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

Report No.: 50-400/95-08

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

Docket No.: 50-400 License No.: NPF-63

Facility Name: Harris 1

Inspection Conducted: April 9 - May 6, 1995

Inspectors: Lucille Stavros for 6-5-95
S. Elrod, Senior Resident Inspector Date Signed

Lucille Stavros for 6-5-95
D. Roberts, Resident Inspector Date Signed

Approved by: 6/5/95
D. Verrelli, Chief Date Signed
Reactor Projects Branch 1
Division of Reactor Projects

SUMMARY

Scope:

This routine inspection was conducted in the areas of operational safety, maintenance, surveillance, engineering activities, plant support, review of licensee event reports, and licensee action on previous inspection items. Numerous facility tours were conducted and facility operations observed. Backshift tours and observations were conducted on April 14, 18, 21, 22, 24, 25, 26, 27, May 3 and 4, 1995.

Results:

Operational Safety

The inspectors found operators to be alert and very responsive to unusual plant conditions, especially during an April 22 power reduction in which operator actions possibly prevented a reactor trip (paragraph 3.a.(3)).

Additionally, the licensee's efforts to identify and resolve issues was noteworthy (paragraph 3.b).

The inspector identified two violations in this area; one (a non-cited violation) in which operators inadvertently bypassed an ATWS mitigation system panel (paragraph 3.a.(3)), and another in which an operator breached a reactor auxiliary building ventilation boundary without first notifying the control room shift supervisor (paragraph 3.a.(2)).

Maintenance

Maintenance and surveillance activities were performed competently and safely (paragraphs 4.a and 4.b).

The licensee adequately addressed old inspection items (paragraph 4.c).

The maintenance program for the security diesel generator was historically weak (paragraph 4.a.(1)).

Engineering Activities

Engineering responses to system design challenges, including a feedwater system water hammer event, were appropriate (paragraph 5.a).

The licensee continued to make progress in its handling of service water system requirements outlined in NRC GL 89-13 (paragraph 5.b).

Plant Support

The inspectors identified several housekeeping items which warranted additional plant management attention in that area (paragraph 6.a).

Security activities, including a practice drill and actions following the security diesel failure, were commendable (paragraph 6.c).

Delays in the plant's simulated attempts to return the CCW system to functional status during an emergency exercise pointed to an administrative hurdle the licensee must continue to address (paragraph 6.e).

The licensee's evaluation of current spent fuel pool crud levels was thorough (paragraph 6.f.(1)).

REPORT DETAILS

1. PERSONS CONTACTED

Licensee Employees

D. Batton, Manager, Work Control
*D. Braund, Manager, Security
B. Christiansen, Manager, Maintenance
J. Collins, Manager, Training
*J. Dobbs, Manager, Outages
*J. Donahue, General Manager, Harris Plant
*R. Duncan, Manager, Technical Support
*M. Hamby, Manager, Regulatory Compliance
M. Hill, Manager, Nuclear Assessment
R. Prunty, Manager, Licensing & Regulatory Programs
W. Robinson, Vice President, Harris Plant
*G. Rolfson, Manager, Harris Engineering Support Services
H. Smith, Manager, Radwaste Operation
*T. Walt, Manager, Regulatory Affairs
*B. White, Manager, Environmental and Radiation Control
*A. Williams, Manager, Operations

Other licensee employees contacted included: office, operations, engineering, maintenance, chemistry/radiation control, and corporate personnel.

NRC Personnel

P. Byron, Resident Inspector, Brunswick Plant
K. Clark, Senior Public Affairs Officer, RII
*S. Elrod, Senior Resident Inspector, Harris Plant
A. Gooden, Radiation Specialist (Emergency Preparedness), RII
B. Parker, Radiation Specialist (Health Physics), RII
W. Rankin, Section Chief, Facilities Radiation Protection Section, RII
*D. Roberts, Resident Inspector, Harris Plant
W. Sartor, Senior Radiation Specialist (Health Physics), RII

*Attended exit interview

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

2. PLANT STATUS AND ACTIVITIES

a. Operating Status of the Plant Over the Inspection Period.

The plant continued in power operation (Mode 1) for the duration of this inspection period. Operators reduced reactor power to 30 percent on April 22, allowing plant personnel to locate and repair a condenser tube leak. Reactor power was further reduced to 11

percent that day to allow the emergent repair of the "C" feedwater regulating valve. The unit returned to normal power operation on April 25 and ended the period in day 177 of power operation since startup on November 8, 1994.

b. Other NRC Inspections or Meetings at the Site.

B. Parker, Radiation Specialist from NRC Region II, was on site from April 10-13, conducting an inspection in the area of radiation control. He was later accompanied by W. Rankin, Section Chief, Facilities Radiation Protection Section, RII. The visiting inspectors conducted an exit meeting on April 13 and their findings will be documented in IR 400/95-06.

W. Sartor, A. Gooden, P. Byron, and K. Clark, of the NRC Region II staff, were on site during the week of April 17-21 evaluating the licensee's annual emergency preparedness exercise. The visiting inspectors conducted an exit meeting on April 21. The inspection results will be documented in IR 400/95-07.

3. OPERATIONAL SAFETY

a. Plant Operations (71707)

(1) Shift Logs and Facility Records

The inspector reviewed records and discussed various entries with operations personnel to verify compliance with the TS and the licensee's administrative procedures. Records reviewed, in part, by the inspectors included: shift supervisor's log; control operator's log; night order book; equipment inoperable record; active clearance log; grounding device log; temporary modification log; chemistry daily reports; shift turnover checklist; and selected radwaste logs. In addition, the inspector independently verified clearance order tagouts.

The inspectors found the logs to be legible and well organized, and to provide sufficient information on plant status and events. The inspectors found clearance tagouts to be properly implemented.

The inspectors identified no violations or deviations in the shift logs and facility records area.

(2) Facility Tours and Observations

Throughout the inspection period, the inspectors toured the facility to observe activities in progress. The inspectors made some of these observations during backshifts. Also, during this inspection period, the inspectors attended several licensee meetings to observe planning and management

activities. Facility tours and observations by the inspectors encompassed the following areas: security perimeter fence; control room; emergency diesel generator building; reactor auxiliary building; waste processing building; turbine building; battery rooms; electrical switchgear rooms; and the technical support center.

