



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

Report Nos.: 50-325/88-38 and 50-324/88-38

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

Docket Nos.: 50-325 and 50-324

License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: October 1-31, 1988

Inspectors:	<u>RL Caswell Jr</u>	<u>11/23/88</u>
	W. H. Kuland	Date Signed
	<u>RL Caswell Jr</u>	<u>11/23/88</u>
	W. Levis	Date Signed
	<u>RL Caswell Jr</u>	<u>11/23/88</u>
	P. M. Madden	Date Signed
Approved by:	<u>P. E. Fredrickson</u>	<u>11/23/88</u>
	P. E. Fredrickson, Chief, Section 1A	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine safety inspection by the resident inspector's involved the areas of maintenance observation, surveillance observation, operational safety verification, ESF system walkdown, and onsite followup of events - Unit 1.

Results: In the areas inspected, two violations were identified: failure to control combustibles inside a restricted area; and failure of system engineers to conduct system walkdowns. This second violation was determined to meet the requirements for licensee identified, and will not be cited.

Three unresolved items were also identified: flow path boundary valves not in monthly surveillance; water contamination of the HPCI oil sump; and remote valve position indicators on motor control centers use different limit switch rotors. No deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *K. Altman, Acting Manager - Maintenance
- W. Biggs, Engineering Supervisor
- *F. Blackmon, Manager - Operations
- *S. Callis, On-Site Licensing Engineer
- T. Canterbury, Mechanical Maintenance Supervisor (Unit 1)
- *G. Cheatham, Manager - Environmental & Radiation Control
- R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)
- *K. Enzor, Director - Regulatory Compliance
- *R. Groover, Manager - Project Construction
- J. Harness, General Manager - Brunswick Nuclear Project
- *W. Hatcher, Supervisor - Security
- A. Hegler, Supervisor - Radwaste/Fire Protection
- *R. Helme, Manager - Technical Support
- J. Holder, Manager - Outages
- *L. Jones, Director - Quality Assurance (QA)/Quality Control (QC)
- *M. Jones, Director - On-Site Nuclear Safety - BSEP
- R. Kitchen, Mechanical Maintenance Supervisor (Unit 2)
- J. Moyer, Manager - Training
- *G. Oliver, Manager - Site Planning and Control
- *J. O'Sullivan, Project Manager, Valves Projects
- B. Parks, Engineering Supervisor
- *R. Poulk, Senior NRC Regulatory Specialist
- J. Smith, Director - Administrative Support
- *R. Starkey, Project Manager - Brunswick Nuclear Project
- R. Warden, I&C/Electrical Maintenance Supervisor (Unit 1)
- B. Wilson, Engineering Supervisor
- *T. Wyllie, Manager - Engineering and Construction

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, office personnel, and security force members.

*Attended the exit interview

Note: Acronyms and abbreviations used in the report are listed in paragraph 9.

2. Followup on Previous Enforcement Matters (92702)

Not inspected.

3. Maintenance Observation (62703)

The inspectors observed maintenance activities, interviewed personnel, and reviewed records to verify that work was conducted in accordance with approved procedures, Technical Specifications, and applicable industry codes and standards. The inspectors also verified that: redundant components were operable; administrative controls were followed; tagouts were adequate; personnel were qualified; correct replacement parts were used; radiological controls were proper; fire protection was adequate; quality control hold points were adequate and observed; adequate post-maintenance testing was performed; and independent verification requirements were implemented. The inspectors independently verified that selected equipment was properly returned to service.

Outstanding work requests were reviewed to ensure that the licensee gave priority to safety-related maintenance. The inspectors observed/reviewed portions of the following maintenance activities:

88-AXRY2	Run Currents on 2-E41-F008 Prior to Packing Adjustment
88-BBF21	Manhole Inspection for MH-11SW
88-NWQ341	2-E21-FT-N003B Calibration
PM 87-003	RPS MG Set "A" Output Breaker Replacement

The licensee is currently experiencing a problem with water contamination of the HPCI turbine lube oil sump. E&RC procedure 1145, Sampling and Analysis Schedule for Lubricating Oils, Rev. 8, establishes a monthly sampling frequency for this oil with an acceptance criteria for moisture of 5,000 $\mu\text{gm/gm}$ (microgram of water/gram of oil). Moisture contamination levels in excess of 25,000 $\mu\text{gm/gm}$ have been measured in recent months for both units.

