92-00884 concurrently, which violated the intent of operating procedure OI-01. More to the point, the shift supervisor did not understand the logic system or component operation. Here again, the identified root cause was but a symptom.

The corrective actions failed to address improving the training/qualifications of the shift supervisor. Only counseling him with emphasis on, "... attention to detail, self checking, multiple discipline reviews, adequacy of technical & safety reviews, and verification steps critical to leaving logic systems in a desirable configuration at the completion testing and before returned to Operations for realignment and restoration was given."

No violations or deviations were identified. A number of ACR root cause determinations were based on symptoms and not the true root cause.

#### 4. Deficiency-Event Evaluation/Corrective Action (92720)

The inspectors reviewed ACR investigations, event review team (ERT) reports, quarterly trend reports, and the licensee's administrative procedure RCI-06.9, Root Cause Analysis, which provided guidance in the performance of these investigations.

The licensee investigates Level I (significant) and Level II (important) ACRs. In addition, significant ACRs undergo a root cause evaluation to determine corrective action to prevent recurrence. Little evaluation is performed on minor ACRs. Quarterly trend reports are required to be issued to identify potential adverse trends from the data analysis. Additional ACRs are required to be generated for any adverse trends and corrective action formally assigned.

According to the licensee, similar investigative techniques are employed at all three nuclear sites. Techniques include event and casual factor charting, change analysis, barrier analysis, and root cause analysis. Human performance evaluation systems are employed to investigate personnel/procedural errors. Section managers or higher can request an

event review team be formed to investigate significant plant events and adverse conditions. These multi-discipline teams investigate the event to determine the cause and identify appropriate corrective actions to prevent recurrence.

Significant and important ACRs are discussed during the morning management meetings to assign responsibility and preliminary corrective action.

As stated in paragraph 3, the inspectors noted examples of root cause analysis that failed to identify the fundamental cause of the event. CAP procedure, OPLP-04, Corrective Action Management, requires that personnel be provided to lead/perform assigned root cause investigations, who are trained in root cause analysis. A review of eight completed root cause determinations revealed that not all personnel (the preparer, the immediate supervisor, or the manager) had training in root cause analysis. The ACRs 94-00271, 93-078A, 94-00191, 94-00362, 94-00412, 94-361, 94-360, and 93-B152A had at least one person not trained. In the case of ACR 94-00271, it appeared that none of the three had been trained. The inspectors considered the lack of root cause analysis training to be a weakness.

The inspectors reviewed the history of NRC enforcement action since 1992, SALP reports, NAD assessments, and ACR trends to determine if the licensee's implemented corrective action program was preventing recurrence of similar problems.

As previously stated, the inspectors reviewed data which indicated continuing problems in the areas of equipment control/mispositionings, clearances, and work practices. Based on these observations and the knowledge that in at least some cases, the licensee's corrective actions are predicated upon flawed root cause analyses, the inspectors concluded that "corrective actions" as a category, was marginally adequate.

No violations or deviations were identified.

#### 5. Procedure Review (92720)

The inspectors reviewed the procedures employed to facilitate the Corrective Actions Program. Two of these procedures were PLP-04, Corrective Action Management, and RCI-06.8, Corrective Actions Program Trending. These procedures were evaluated for adequate guidance on how to generate, process, close, void, cancel, conduct root cause analysis on and propose corrective actions to prevent reoccurrence of ACRs, and consider germane operating experiences in the industry. The inspectors considered procedure guidance to be marginally adequate for the following reasons:

Corrective Action Management Procedure, OPLP-04, Rev. 12, is used to prepare and process ACRs. However, the inspectors determined that the procedure is not a stand alone document. Corrective Action Program Administration, Desk Top Guide, CAP-001, Rev. 0,

which is not an official procedure, is required to be used in order to identify, process, and implement corrective actions for ACRs.

Similarly, Corrective Action Program Trending Procedure, 06.8, Rev.1, is used to select causal codes for trending purposes. This procedure can not be used as stand alone guidance. As with the previous case, Desk Top Guide, CAP-001, an informal document, is necessary to give guidance on how to select cause codes categories, analyze level I and II ACRs for adverse trends, establish the threshold for unacceptable site-wide trends, and prepare trend reports.