During these tours, the inspectors made observations regarding monitoring instrumentation - including equipment operating status, electrical system lineup, reactor operating parameters, and auxiliary equipment operating parameters. They verified indicated parameters to be per the TS for the current operational mode. The inspectors also verified that operating shift staffing was in accordance with TS requirements and that the licensee was conducting control room operations in an orderly and professional manner. The inspectors additionally observed shift turnovers on various occasions to verify the turnover continuity of plant status, operational problems, and other pertinent plant information. Licensee performance in these areas was satisfactory.

RAB Emergency Exhaust System Potential Inoperability

During a tour of the 236 foot elevation of the RAB on April 20, the inspector found RAB door no. 615 blocked open using gloves wedged in the hinge crack. A radwaste operator who was performing checks on a nearby fire alarm panel indicated that he had blocked the door open approximately 10 minutes earlier to establish ventilation where he was standing. Subsequent discussion with the operator indicated that he was unaware of the door operability requirements, and the need to notify the MCR shift supervisor prior to blocking it open. The inspector informed the operator that blocking the door open potentially rendered both RABEES trains inoperable. The inspector alerted the MCR shift supervisor of the door's blocked-open status, then closed it.

This door was part of the reactor auxiliary building emergency exhaust system (RABEES) ventilation boundary and was required to be closed so that the RABEES, if required, could maintain a negative 1/8 inch water gauge pressure in certain RAB rooms, as specified in TS. The system was also designed to minimize the spread of airborne contamination from certain areas to others within the RAB. This and other RABEES boundary doors were identified in the plant with large diagonal yellow stripes and signs requiring personnel to notify the MCR shift supervisor before blocking them open.

The April 20 incident followed a similar one on April 6 in which plant personnel found the "B" RHR room door, also a RABEES ventilation boundary, blocked open by an electrical cord running through it. In that instance, the RHR door had been blocked open by contractors who were painting inside the building. ACFR 95-1011 was generated for the earlier incident, and a subsequent engineering evaluation showed that, since the RHR room door was only opened wide enough to allow the cord to pass through, the RABEES would have been able to maintain the TS-required negative 1/8 inch water gauge pressure. That engineering evaluation is discussed further in report paragraph 5.a.(1).

For the April 20 incident, engineers indicated that the door's half-open status would have potentially rendered the RABEES system inoperable. The inspector determined that the conditions for being allowed to block such a door open, were that the responsible individual would be able to shut it within 10 minutes of a PA system announcement of a reactor trip. These conditions were outlined in administrative procedure AP-002, Plant Conduct of Operations. Although the door was never left unattended, the individual was unaware of the emergency function of the door and the need to shut it following a reactor trip PA announcement. Additionally, the lack of communication between the individual and the control room would have likely resulted in the shift supervisor not being aware of the door's off-normal status in the event of a reactor trip. Technical specification 6.8.1 and Regulatory Guide 1.33, Appendix A, required procedures covering the operation of Auxiliary Building Heating and Ventilation Systems. Procedure AP-002, Section 5.32.3, Ventilation Boundaries, required that personnel obtain permission from the control room shift supervisor prior to blocking open a RABEES boundary door. The radwaste operator's action on April 20 was contrary to that requirement.

This is Violation 400/95-08-01, Failure to Notify Shift Supervisor of a Breached RABEES Ventilation Boundary.

The April 20 incident also indicated the following:

- the plant program for controlling the RABEES doors needed improvement;

- plant personnel whose work may require them to interface with these doors were, in some cases, not aware of operating requirements for the doors; and

- the licensee's corrective actions for the April 6 incident were ineffective. The ACFR for that incident was assigned to the Maintenance subprogram with a

Level 3 (minor) status. The corrective actions for that event were restricted to counseling for the responsible work group, and posting of maintenance reminders on certain plant bulletin boards.

The inspector concluded that the issue of RABEES boundary door control was one which warranted additional plant management attention.

The inspectors identified one violation in the facility tours and observations area.

(3) Plant Power Reduction

During the weekend of April 21, the inspectors observed operators reduce plant power to 30 percent in accordance with portions of procedure GP-006, Rev 6/6, Normal Plant Shutdown From Power Operation to Hot Standby (Mode 1 to Mode 3). The power reduction was intended to allow maintenance personnel to locate and repair a main turbine condenser tube leak. During the downpower evolution, operators faced several simultaneous and interrelated balance-of-plant challenges which required prompt, yet carefully integrated, actions to maintain stable operating conditions. Later, operators further reduced reactor power to 11 percent to repair a feedwater regulating valve as discussed below.

Feedwater Regulating Valve Failure

At about 2:30 a.m., on April 22 with the plant operating at approximately 40 percent power, operators experienced difficulty controlling water level in the "C" steam generator. A control room board operator noticed that "C" water level was slightly lower than that of the other two steam generators. The operator attempted to restore level by taking the associated feedwater regulating valve, 1FW-191, to manual control and raising its demand setting. When the steam generator level did not respond, the operator opened the feedwater regulating bypass valve, establishing a parallel flowpath of feedwater to the "C" steam generator. Steam generator level subsequently returned to normal. Within 20 minutes, operators returned the feedwater regulating valve to automatic control. Operators then observed that 1FW-191 was controlling S/G "C" at the desired program level with a valve demand position indicating 17 percent higher than that of the other two regulating valves. Operators locally verified that valve 1FW-191 was between 0.5 and 0.75 inches farther open than the other two feedwater regulating valves. Subsequent to this event, the licensee attributed the "C" feedwater regulating valve problem to an internal pin failure which resulted in the valve stem separating from the valve plug, or disk.

Water Hammers in Feedwater System

Shortly after 2:30 a.m., when operators opened the feedwater regulating bypass valve, the associated feedwater piping experienced several water hammer events. An auxiliary operator located at the valve stated that he saw pipe movements of up to 6 inches. Large oscillations in feedwater flow and feedwater pressure, as indicated in the main control room, accompanied the water hammers. The inspectors and plant personnel were concerned about the potential damage caused by the water hammer events. These concerns were specifically related to main feedwater and AFW piping, components, and supports. Licensee personnel resolved these concerns in ESR 9500488 discussed in paragraph 5.a.(2).