In response to EWR 06897, technical support evaluated this high moisture condition, and after discussion with the vendor, established 10,000 $\mu\text{gm/gm}$ as the high limit and 20,000 $\mu\text{gm/gm}$ as the point where potential bearing damage could occur. Technical support, therefore, recommended that the oil be changed prior to exceeding 20,000 $\mu\text{gm/gm}$. Since the evaluation, the licensee has purchased filtering equipment and developed a special procedure to filter the oil to maintain less than 5,000 $\mu\text{gm/gm}$ water contamination. The licensee has increased the sampling frequency to weekly and is attempting to locate the water source.

The inspector reviewed sampling data to determine when the contamination problem first existed. Sample results are shown below:

Unit 1

Aug. 1987	-	300 $\mu\text{gm/gm}$	Apr. 1988	-	8370 $\mu\text{gm/gm}$
Sep. 1987	-	229 $\mu\text{gm/gm}$	May 1988	-	25000 $\mu\text{gm/gm}$
Oct. 1987	-	1199 $\mu\text{gm/gm}$	Jun. 1988	-	Too Much To Count (TMTC)
Nov. 1987	-	1125 $\mu\text{gm/gm}$	Jul. 1988	-	TMTC
Dec. 1987	-	1087 $\mu\text{gm/gm}$	Aug. 1988	-	16260 $\mu\text{gm/gm}$
Jan. 1988	-	5880 $\mu\text{gm/gm}$	Sep. 1988	-	24490 $\mu\text{gm/gm}$
Feb. 1988	-	9200 $\mu\text{gm/gm}$	Oct. 1988	-	32300 $\mu\text{gm/gm}$
Mar. 1988	-	22720 $\mu\text{gm/gm}$			

Unit 2

Feb. 1987	-	2600 $\mu\text{gm/gm}$	Jun. 1988	-	TMTC
Mar. 1987	-	31000 $\mu\text{gm/gm}$	Jul. 1988	-	TMTC
Apr. 1987	-	14000 $\mu\text{gm/gm}$	Aug. 1988	-	7600 $\mu\text{gm/gm}$
Apr. 1988	-	TMTC	Sep. 1988	-	3410 $\mu\text{gm/gm}$
May 1988	-	25000 $\mu\text{gm/gm}$			

No samples were taken for Unit 2 from April 1987 to April 1988 due to a clogged sample point.

As seen by the data, Unit 2 HPCI has experienced a problem with water contamination since March 1987, while Unit 1 HPCI has experienced similar problems since January 1988. The licensee's HPCI SSFI noted the problem of water contamination of the HPCI oil. However, the discrepancy was closed out in June 1987 when a plant modification was proposed to add connection points to the sump to allow for oil filtering. The adequacy of the licensee's corrective action regarding the out of specification condition must be further evaluated by the inspectors to determine if a violation of NRC requirements occurred. Pending this evaluation, this item will remain *Unresolved: Water Contamination of HPCI Turbine Oil (325/88-38-04 and 324/88-38-04).

The operability of the HPCI system does not appear to be affected by the water contamination of the oil at this time. The licensee's periodic testing of HPCI, conducted every 45 days, includes both vibration measurements and control system valve response checks. Any significant degradation or wear of bearings due to water contamination or sluggishness of hydraulic control valves would be noted during the accomplishment of the periodic test. In addition, the HPCI turbine stop and control valves are stroked daily as part of the AO's manual surveillance check. The oil used in this application, Mobil Vaportec light, is formulated for applications where oil could contact water. This formulation should help to minimize the effects of the water contamination on bearing surfaces.

No violations or deviations were identified in the areas inspected.