Likewise, Administrative Instruction, AI-02, Feedback Of Operating Experience, defines Brunswick's program to assure the review of operating experience information in a timely manner with appropriate feedback to plant personnel. This procedure contains one sentence of instruction, "The responsible manager shall initiate the screening of plant and industry operating experience documents, coordinate the evaluation process, and implement timely action and/or feedback." Here again, informal guides are necessary to provide "how to" instruction.

The inspectors were told that there were no procedures to delineate the process on how to void, cancel, close, extend, or transfer ACRs. The inspectors did note that there was mention of the responsibilities associated with the transfer of an ACR in procedure OPLP-04. Within this section, closure was mentioned with reference to transferred ACRs. However, this is not an acceptable substitute for procedures giving consistency in providing a process and giving guidance.

The inspectors noted the following as examples of ACRs which appeared to have been voided without procedural guidance: 94-00133, 94-00319, 94-01244, 94-0126, 94-00241, 94-00243, 94-00375, 94-00908, 94-0048, 94-00164, 94-00792, 94-01254, 94-00644, 94-00756, 94 00815, 94-01231, and 94-004405.

The inspectors also noted that in the process of transferring ACRs 93-122 and 92-54, they appeared to have been incorrectly re-categorized in the process of being transferred. Originally they both were level I. ACR 93-122 was downgraded to a level III and 92-54 to a level II. The licensee was unaware of this until notified by the inspector, and was unable to provide an explanation of the error.

It should also be noted that many of the procedures reviewed used the action verb "should" instead of "shall", a latitude which can result in procedural compliance difficulties.

No violations or deviations were identified.

## 6. Operating Experience Feedback Program (92720)

The inspectors reviewed the licensee's Operating Experience Feedback (OEF) program, as implemented by Administrative Instruction, AI-02, Feedback Of Operating Experience, to determine program inputs and verify appropriate corrective action for selected events. Inputs for this program included ACRs from the licensee's other nuclear plants, industry reports, and NRC information notices. The inspector reviewed a list of OEF items from July 1993 through the time of this inspection and selected a number of these for a more detailed review.

The inspectors reviewed several OEF items and ACRs shared between the CP&L nuclear plants. The inspectors noted that only Level I (significant) and Level II (important) ACRs, are shared between the CP&L nuclear plants. The inspectors noted that information contained in a Level III ACR (94-209) pertaining to a previous incident which occurred at the H.B. Robinson facility involving the misplacement of a fuel assembly during refueling, may have prevented a subsequent similar event at Brunswick. The inspectors also noted that of the 28 1994 ACRs which had been received from Robinson, 12 had been received in the last 15 days and had yet to be dispositioned. This was out of a total of approximately 1200 ACRs generated at Robinson as of September 23, 1994. Similarly, of the 22 ACRs which had been received for the Harris facility, 11 had been received in the last 30 days. This was out of approximately 2660 ACRs generated at that facility prior to the inspection. This narrow focus and minimal dissemination of event information is considered to be a weakness. The inspectors were notified at the exit that this observation had also been made by the NAD organization.

On a positive note, the corrective actions taken for the significant OEF items reviewed appeared to be adequate.

No violations or deviations were identified.

## 7. Exit Interview (30703)

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on September 30, 1994. During this meeting, the inspectors summarized the scope and findings of the inspection as they are detailed in this report. The licensee representatives acknowledged the inspector's comments and did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection. No dissenting comments from the licensee were received.

## 8. Acronyms and Initialisms

ACR	-	Adverse Condition Report
CFR	-	Code of Federal Regulations
ERT	-	Event Review Team
LSA	-	Low Specific Activity

MCC	-	Motor Control Center
NAD	-	Nuclear Assessment Department
NRC	-	Nuclear Regulatory Commission
OI	-	Operating Instruction
OEF	-	Operating Experience Feedback
RSIB	-	Reactor Special Inspections Branch
SALP	-	Systematic Assessment of Licensee Performance
SRO	-	Senior Reactor Operator
TS	-	Technical Specification