AFW System Check Valves Unseated

During the previously described events, operators noticed AFW flow oscillations of up to 150 KPPH to the "C" steam generator. None of the AFW pumps were operating. At Harris, a portion of the main feedwater flow is diverted to AFW piping to bypass the steam generators' preheater sections. Hence, during normal operations, approximately 20 percent of main feedwater flows to the steam generators through AFW piping and AFW nozzles. Three check valves located between each AFW pump and an AFW-MFW interface prevent backflow to the AFW pumps from either the steam generators or the MFW system.

The check valves remain closed during normal operations to reduce AFW pump casing temperature and associated potential for steam binding, which is especially a concern with the turbine driven AFW pump.

Shortly after the water hammer-related flow oscillations, AFW pipe high temperature alarms indicated that two of the check valves in the line from the turbine-driven AFW pump to the "C" steam generator were no longer seated. AFW pipe temperatures reached as high as 195 degrees F, confirming check valve back leakage. Operators entered abnormal operating procedure AOP-010, Feedwater Malfunctions, and isolated the TDAFW piping from the steam generators by closing the AFW isolation valves. This placed the plant in a 72-hour LCO action statement for the TDAFW pump. Operators then successfully vented and drained the TDAFW line to the "C" steam generator, and operated the TDAFW pump for approximately 5 minutes to reflush the AFW line with colder water from the condensate storage tank. Operators finally reopened the AFW isolation valves and exited the LCO action statement. This corrective action reseated the AFW system check valves.

Licensee personnel postulated that the check valves opened due to pressure perturbations caused by the water hammer in the feedwater lines when operators opened the feedwater regulating bypass valve. Plant personnel also indicated that although this anomaly has occurred before at Harris, it is not a normally expected occurrence. It was noted that the third check valve in the affected line remained closed such that AFW pump casing temperature remained low.

Plant personnel documented the regulating valve failure and associated events in ACFR 95-1135.

Large Steam Leak in Turbine Building

Concurrent with the above-mentioned incidents, plant operators were faced with another challenge. A blown gasket on a valve in piping associated with the 5B feedwater heater caused a large steam leak in the turbine building. The amount of steam created by the leak posed a definite personnel safety hazard and required that operators remove the moisture separator reheaters from service to isolate the valve. The operators successfully integrated this activity with the incidents described above.

The inspectors concluded that control room operations were conducted smoothly, especially considering the previously discussed operational challenges. Operators took necessary actions to keep the plant in a stable condition. The fact that the balance of plant operator identified the decreasing steam generator level prior to any alarm annunciation was considered positive.

ATWS Panel Bypass

Although control room operations were conducted smoothly, the inspector identified one violation. General procedure GP-006, Rev 6, Normal Plant Shutdown from Power Operation to Hot Standby (Mode 1 to Mode 3), step 5.1.11 stated that when turbine load is less than 40 percent (or 185 psig first stage turbine pressure) and the turbine is being removed from service, place the SG LEVEL ATWS PANEL BYPASS switch to BYPASS. The inspector, upon returning to the control room from a tour of the turbine building, noticed that the ATWS PANEL BYPASSED annunciator was lit and observed that operators had performed this procedure step even though the turbine was not being removed from service. The inspector informed the control room operators who indicated that they had inadvertently overlooked the procedure wording related to removing the turbine from service. Operators immediately returned the SG Level ATWS panel switch to the NORMAL position.

Following subsequent discussions with plant personnel and a review of associated procedures, the inspector determined that the AMSAC system was automatically unarmed below 40 percent turbine load (triggered by the equivalent turbine first stage pressure). Placing the switch to BYPASS at this point in the procedure had no effect on the availability of AMSAC. On the night of the occurrence, the inspector verified that the S/G ATWS PANEL ARMED light (located on the bypass permissive light panel) was extinguished while turbine load was below 40 percent, even after the ATWS panel switch was returned to normal. It was actually desirable to remove AMSAC from service if the turbine was being taken off-line at a very low power because of the potential for AMSAC to cause inadvertent AFW system actuations. Operations procedure writers indicated that the wording in the procedure related to removing the turbine from service was unnecessary because the ATWS panel would be unarmed below 40 percent turbine load, regardless of the turbine's on-line status. Licensee personnel further stated that the two-clause wording of the procedure step possibly contributed to the operator's non-compliance.

Following the inspector's finding, control room personnel initiated ACFR 95-1204 to document and correct the situation. At the end of the inspection period, the licensee's goal was to reword this step in the procedure.

Although the inspector was initially concerned with the need for AMSAC to be available while the turbine was still on-line because of the potential for some unexpected increase in turbine first stage pressure at loads near 40 percent, the inspector concluded that performing the step was of low safety significance and that operators would likely have been triggered to un-bypass the ATWS panel either while performing the subsequent startup procedure or during efforts to clear the associated annunciator during power ascension. Although bypassing the ATWS panel was of low safety significance, the inspector maintained that the procedure could have been changed prior to performing the step.

Technical Specification 6.8.1 and Regulatory Guide 1.33, Rev 2, Appendix A, section 2, require that procedures shall be established and implemented covering load changes and plant shutdown to Hot Standby. Procedure GP-006, step 5.1.11 directed operators to bypass the S/G Level ATWS panel when turbine load decreased below 40 percent and the turbine was being removed from service. Bypassing the ATWS panel when the turbine was not being removed from service was contrary to that requirement and is a violation. This

violation will not be subject to enforcement action because the licensee's actions to correct the violation meet the criteria specified in Section VII.B of the enforcement policy.

Non-cited Violation 400/95-08-02: Failure to Follow Plant Shutdown Procedure by Bypassing ATWS Panel.

The inspector concluded that, with the exception of the procedural violation, operators performed the downpower evolution very well, especially considering the multitude of balance of plant problems that occurred.

b. Effectiveness of Licensee Control in Identifying, Resolving, and Preventing Problems (40500)

Adverse Condition and Feedback Reports (ACFRs) were reviewed to verify that TS were complied with, corrective actions and generic items were identified, and items were reported as required by 10 CFR 50.73. The inspectors reviewed ACFRs documenting the following incidents:

(1) ACFR 95-1019 reported a situation in which a quarterly surveillance requirement was missed. The surveillance requirement, affecting both ESW system trains, was to cycle room air cooler solenoid valves. These valves shift the room cooler water supply from cooling tower makeup water to ESW upon receipt of an SI signal. Upon discovery, the manual isolation valves in each train, which had been opened for about 24 hours, were reclosed and the solenoid valves were cycled to demonstrate operability.