*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

4. Surveillance Observation (61726)

The inspectors observed surveillance testing required by Technical Specifications. Through observation, interviews, and record review, the inspectors verified that: tests conformed to Technical Specification requirements; administrative controls were followed; personnel were qualified; instrumentation was calibrated; and data was accurate and complete. The inspectors independently verified selected test results and proper return to service of equipment.

The inspectors witnessed/reviewed portions of the following test activities:

1MST-APRM28Q	APRM Flow Bias Flow Units A & B Channel Calibration
2MST-APRM11W	APRM Channel Functional Test (RPS Inputs)

No violations or deviations were identified in the areas inspected.

5. Operational Safety Verification (71707)

The inspectors verified that Unit 1 and Unit 2 were operated in compliance with Technical Specifications and other regulatory requirements by direct observations of activities, facility tours, discussions with personnel, reviewing of records, and independent verification of safety system status.

The inspectors verified that control room manning requirements of 10 CFR 50.54 and the Technical Specifications were met. Control operator, shift supervisor, clearance, STA, daily and standing instructions, and jumper/bypass logs were reviewed to obtain information concerning operating trends and out of service safety systems to ensure that there were no conflicts with Technical Specification Limiting Conditions for Operations. Direct observations were conducted of control room panels, instrumentation, and recorder traces important to safety to verify operability and that operating parameters were within Technical Specification limits. The inspectors observed shift turnovers to verify that continuity of system status was maintained. The inspectors verified the status of selected control room annunciators.

Operability of a selected Engineered Safety Feature division was verified weekly by ensuring that: each accessible valve in the flow path was in its correct position; each power supply and breaker was closed for components that must activate upon initiation signal; the RHR subsystem cross-tie valve for each unit was closed with the power removed from the valve operator; there was no leakage of major components; there was proper lubrication and cooling water available; and a condition did not exist which might prevent fulfillment of the system's functional requirements. Instrumentation essential to system actuation or performance was verified operable by observing on-scale indication and proper instrument valve lineup, if accessible.

The inspectors verified that the licensee's health physics policies/procedures were followed. This included observation of HP practices and a review of area surveys, radiation work permits, posting, and instrument calibration.

The inspectors verified that: the security organization was properly manned and security personnel were capable of performing their assigned functions; persons and packages were checked prior to entry into the protected area; vehicles were properly authorized, searched and escorted within the PA; persons within the PA displayed photo identification badges; personnel in vital areas were authorized; and effective compensatory measures were employed when required.

The inspectors also observed plant housekeeping controls, verified position of certain containment isolation valves, checked several clearances, and verified the operability of onsite and offsite emergency power sources.

a. Control of Combustibles

During a tour of the service water intake structure on October 20, 1988, the inspector noted that non-fire retardant treated wood was being utilized to construct forms for penetration seals under the Unit 2 nuclear and conventional service water pumps. The licensee's procedure, Control of Combustibles, Transient Fire Loads, and Ignition Sources, FPP-014, Revision 3, dated July 15, 1988, section 8.4, prohibits the use of non-fire retardant treated wood inside restricted structures housing safety-related equipment. In addition, this procedure stipulates that, if wood is required to be used inside a restricted area, only fire retardant treated wood be used and only after a review of the transient combustible threshold limits. The review ensures that the introduction of the treated wood does not exceed the allowable loading for that particular area. However, the licensee's program failed to keep the unauthorized wood out of a restricted structure. The inspector did conclude that the wood would not have exceeded the transient combustible threshold limit had the analysis been performed.

