

## EXECUTIVE SUMMARY

Brunswick Steam Electric Plant, Units 1 & 2  
NRC Inspection Report 50-325/96-15, 50-324/96-15

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection; in addition, it includes the results of maintenance, in-vessel inspections, and engineering inspections by regional inspectors.

### Operations

An unresolved item was identified concerning vessel disassembly while secondary containment was inoperable. (Section 01.1). This was a conscious action by the licensee although contrary to technical specification requirements. This item was unresolved pending further review of the technical specifications and licensee's risk assessment.

An unresolved item was identified concerning a loss of shutdown cooling. (Section 02.2). Repairs were being made to an instrument rack that contained the pressure switch to isolate shutdown cooling. Further review of the shutdown risk assessment was being completed.

### Maintenance

A noncited violation was identified concerning securing of wheeled equipment and carts in the plant. (Section M1.1). The licensee corrected the specific problems and revised their procedure.

The alternate remote shutdown equipment and panels have been maintained in a satisfactory manner except for the material condition of two main Remote Shutdown Panels which were considered poor. (Section M1.3).

The reactor vessel core shroud ultrasonic examination efforts observed by the inspector were conducted in an exemplified manner. (Section M2.1). Scan plans, procedures, personnel, and equipment were integrated to obtain the best possible inspection results. In-vessel visual inspections were also performed in an effective manner.

### Engineering

The licensee's progress to correct EQ program deficiencies was satisfactory. (Section E1.1). No equipment operability issues were identified.

An apparent violation was identified concerning exceeding the maximum thermal power allowed by the license and a technical specification thermal limit. (Section E2.1). This occurred due to inadequate testing of the plant process computer after installation in 1994.

A repeat violation was identified concerning failure to take corrective action to correct the cause of chlorine detector failures. (Section E2.2). Five out of eight detectors failed on September 19, 1996. This

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### Operations

An unresolved item was identified concerning vessel disassembly while secondary containment was inoperable. (Section 01.1). This was a conscious decision planned by the licensee with the belief that technical specification requirements were met although secondary containment was required to be maintained during refueling. This item was unresolved pending further review of the technical specifications and licensee's risk assessment.

An unresolved item was identified concerning a loss of shutdown cooling. (Section 02.2). Repairs were being made to an instrument rack that contained the pressure switch to isolate shutdown cooling. Further review of the shutdown risk assessment was being completed.

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ENCLOSURE 3

Engineering

The licensee committed to keep the unit at the old 100% power level pending resolution of questions.

Plant Support

Overall, the licensee's program for monitoring external exposure and tracking dose within the restricted area was effective. (Section R1 & R5). However, outside the restricted area, the licensee's dosimetry procedures did not adequately address occupational doses to workers in the controlled area who were receiving doses above the public dose limit. One violation was identified for failure to implement a radiological control procedure consistent with the requirements of 10 CFR 20.1502 (a)(2) which requires monitoring of dose to declared pregnant women likely to receive a dose in excess of 500 millirem. One unresolved item was open for the unresolved issue of accurate dose tracking and assignment practices and related procedures. One non-cited violation was identified for failure of the licensee to train workers receiving occupational dose in accordance with the requirements of 10 CFR 19.12, Instructions to Workers.

A fire protection modification associated with the deluge valves was adequate. (Section F2.1). The design review failed to identify an updated final safety analysis report discrepancy for internal flooding in the reactor building.

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The radiological controls program was being effectively implemented with good occupational exposure controls demonstrated during outage conditions. Internal and external exposures were being maintained to a small fraction of regulatory limits. The ALARA program was reducing total site dose but overall site dose remains relatively high. The licensee has experienced a high level of personnel contamination events during 1996 year to date but a significant reduction in PCEs was noted during the Unit 1 Fall outage was noted. Minor discrepancies in radioactive material labeling and control were observed while onsite which were promptly corrected by the licensee.

A fire protection modification associated with the deluge valves was adequate. (Section F2.1). The design review failed to identify an updated final safety analysis report discrepancy for internal flooding in the reactor building.

bottom of the cabinet were checked and found properly sealed. The inspection reviewed the WR/JO for the task. No deficiencies were noted.

c. Conclusion

The inspector concluded that the work observed on the MCC was in accordance with the instructions provided to provide sealing protection from a possible HELB. This WR/JO was one of many to correct EQ material condition problems with the MCCs in the reactor building for both units.

#### IV. Plant Support

#### R1 Radiological Protection and Chemistry Controls

##### R1.4 External Occupational Exposure Control and Personal Dosimetry

##### a. Inspection Scope(83724)

The inspectors evaluated the adequacy of the licensee's program for monitoring external occupational exposures during normal operations and the adequacy of the licensee's personal dosimetry program. Emphasis was given to the licensee's monitoring of occupational dose in buildings close to but outside the restricted area fence that are within the licensee's controlled area.