The missed surveillance was determined not to be reportable (in accordance with 10 CFR 50.73) when licensee personnel discovered that a 25 percent grace period still existed on one train's surveillance frequency.

Additionally, the licensee discovered through an operability determination, that the isolation function of these solenoid valves was unnecessary during an accident because the amount of ESW flow that could be potentially diverted was small. The inspectors concluded that this missed surveillance was not a safety problem.

The licensee immediately assigned an event review team to investigate this situation. At the close of the inspection, the licensee had not formalized the results of its investigation.

The inspector reviewed the situation and concluded that a contributing cause was test requirements for these valves being poorly communicated in operating procedures and in the

process for tracking inoperable equipment. This allowed the ESW room coolers, which had been shut down and drained all winter, to be aligned for operation without properly testing the solenoid valves. The inspectors also concluded that, once licensee personnel identified the situation, they took prompt corrective actions. However, this latest incident was not a mark of good performance for a plant with several missed surveillance requirements over the last year.

(2) ACFR 95-1161 reported a near-miss situation in which maintenance personnel began removing a cover plate from a nonsafety-related chilled water evaporator before it was properly placed under clearance. Licensee personnel identified the situation when a Radiological Waste Shift Supervisor happened to walk by the job site and question the work being performed. Had the shift supervisor not identified the discrepancy, a personnel safety hazard could have existed. Although the licensee's resolution to the ACFR had not been completed by the end of the inspection period, the inspector attributed the cause of this incident to improper replanning by plant personnel when the job's original work scope was changed.

Operating outside of clearance boundaries has not been a recurring problem at Harris. The inspector concluded that the above incident represented a single lapse in performance.

(3) ACFR 95-1135 was also reviewed for the feedwater system problems described in paragraph 3.a.(3). The inspector concluded that the licensee's efforts to identify, document and correct or evaluate these conditions were satisfactory.

The licensee's Nuclear Assessment Section completed a two-week assessment of the plant modification program on March 31. The findings were discussed in NAS report H-MOD-95-01, Harris Engineering Support Section Plant Modification Program. The inspector reviewed the assessment and concluded that the assessment was thorough and resulted in substantive findings.

The licensee's efforts to identify and resolve issues was excellent. The inspectors identified no violations or deviations in the self-assessment area.

The inspectors found operators to be alert and very responsive to unusual plant conditions, especially during the April 22 power reduction. Additionally, the licensee's efforts to identify and resolve issues was excellent. Increased management attention was warranted in the control of RAB emergency exhaust system ventilation boundary doors.

The inspectors identified two violations in the operational safety area.

4. MAINTENANCE

a. Maintenance Observation (62703)

The inspectors observed or reviewed maintenance activities to verify that correct equipment clearances were in effect; work requests and fire prevention work permits were issued; and TS requirements were being followed. Maintenance was observed and work packages were reviewed for the following maintenance activities:

(1) WR/JO 95-AETK1, Troubleshoot, Disassemble and Repair the Security Diesel Generator as Necessary. The inspector observed licensee personnel troubleshooting the security diesel generator during the week of April 17. The manufacturer's technical representative was onsite providing expertise and techniques for troubleshooting the diesel engine. This diesel had been inoperable since April 8. The licensee took precautionary and compensatory security measures as discussed in report paragraph 6.c.

The security diesel generator had a 16-cylinder engine and was rated for 680 KW. Maintenance personnel speculated that symptoms, including erratic voltage and frequency swings, originated in the engine fuel system. During a 15 minute troubleshooting run on April 17, the vendor representative measured exhaust manifold temperatures near each cylinder to determine which, if any, fuel injectors were not operating properly. Six fuel injectors were malfunctioning. Plant personnel conservatively replaced all 16 injectors since the majority were original equipment. Maintenance personnel also replaced all three fuel filters. Subsequently, plant personnel removed one of these filters - which had been previously installed by a design change to the diesel fuel day tank outlet piping - after the vendor representative determined that this filter was starving fuel from the engine during extended operations.

Several diesel runs since the earlier modification did not indicate that this filter presented an operational problem. The vendor representative concluded that the unnecessary filter, dirty fuel, and clogged injectors were all factors affecting fuel oil pressure and were the likely causes of erratic engine operation on April 8.

The inspector inquired about the maintenance history of the diesel engine fuel system. Licensee personnel indicated that the only maintenance program involved inspecting the fuel and lubrication systems for leaks, and minor maintenance items associated with air filters, hoses, engine belts, and coolant level. The inspector and licensee personnel concurrently reviewed the associated vendor

technical manual to determine if other maintenance items should also be performed. Licensee review determined that additional vendor manual items such as engine tune-up and periodic replacement of fuel filters were appropriate. These were assigned a preventive maintenance frequency. Though not in the vendor manual PM table, an additional item to periodically record exhaust manifold temperatures at each cylinder was added to check for proper fuel injector operation. The inspector verified through the licensee's automated maintenance management system that these items were indeed assigned a PM frequency.

Licensee personnel conducted the maintenance activities associated with the security diesel between April 17 and 21 satisfactorily. Although the newly assigned system engineer, who was present during much of the troubleshooting, was diligent in his efforts to enhance the PM program for the diesel generator, the inspector considered the licensee's maintenance program for this component to be historically weak.

(2) WR/JO 95-AEWZ1, Troubleshoot ESW Pump 1A Motor. The inspector observed technicians troubleshooting electrical components associated with the 1A ESW pump motor after the circuit breaker tripped on C phase instantaneous overcurrent during an April 12 pump start attempt. Technicians assessed motor conditions using a resistance bridge and a megohm meter, and calibrated the overcurrent relay in the maintenance shop. The inspector observed the technicians performing the work at the breaker in accordance with procedure CM-E0014, Rev 4, Initial Checkout Of 6.9 KV Motors. During the procedure, a technician received a small shock while bridge equipment was being connected to the breaker. The licensee determined that the shock was caused by residual charges remaining on the motor cables after isolation. Licensee personnel removed the charges by installing and removing temporary grounds prior to continuing with the procedure. According to plant personnel, the governing procedure was usually performed on components that had been out of service for longer periods of time than the ESW motor had been. An ACFR was generated to document this situation. The work was performed satisfactorily with the motor meeting all of the acceptance criteria for the resistance bridge and megohm meter tests.