On October 20, 1988, the inspector identified this issue to the licensee's system engineer for the service water system and requested that he review procedure FPP-014 and take the necessary actions required to assure that the wood utilization inside the service water intake structure was in compliance with this procedure. The system engineer had the wood removed. On October 26, 1988, licensee management issued a memorandum to all site personnel advising them on the restrictions and use of wood in restricted plant areas. This issue is identified as a Violation: Failure to Control Combustibles in Restricted Plant Areas (325/88-38-01 and 324/88-38-01).

b. 1-E11-F048B Dual Indication

On October 24, 1988, the inspector noted on MCC 1XB that both open and closed indicating lights for 1-E11-F048B (RHR heat exchanger bypass valve) were lit. The valve was required to be open by the plant operating procedures. The control room indication showed only the red, an open light, to be lit. Licensee investigation into this problem revealed that the closed limit switch rotor for the control room indication was not adjusted synchronously with the closed limit switch rotor that provided MCC indication. The difference in adjustment was within specification (96% plus or minus 1%). The limit switch for the control room indication was subsequently adjusted. Post maintenance valve stroking showed an increase in valve open stroke time from 94 to 99 seconds.

The licensee's IST program defines the F048B valve as a Category B valve, for which seat leakage in the closed position is inconsequential for fulfillment of its function. The valve has a maximum specified stroke time of 140 seconds. When the stroke time is being recorded for IST purposes the operator times the valve stroke from the control room indication. For this valve, the control room indication is supplied by a different limit switch rotor than that which supplies the MCC indication and which controls valve actuation. The inspector noted the following problems associated with this limit switch arrangement:

- o Valve position indications at the MCC are not verified during IST valve testing. These MCCs are used as remote shutdown panels in the licensee's Appendix R safe shutdown analysis. Article 1WV-3300 of ASME Section XI, 1981 Edition, through the Winter 1981 Addendum, states that, "Valves with remote position indications shall be observed at least every 2 years to verify that valve operation is accurately indicated." The licensee feels that they are in compliance with this requirement by verifying control room remote position indications during valve testing. The licensee has agreed, however, to obtain additional clarification from their nuclear insurance agency, ASME members and other utilities concerning this requirement.
- o Valve was not full stroke verified as required by article 1WV-3413(a) since valve timing was performed using an indication which was provided from a different limit switch rotor than controlled the valve actuating cycle. There is minimal safety significance related to this particular valve since it is a Category B valve with no Technical Specification operating time. Valve timing is performed to note any potential degradation of valve performance which can be accomplished by using the same indication. However, the possibility exists that this same problem (e.g. where the limit switch rotor which controls valve actuations differs from that providing control room indication)

could exist for Category A valves or others that have a Technical Specification required operating time. The licensee is currently investigating this possibility. Pending completion of the licensee's investigation, answers from outside groups, and inspector review, this is an Unresolved Item: Remote Valve Indications on Motor Control Centers Use Different Limit Switch Rotors (325/88-38-03 and 324/88-38-03).

c. Core Spray Injection Valve Leaking

On October 7, 1988, at 7:30 a.m., the inspector noted that the core spray pump 2A discharge header pressure on the control room indicator was at 310 psig. However, the demineralized water header pressure, used to supply keepfill water to the core spray system through a bypass valve, was only 190 psig. Consequently, licensee investigation and subsequent testing revealed that core spray injection valve (2-E21-F005A) was leaking. The measured leakage when combined with previous measured containment leakage was still within the Technical Specification allowable tolerance of 0.60 L_a .

In order to mitigate the leakage effects, the licensee made procedure changes to leave the F005A valve open and close the outboard injection valve (F004A) instead. Both valves receive automatic open signals during core spray automatic initiation. The evaluation which addressed the swapping of valve positions and which calculated the above leakage rate is contained in EER 88-0476. The inspectors reviewed the EER and concluded that the licensee satisfactorily addressed the issues; however, the licensee could have been more specific on how the determination for no effect on the response time was made. The inspectors continue to review the licensee's actions.

The licensee has experienced problems with keepfill systems for some time. Presently 4 of the 12 systems are inoperable and must be bypassed to ensure a steady supply of keepfill water for their respective ECCS system. The licensee is currently evaluating possible fixes for this system. The inspectors will track the licensee's resolution of this recurring problem by Inspector Followup Item: Licensee Activities Related to Correcting Keepfill System Discrepancies (325/88-38-05 and 324/88-38-05).

No violations or deviations were identified in the areas inspected.

6. Engineered Safety Feature System Walkdown (71710)

During the week of October 24, 1988 the inspectors performed a comprehensive assessment of the physical condition of the Unit 2 LPCI/RHR system. This assessment included review of the licensee's RHR System Operating Procedure OP-17, Revision 78, dated September 27, 1988; Periodic Test PT-08.2.2c, LPCI/RHR System Operability Test - Loop A, Revision 17, dated September 27, 1988; PT-08.2.2b, LPCI/RHR System Operability Test - Loop B,

Revision 21, dated September 27, 1988; and PT-08.1.3, LPCI/RHR System Component Test, Revision 29, dated September 27, 1988. The inspectors performed a walkdown and a visual inspection of 178 selected LPCI/RHR system valves (motor operated and manual), verified that the associated control room valve position indication for 58 RHR system valves showed the correct valve positions, and visually verified the correct electrical breaker/switch positions for 87 RHR system components. A detailed review of all outstanding RHR system work requests were reviewed for conditions that could affect system operability.

The inspectors verified that there were no discrepancies in plant valve position lineups, valve position indication in the control room, and electrical breaker/switch positions for the selected RHR system components. However, the inspectors identified several conditions which should have been identified by the licensee through their own system walkdown program. The inspectors found:

- 5 valve body drain valves with pipe caps missing from their tail pipes.
- 2 valves with handwheel related problems.
- 2 valves with packing leaks.
- 4 valve body drain valves which were leaking and not capped.
- 2 valves which were heavily corroded.
- 2 cases of RHR heat exchanger level transmitter support problems.
- 1 case of a mechanical valve position indicator not indicating proper valve position.

None of the above problems rendered the system inoperable.

The licensee reported that an outstanding report, SFR-88-052, dated October 14, 1988, stated that the system engineers were not conducting the system walkdown as specified in ENP-45, System Engineer Walkdown Procedure. The disposition of this QA/QC field report by the licensee's technical support section's management, along with the performance of the system engineers with regard to monitoring the physical condition, operating parameters, and design conformity of plant systems will be reviewed during subsequent NRC inspections.

The licensee's failure to conduct walkdowns or take other measures necessary to identify discrepancies in the plant material condition is a violation of 10 CFR 50 Appendix B, Criterion XVI, Corrective Action. However, since the licensee had identified the problem, and the conditions of 10 CFR 2, Appendix C, Section V.G.1 have been met, no Notice of Violation is being issued.

In addition, the inspectors, as a result of their procedure review and walkdown, identified conditions where there were discrepancies between the procedures and the valve configurations identified on the piping and instrumentation drawings. The following differences between the procedures and the P&IDs were identified to the licensee:

- Minimum flow test line drain isolation valves E11-V202 (loop B) and E11-V201 (loop A) are shown as open on the P&ID. This indicated valve position is in conflict with the required normal operating position identified in procedure OP-17.
- Minimum flow bypass valves E11-F007B (loop B) and E11-F007A (loop A) are shown as open on the P&ID. This indicated valve position is in conflict with the normal operating position identified in procedure OP-17 and PT-08.1.3.

The licensee agreed to evaluate these differences and incorporate the necessary drawing changes to correct the identified discrepancies. These items will be re-inspected during a subsequent NRC inspection.

In addition, the inspectors had some concern with regard to the testing of valves in order to meet the surveillance requirements of Technical Specification 4.5.3.2.a and 4.6.2.2.a. These specific surveillance requirements for LPCI and suppression pool cooling require that the licensee, at least once per 31 days, verify that each valve in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position. The inspectors identified the following flow path boundary valves for the LPCI or suppression pool cooling mode of RHR which were not included in PT-08.1.3:

- Suppression pool spray isolation valves E11-F027A (loop A) and E11-F027B (loop B).
- RHR heat exchanger outboard and inboard vent isolation valves E11-F103B and E11-F104B (loop B) and E11-F103A and E11-F104A (loop A).