Licensee personnel later informed the inspector that the overcurrent relay was found out of calibration. Its as-found trip setpoint was 30 amperes, vice the 40 amperes specified in acceptance criteria. Technicians adjusted the relay trip setpoint to its correct value prior to reinstallation. The overcurrent relay was last calibrated in January 1995. The pump had been successfully started

since then - indicating that the relay was set properly in January. Following all of the troubleshooting efforts, operators restarted the pump and it operated satisfactorily.

The inspector reviewed the closed work ticket for the above jobs and found that, with one exception, technicians had properly documented the data and work performed. That exception was an error in the calculation of the polarization index in the megohm meter testing section of procedure CM-E0014. The error was in the conservative direction, however, and did not affect the acceptability of the data. The inspector informed the licensee.

Overall, licensee personnel conducted the ESW breaker work competently and effectively.

(3) WR/JO 95-AFDA1, Verify That Pressure Switches Associated With the Loss of Feedwater and Heater Drain Pump Turbine Runbacks Were Reset on Reduced Turbine First Stage Pressure. This item involved measuring voltages at certain terminals associated with the main turbine runback logic. Procedure GP-006, Step 5.1.9 required the verification but did not specify how to verify the condition and did not include acceptance criteria. This procedural omission, and the fact that the criteria was not specified in an implementing work ticket during a previous plant power reduction on October 28, 1994, was the subject of a weakness discussed in NRC IR 400/94-22. During the April 21-22, 1995, plant power reduction, the inspectors observed technicians perform the verification in accordance with the subject work ticket. This time, the work ticket included a note discussing expected voltage readings and specified criteria for determining whether the switches had been reset. The inclusion of criteria in the work ticket on April 22 adequately addressed the weakness identified in the earlier inspection report.

The technicians did a good job verifying pressure switch status.

(4) WR/JO 94-APPU1, Open and Inspect CSIP Gear Oil Cooler for Fouling. The licensee inspected the 1A CSIP oil cooler in accordance with test procedure EPT-163, Rev 2, Raw Water Systems Inspection and Documentation. The licensee's inspection was one of many performed during the month of April on heat exchangers cooled by the ESW system. The inspections were part of an ongoing effort to satisfy requirements contained in NRC GL 89-13, Service Water System Problems Affecting Safety-Related Systems. The inspector observed plant personnel disassemble the oil cooler; inspect for sediment, biological fouling, and other indications of potential flow blockage; and clean the tubes. The cognizant

system engineer was present and oversaw the inspections. Findings, which were minimal, were properly documented on the EPT-163 data sheets. The licensee found no biological fouling in the oil cooler.

Overall, this job was well performed.

In general, the performance of work was satisfactory with proper documentation of removed components and independent verification of the reinstallation. The inspector considered the licensee's maintenance program for the security diesel generator to be historically weak. The inspectors identified no violations or deviations in the maintenance area.

b: Surveillance Observation (61726)

The inspector observed several surveillance tests to verify that approved procedures were being used; qualified personnel were conducting the tests; tests were adequate to verify equipment operability; calibrated equipment was used; and TS requirements were followed. Test observation and data review included:

(1) OST-1017, Rev 3, Pressurizer PORV Block Valve Full Stroke Test, Quarterly Interval. The inspectors observed operators perform a stroke time test on each of the three pressurizer PORV block valves. The valves were tested quarterly to meet ASME Code Section XI ISI requirements. Operators timed the valves by observing position indication on the main control board. The inspector verified that calibrated testing equipment was used, and that operators strictly followed the effective procedure revision. The inspector also verified that the test results, which met the stated acceptance criteria, were being tracked in the licensee's ISI program.

Licensee personnel performed this test satisfactorily.

(2) OST-1039, Rev 5, Calculation of Quadrant Power Tilt Ratio, Weekly Interval (with Alarm Operable). The inspector observed operators perform this procedure in accordance with TS 4.2.4.1.b, which required the ratio to be calculated at least once per 12 hours while the (QPTR) alarm was inoperable. Beginning with the downpower evolution on April 21, operators received spurious alarms indicating POWER RANGE LOWER DETECTOR HI FLUX DEVIATION OR AUTO DEFEAT. The alarms annunciated before reactor power was reduced to 50 percent, when the flux deviation alarm was expected to actuate. After investigating, operators declared this annunciator inoperable which then required the manual calculation every 12 hours. The inspector verified that,

while performing the test, operators used the effective procedure revision and properly self-verified the data they used in the calculation. The calculated QPTR met acceptance criteria.

Operators performed this test satisfactorily.

(3) ORT-1408, Rev 4, Security Diesel Operability Run, Biweekly Interval. The inspector reviewed the data from the test which immediately preceded the diesel's failure on April 8. This test was successfully completed on April 6. The diesel was operated for slightly greater than 1 hour at loads of between 255 and 420 kilowatts. These loads were dictated by security building system loads and they fluctuated, as expected, throughout the test. None of the voltage and frequency swings that occurred on April 8 were documented as observed during the April 6 test.

The inspector found the data sheets to be complete with appropriate documentation of the diesel test results.

The inspectors found satisfactory surveillance procedure performance with proper use of calibrated test equipment, necessary communications established, notification/authorization of control room personnel, and knowledgeable personnel having performed the tasks. The inspectors observed no violations or deviations in the surveillance area.

c. Followup - Maintenance (92902)

(1) (Closed) IFI 400/94-13-04: Impact of Non-RCS Valve Leakoff on RCS Leakrate Calculations.

The inspector reviewed surveillance procedure OST-1026, Rev 6, Reactor Coolant System Leakage Evaluation, Computer Calculation, Daily Interval; and its associated procedure, OST-1226, Rev 0, Reactor Coolant System Leakage Evaluation, Manual Calculation, Daily Interval. This review determined that recent procedural revisions corrected a potential non-conservatism associated with the RCS unidentified leakage calculation. The inspector verified that these surveillance procedures' revisions corrected this nonconservatism by subtracting SI accumulator level changes from the total RCS leakage value. This would cause the identified and unidentified RCS leakage values to be minimally affected by SI system input to the RCDT.