The licensee contends that, since these valves are not directly in the flow path and their misposition would be readily detectable, they are not required to have their positions verified for compliance with the Technical Specifications and, therefore, do not have to be included in PT-08.1.3. The licensee's position on these valves, since currently several flow path boundary valves are tested (i.e., E11-F023 reactor vessel head spray outboard isolation valve, E11-F016A drywell spray outboard isolation valve, E11-V81 LPCI line (loop A) high point vent valve, etc.), does not appear to be consistent with meeting the intent of surveillance test requirements and demonstrating system operability. Therefore, this item is identified as an Unresolved Item: Failure to Include All LPCI and Suppression Pool Cooling Flow Path Boundary Valves in Their Surveillance Program (325/88-38-02 and 324/88-38-02). This matter

will be referred to the Office of Nuclear Reactor Regulation in order to decide whether the licensee must check the position of flow path boundary valves.

No violations or deviations were identified in the areas inspected.

7. Onsite Followup of Events - Unit 1 (93702)

Unit 1 scrammed from 28% on October 21, 1988, at 12:43 p.m., when an erroneous low level signal caused a reactor vessel overfill and subsequent turbine trip and scram. The licensee was reducing power to fix reactor water cleanup inboard isolation valve 1-G31-F001. While transferring feedwater control to single element, degraded high resistance relay contacts caused a loss of level signal. No ECCS actuations or isolations occurred and no safety equipment failed to activate. The non-safety grade relay was replaced, and the F001 valve was repaired prior to startup. On October 23, 1988, at 7:56 a.m., the reactor was taken critical. At 6:38 p.m., the generator was synchronized to the grid. The inspectors found no problems with the post-scram investigation. Further followup will occur after the LER is issued.

No violations or deviations were identified in the areas inspected.

8. Exit Interview (30703)

The inspection scope and findings were summarized on November 1, 1988, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
325, 324/88-38-01	VIOLATION - Failure to Control Combustibles in Restricted Plant Areas (paragraph 5.a).
325, 324/88-38-02	URI - Failure to Include All LPCI and Suppression Pool Cooling Flow Path Boundary Valves in Surveillance Program (paragraph 6).
325, 324/88-38-03	URI - Remote Valve Indicators on Motor Control Centers Use Different Limit Switch Rotors (paragraph 5.b).
325, 324/88-38-04	URI - Water Contamination of HPCI Turbine Oil (paragraph 3).
325, 324/88-38-05	IFI - Licensee Activities Related to Correcting Keepfill System Discrepancies (paragraph 5.c).

<u>Item Number</u> (cont'd)	<u>Description/Reference Paragraph</u>
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----	LIV - Failure of System Engineers to Conduct System Walkdowns or Other Measures Necessary to Identify Discrepancies in the Plant Material Condition.
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9. List of Abbreviations for Unit 1 and 2

AO	Auxiliary Operator
APRM	Average Power Range Monitor
ASME	American Society for Mechanical Engineers
BSEP	Brunswick Steam Electric Plant
E&RC	Environmental & Radiation Control
ECCS	Emergency Core Cooling System
ENP	Engineering Procedure
ESF	Engineered Safety Feature
EWR	Engineering Work Request
FPP	Fire Protection Procedure
HP	Health Physics
HPCI	High Pressure Coolant Injection
I&C	Instrumentation and Control
IFI	Inspector Followup Item
IPBS	Integrated Planning Budget System
IST	In Service Testing
LER	Licensee Event Report
LIV	Licensee Identified Violation
LPCI	Low Pressure Coolant Injection
MCC	Motor Control Center
MG	Motor Generator
NRC	Nuclear Regulatory Commission
OP	Operating Procedure
P&ID	Piping & Instrumentation Data
PA	Protected Area
PM	Plant Modification
PNSC	Plant Nuclear Safety Committee
PSIG	Pounds per Square Inch Gauge
PT	Periodic Test
QA	Quality Assurance
QC	Quality Control
RHR	Residual Heat Removal
RPS	Reactor Protection System
SFR	Surveillance Field Report
SSFI	Safety System Functional Inspection
STA	Shift Technical Advisor
TS	Technical Specification
URI	Unresolved Item