This item is closed.

(2) (Closed) VIO 400/94-17-01: Failure to Test the EDGs in Accordance With TS Table 4.8-1 on a Staggered Test Basis.

The inspector verified that actions committed to in licensee response letter HNP-94-080, dated October 17, 1994, were completed. These actions included STSS program enhancements, various procedural enhancements related to EDG operation and testing, and personnel training for those normally involved in diesel testing and test scheduling.

The inspector has closed this violation.

The inspectors concluded that the maintenance and surveillance activities observed were performed competently and safely, and that the licensee adequately addressed previous inspection items. The inspector considered the licensee's maintenance program for the security diesel generator to be historically weak.

5. ENGINEERING ACTIVITIES

a. Design/Installation/Testing of Modifications (37551)

Engineering Service Requests (ESR) involving the installation of new or modified systems were examined to verify that the changes were reviewed and approved in accordance with 10 CFR 50.59, that the changes were performed in accordance with technically adequate and approved procedures, that subsequent testing and test results met approved acceptance criteria or deviations were resolved in an acceptable manner, and that appropriate drawings and facility procedures were revised as necessary. ESRs documenting engineering evaluations were also reviewed. ESRs reviewed included:

(1) ESR 9500473, Rev 0, RAB Emergency Ventilation Operability. This evaluation determined that the RAB emergency exhaust system was operable during the time that a ventilation boundary door was blocked open on April 6. That incident, which involved an RHR room door on the 236 foot elevation, preceded the April 20 event, which was the source of the violation described in paragraph 3.a.(2) of this report. Engineers determined that the system was operable on April 6 because the door opening was equivalent to an area of 46.5 square inches. This was less than the 70 square inches which would render the RAB emergency exhaust fans unable to maintain a negative 1/8 inch water gauge pressure in the RAB envelope. The operability criteria was based on calculations using the results of a recent quarterly surveillance test on the exhaust fans. A calculation was also done to show that the area created by the door opening on April 6 was not sufficient to allow the passage of contamination from the RHR room to surrounding areas.

The inspector considered the above evaluation to be adequate to address the April 6 issue.

(2) ESR 9500488, Rev 0, Evaluate Water Hammer at [the Feedwater] Regulator Valve for "C" Steam Generator. This evaluation concluded that feedwater and auxiliary feedwater system piping and components were not damaged by the water hammer events described in paragraph 3.a.(3) of this inspection report. The evaluation primarily consisted of visual inspections of areas affected by the water hammer events. Licensee personnel compared expected evidence of significant pipe movement; such as displacement of, or damage to, supports, pipe insulation, junction boxes, and other components; to actual results of the April 22 event. The evaluators concluded that the system piping was designed to seismic specifications and that the April 22 water hammers, based on the visual evidence, was not sufficient to cause system damage.

The inspector considered this evaluation to be adequate.

The inspectors identified no violations or deviations in the design/installation/testing of modifications area.

b. Onsite System Engineering (37551)

The inspectors reviewed results of the licensee's inspections of various heat exchangers cooled by the ESW system. These inspections were conducted in accordance with test procedure EPT-163, Rev 2, Raw Water Systems Inspection and Documentation. Recent component inspections were part of a continuing effort to satisfy periodic inspection requirements contained in NRC GL 89-13. Data sheets for the following components were reviewed:

- "B" CSIP gear and pump oil coolers;
- "A" CSIP gear and pump oil coolers;
- "A" ESCWS chiller expansion tank; and
- "A" and "B" ESCWS chiller condensers.

For each of the components inspected, the licensee found no Asiatic clams or other biological fouling agents. For the majority of components, there was no flow blockage of any kind nor significant corrosion observed. In some cases, however, licensee personnel identified partial tube blockage from foreign particles including a tie wrap, a rock, gasket material, and corrosion nodules from carbon steel piping elsewhere in the system. For the "B" CSIP gear oil cooler, licensee personnel found a piece of plastic blocking several tubes. All of these conditions were corrected and documented in the data sheets for EPT-163.

The cognizant system engineer filed the inspection results, including pictures documenting some of the findings, in files dedicated to the licensee's overall service water system inspection effort.

Activities associated with the licensee's original handling of GL 89-13 resulted in previous Violation 400/94-21-02. Recent concerns related to Asiatic clams found at the plant's emergency service water intake structures were discussed in NRC IR 400/94-17-02. The licensee's efforts this month demonstrated progress in addressing the above issues. The inspectors identified no violations or deviations in the systems engineering area.

Overall, engineering responses to system design challenges, including the feedwater system water hammer event, were appropriate. The licensee continued to make progress in meeting service water system requirements outlined in NRC GL 89-13.

6. PLANT SUPPORT

a. Plant Housekeeping Conditions (71707) - The inspectors reviewed storage of material and components, and observed cleanliness conditions of various areas throughout the facility to determine whether safety or fire hazards existed. During tours of the reactor auxiliary building, the inspector identified several housekeeping items:

- Insulation and canning was torn or removed from piping in various locations, including containment spray piping, chilled water piping associated with an air handler in the 1A RHR room, and insulation for the end bell on the 1A ESCWS chiller condenser. The end bell insulation was removed and precariously located near the 1A ESCWS chilled water pump (P-4 pump).

- An abandoned "Contaminated Area" sign was located between an electrical junction box and a column in the spent fuel pool heat exchanger room.

- An empty water bucket was lying on the 1A CSIP baseplate.

- Water was collecting on the floor under the 1A containment spray pump.

- Red plastic bags were wrapped or taped around each of the two "A" train ESW valves serving the 1A CSIP oil coolers. One of the bags had a cloth glove stored inside. The bags did not affect ESW system or CSIP operability, but were an obstruction to verifying the valves' positions, and had to be removed to allow valve operation.

The inspector reported these observations to plant management who initiated efforts to locate and correct the situations. The inspector considered each of the individual cases to represent minor lapses in housekeeping, especially considering the current amount of plant upgrade work. However, collectively, these observations represented a housekeeping situation that could.be avoided with more attention in this area.

b. Radiological Protection Program (71750) - The inspectors reviewed radiation protection control activities to verify that these activities were in conformance with facility policies and procedures, and in compliance with regulatory requirements. The inspectors also verified that selected doors which controlled access to very high radiation areas were appropriately locked. Radiological postings were spot checked for adequacy.

c. Security Control (71750) - During this period, the inspectors toured the protected area and noted that the perimeter fence was intact and not compromised by erosion or disrepair. The fence fabric was secured and barbed wire was angled. Isolation zones were maintained on both sides of the barrier and were free of objects which could shield or conceal an individual. The inspectors observed various security force shifts perform daily activities, including searching personnel and packages entering the protected area by special purpose detectors or by a physical patdown for firearms, explosives and contraband. Other activities included vehicles being searched, escorted and secured; escorting of visitors; patrols; and compensatory posts.

The licensee conducted several security drills during which simulated adversaries attempted to bring contraband into the protected area. The inspector observed one of these drills in which an individual carried a [fake] gun into the search area. The inspector observed security personnel quickly apprehend the perpetrator, whose gun was detected by a metal detector. Security personnel concurrently evacuated the search area of non-security personnel, including the inspector. From his vantage point in the search area, the inspector concluded that this drill was conducted successfully.

As discussed in paragraph 4.a.(1) of this report, the licensee experienced problems with the security diesel generator on April 8. As a result, power was temporarily lost to some equipment in the security building. The inspector verified that compensatory actions were taken. This included performing augmented personnel searches at the search area. The licensee also augmented the security staff on the weekends while the security diesel generator was out of service. The inspector verified that the April 8 situation was logged in the security blotter. The inspector considered the licensee's actions to be appropriate. The diesel generator was finally repaired and successfully tested on April 21.

The inspectors found that selected functions and equipment of the security program complied with requirements.

d. Fire Protection (71750) - The inspectors observed fire protection activities, staffing and equipment to verify that fire brigade staffing was appropriate and that fire alarms, extinguishing equipment, actuating controls, fire fighting equipment, emergency equipment, and fire barriers were operable. During plant tours, areas were inspected to ensure fire hazards did not exist.

e. Emergency Preparedness (71750) - The inspectors toured emergency response facilities to verify availability for emergency operation. Duty rosters were reviewed to verify appropriate staffing levels were maintained. As applicable, the inspectors observed emergency preparedness exercises and drills to verify response personnel were adequately trained.

On April 18, the licensee conducted its annual emergency exercise to verify the effectiveness of the Shearon Harris Offsite Radiological Emergency Response Plan and implementing procedures. State and county organizations participated in this FEMA-evaluated exercise. Details of the exercise concerning offsite response plan implementation and Harris emergency response facility operations were discussed in NRC IR 400/95-07. The resident inspectors made the following observation which was not directly related to emergency response plan implementation.

Administrative Delays in Restoring a Safety System

The following discussion addresses simulated plant conditions during the emergency drill on April 18, 1995.

The key initiators for this exercise were the loss of the "A" CCW heat exchanger and the "B" CCW pump motor. The loss of both trains of CCW placed the plant in an Alert condition and required operators to trip the reactor coolant pumps and hence the reactor. Emergency response management decided, in accordance with plant procedures, that the plant would be operated in natural circulation and a plant cooldown would not begin until CCW could be restored. During this drill, the resident inspectors observed that approximately 3.5 hours elapsed before damage control personnel physically attempted to restore CCW, a key safety function.

The success path to restoring CCW was cross-tying the "A" train pump and the "B" train piping and heat exchanger. Since none of the current operating procedures provided for this type of system alignment, plant personnel determined that they would have to invoke the procedure change process before operators could manually realign valves. The licensee's options ranged from the

rather lengthy procedure revision process to the quickest form of procedure alteration, the temporary change process. These processes were outlined in procedure AP-006, Rev 12, Procedure Review and Approval.

The licensee's program for regular procedure changes included requirements for various reviews and approvals by management personnel and the PNSC. The temporary change process, however, only required prior approval from two interim approvers, one of whom must have been a currently-licensed SRO. By choice, licensee personnel initially invoked the temporary change process, but the change was rejected when one of the approvers determined that this process was inappropriate for the CCW application because the changes affected the overall intent of the original operating procedure. Licensee personnel considered performing an off-normal valve lineup checklist, in accordance with procedure OMM-001, Rev 7, Operations - Conduct of Operations, to achieve the desired system line-up. That option was also discarded because the desired system alignment was considered beyond the scope of the OMM-001 process.

After deliberating over these and other options, the licensee finally decided to invoke 10 CFR 50.54(x) which allowed them to deviate from TS 6.8, Procedures and Programs. The shift supervisor ultimately provided a marked up drawing to auxiliary operators for them to use in realigning the CCW system.

The inspector determined that 3.5 hours elapsed from the time of the initial failures to the time operators could put their hands on system valves. Approximately two of these hours were spent developing the temporary change and deliberating over other options. The inspector concluded that these delays were attributed to the following factors:

- The licensee's established programs for handling procedure changes (procedure AP-006) and other off-normal system conditions (procedure OMM-001) were developed for non-emergency situations.

- Licensee management's expectations regarding procedure changes and/or off-normal system configurations during emergency situations were not clearly defined and/or not clearly understood by key plant personnel.

The inspector concluded that, based on the 3.5 hour delay and the availability of plant management personnel during what was viewed to represent the highest state of readiness a plant can achieve, the licensee's administrative program was driving management instead of management driving the program. The inspectors

discussed these observations with plant management who had made similar observations and initiated a review team to address the noted deficiencies. The utility was continuing to address this area at the end of the inspection period.

f. Followup - Plant Support (92904)

(1) (Closed) IFI 400/94-13-06, Review the Licensee's Activities to Quantify the Amount of Crud in the Spent Fuel Pools.

To address this IFI, licensee personnel developed a methodology to calculate the amount of radioactive crud deposited in the spent fuel pools due to spent fuel shipments from the Brunswick and Robinson plants. This method consisted of an analytical calculation which determined expected dose rates associated with the assumed maximum amount of crud once the pools have been filled to capacity. The maximum crud assumption was previously analyzed in engineering evaluation RET-0252, Rev 1, BNP Spent Fuel Crud on HNP Design Basis. The maximum amount of crud deposited from a complete fuel load of the Harris pools had been previously determined to represent a value which, following the limiting accident, would not cause radioactivity concentrations off site to exceed 10 CFR 20 limits which were then in place.

The expected dose rates associated with the maximum crud deposit for the full fuel load were determined from the results of an isotopic analysis which considered both the crud and the spent fuel pool water. The expected dose rates for the maximum crud concentration were then compared to actual results of radiological surveys taken in December 1994 for the pools. For conservatism, the expected dose rate for a maximum crud deposit assumed a uniform distribution of crud over the area of the spent fuel pool floors, where the crud is primarily concentrated. Actual survey results indicated that the average dose rate on contact with the spent fuel floors was 67 R/hr. This result was less than the expected average dose rate from maximum crud deposit of 585 R/hr. The licensee concluded that the current spent fuel pool/transfer canal activity caused by fuel shipments from Brunswick or Robinson was bounded by the engineering evaluation of record.

The inspector considered the licensee's evaluation of current spent fuel pool crud levels to be thorough and conservative. The licensee indicated that the evaluation will be performed annually and triggered by a CAP Action Item. The inspector also observed spent fuel shipments from Brunswick and witnessed crud depositing from the assemblies as they were being transported from the shipping cask to the spent fuel racks. The inspector concluded that although the

licensee has addressed the concern for quantifying the amount of crud, it still had a long-term challenge in the area of controlling this material.

For additional review of this area, see also NRC IR 400/95-06. This IFI is closed.

(2) (Open) VIO 400/94-17-03: Failure to Maintain Operator Respirator Qualifications in Accordance with Emergency Plan Procedures.

The inspector verified that actions committed to in licensee response letter HNP-94-080, dated October 17, 1994, were completed. These actions included a monthly review of plant personnel respirator requalification requirements and steps taken to notify, if required, supervisors of those individuals who were near the end of the requalification grace period. The inspector reviewed memorandums documenting both the monthly reviews by Access Authority and reviews conducted by Emergency Preparedness.

Subsequent to the inspection period, the licensee's NAS organization discovered seven more individuals on the emergency response organization roster who were not respirator qualified. These individuals were primarily maintenance and security personnel. The licensee documented this finding in ACFR 95-1407 and launched an inquiry. These recent findings show that this item should remain open pending inquiry results and further NRC inspection.

Except for the cases noted above, the inspectors found plant housekeeping and material condition of components to be satisfactory. The licensee's adherence to radiological controls, security controls, fire protection requirements, emergency preparedness requirements, and TS requirements in these areas was satisfactory. Administrative hurdles and a lack of understanding or communication of plant management's intentions caused delays in simulated attempts to restore a safety function during the emergency exercise. The inspectors identified no violations or deviations in the plant support area.

7. EXIT INTERVIEW

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on May 5, 1995. During this meeting, the inspectors summarized the scope and findings of the inspection as they are detailed in this report, with particular emphasis on the Violations addressed below. 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.

Item Number	Status	Description and Reference	
400/95-08-01	Open	VIO	Failure to Notify Shift Supervisor of a Breached RABEES Ventilation Boundary, paragraph 3.a.(2).
400/95-08-02	Closed	NCV	Failure to Follow Plant Shutdown Procedure by Bypassing ATWS Panel, paragraph 3.a.(3).
400/94-13-04	Closed	IFI	Impact of Non-RCS Valve Leakoff on RCS Leakrate Calculations, paragraph 4.c.(1).
400/94-17-01	Closed	VIO	Failure to Test the EDGs in Accordance with TS Table 4.8-1 on a Staggered Test Basis, paragraph 4.c.(2).
400/94-13-06	Closed	IFI	Review the Licensee's Activities to Quantify the Amount of Crud in the Spent Fuel Pools, paragraph 6.f.(1).
400/94-17-03	Open	VIO	Failure to Maintain Operator Respirator Qualifications in Accordance with Emergency Plan Procedures, paragraph 6.f.(2).

8. ACRONYMS AND INITIALISMS

ACFR - Adverse Condition and Feedback Report
AFW - Auxiliary Feedwater
AMSAC - ATWS Mitigation System Actuation Circuitry
AOP - Abnormal Operating Procedure
ASME - American Society of Mechanical Engineers
ATWS - Anticipated Transient Without Scram
BNP - Brunswick Nuclear Plant
CCW - Component Cooling Water
CFR - Code of Federal Regulations
CSIP - Charging/Safety Injection Pump
EDG - Emergency Diesel Generator
EPT - Engineering Performance Test
ESCWS - Essential Services Chilled Water System
ESR - Engineering Service Request
ESW - Emergency Service Water
FEMA - Federal Emergency Management Agency
GL - (NRC) Generic Letter
GP - General Procedure

HNP	-	Harris Nuclear Plant
IFI	-	Inspector Followup Item
IR	-	Inspection Report
ISI	-	Inservice Inspection
KPPH	-	Kilopounds per Hour
KV	-	Kilovolt
LCO	-	Limiting Condition for Operation
MCR	-	Main Control Room
MFW	-	Main Feedwater
NAS	-	Nuclear Assessment Section
NCV	-	Non-cited Violation
NPF	-	Nuclear Production Facility [a Type of License]
NRC	-	Nuclear Regulatory Commission
OMM	-	Operations Management Manual
ORT	-	Operations Reliability Test
OST	-	Operations Surveillance Test
PDR	-	Public Document Room
PNSC	-	Plant Nuclear Safety Committee
PORV	-	Power Operated Relief Valve
PSIG	-	Pounds per Square Inch, Gauge
QPTR	-	Quadrant Power Tilt Ratio
RAB	-	Reactor Auxiliary Building
RABEES	-	Reactor Auxiliary Building Emergency Exhaust System
RCDT	-	Reactor Coolant Drain Tank
RCS	-	Reactor Coolant System
RHR	-	Residual Heat Removal System
RWST	-	Refueling Water Storage Tank
SG	-	Steam Generator
SI	-	Safety Injection
SRO	-	Senior Reactor Operator (Licensed)
STSS	-	Surveillance Test Scheduling System
TDAFW	-	Turbine Driven Auxiliary Feedwater
TS	-	Technical Specification
VIO	-	Violation
WR/JO	-	Work Request/Job Order