##### b. Observations and Findings

The inspectors reviewed area Thermoluminescent Dosimeter (TLD) results for the period of January 11, 1996, through October 10, 1996, with focus on exposures in buildings occupied by personnel adjacent to the licensee's restricted area boundary fence. A review of these TLD results averaged for a 2000 hour work year indicated several work areas outside the fence with elevated doses above the regulatory public dose limit of 100 millirem per year. Doses for an average work year were found to range from a high of 229 millirem on the second floor of the Administrative Building to doses under 100 millirem in the TAC Building. The elevated doses above the public dose limit were primarily attributable to N-16 Turbine Shine resultant from the licensee's use of Hydrogen Water Chemistry. The licensee's area TLD monitoring network confirmed that doses to workers were the highest for those workers whose offices were the closest to the source (Turbine Building) as might be expected. Doses above the public dose limit were identified in the Administrative Annex (Old Training) and Document Control Buildings although these doses were less on average than those doses in the Administrative Building. The inspectors review of licensee dosimetry, monitoring, and general radiation control procedures indicated the licensee did not treat dose to occupational workers in these buildings in the controlled area as occupational dose and licensee procedures were generally deficient in this regard. However, as defined in the regulation, dose above the public dose limit which is received by a worker in the course of employment during which the worker's assigned

duties involve exposure to radiation from licensed sources is occupational dose. The licensee was aware that some workers outside of the restricted area were receiving occupational doses above the public dose limit incidental to their occupational activities based on limited data contained in a dosimetry technical report (95-08) dated August 28, 1995. However, this report failed to address the issue comprehensively other than to conclude that no workers exceeded the 500 millirem monitoring threshold based on an analysis of actual individual summed doses inside and outside the restricted area during mid 1995 and, therefore, there was no regulatory requirement for the monitoring of individuals in the controlled area.

The inspectors reviewed available dose data for radiation workers outside the restricted area and determined that no workers were exceeding regulatory limits. However, the inspectors reviewed dose monitoring procedures as well as dose records of other categories of individuals including members of the public, casual visitors, and the exposure monitoring practices/procedures for declared pregnant women and the embryo/fetus. No concerns were identified with respect to public or casual visitors. However, because the regulatory limits for declared pregnant women are at one tenth of occupational dose limits for exposure and monitoring the full population of declared pregnant women at the site was reviewed for the prior two years. Of this population of workers none were identified that exceeded regulatory limits with respect to radiation exposure. A review of licensee actions with respect to declared pregnant women indicated the licensee had taken actions with respect to these workers post pregnancy declaration to minimize occupational exposure. Licensee actions included reassignment of workers to less dose intensive duties to lower their exposures. However, the licensee was not monitoring declared pregnant women who were working in the controlled area and had no procedural provision for declared pregnant women who may work in buildings with exposure levels above public dose limits. These workers, based on a review of area TLD monitoring results for office space located in the controlled area, have potential to receive during a nine month gestation period doses in excess of the 50 millirem occupational dose limit at which monitoring is required. Although no declared pregnant women were identified who would actually exceed the 50 millirem monitoring limit based on specific declaration dates and remaining periods of pregnancy, the workers reviewed approached the limit (maximum prospective dose was 43 millirem) indicating the need for monitoring as a conservative measure.

Incidental to this review the inspectors identified a defect with respect to the applicable procedure for dosimetry issuance for the monitoring of declared pregnant women. Carolina Power & Light Company Nuclear Generation Group Standard Procedure DOS-NGGC-0002, "Dosimetry Issuance", Revision 1, Effective Date August 12, 1996, states within paragraph 9.9.5, Individual Monitoring of Declared Pregnant Women, "If the woman works solely in the controlled area (does not enter the restricted area), then individual monitoring is not required if the dose is not likely to exceed 100 mrem in a year, the public dose limit." This procedure directly contradicts the requirements of 10 CFR 20.1502

(a) (2) which requires licensees to monitor exposures to radiation for declared pregnant women likely to receive in one year from sources external to the body a dose in excess of 50 millirem. The failure to implement a radiological control procedure consistent with the requirements of 10 CFR 20.1502 (a) (2) is a violation of regulatory requirements (VIO 50-325(324)/96-16-02), Failure to Implement a Radiological Control Procedure Consistent with 10 CFR 20.1502 (a)(2).

The inspectors evaluated the licensee's procedures and practices with respect to the monitoring and tracking of occupational dose for radiation workers. The licensee was unable to demonstrate adequately during the period of inspection that occupational dose received by workers in the controlled area was being considered in the prospective analysis used to determine if workers required monitoring in accordance with the requirements of 10 CFR 20.1502. Radiation workers who are required to be monitored for radiation work in restricted areas, i.e., workers who are likely to receive greater than 500 millirem in a year based on a prospective analysis of likely dose, are also required to be monitored for occupational dose received in controlled areas. The licensee was unable to produce records or reference procedures which demonstrated full compliance with the requirements of 10 CFR 20.1502 for monitoring occupational exposure. Additionally, the licensee was asked to demonstrate, as conservative to radiological safety and within regulatory requirements, the current dosimetry practice of subtracting 100% of turbine shine dose from the sitewide personnel TLDs stored in racks at the entrances to the restricted area. The inspectors stated to the licensee that this practice appeared nonconservative with respect to the accurate reporting of dose both in terms of cumulative site dose and individual dose assignments. The licensee was unable to provide any data to demonstrate this practice as conservative or reasonable during the week of inspection. A subtraction of less than 100% of the turbine shine dose would be a reasonable approach in the view of the inspectors due to the fact that most of the TLDs actively in use are typically on personnel inside the restricted area for 2000 hours or more during a usual workyear. The subtraction from worker dose assignments of the full turbine shine dose component as detected on the area TLDs in the vicinity of the TLD racks (which includes the turbine shine dose workers receive while working in the restricted area and while wearing their TLDs) does not appear reasonable. Subtracting the turbine shine dose component incurred by radiation workers during normal working hours when the TLDs are being worn by the radiation workers is not clearly justifiable or conservative with respect to dose assignment practices.

The licensee indicated further evaluation and time to prepare a response was necessary due in part to the need to coordinate a response with corporate dosimetry personnel who worked offsite in the Harris Energy and Environmental Center at New Hill, N. C. These inspector concerns were unresolved at the end of the inspection and will require further evaluation of licensee data. These issues regarding demonstration of accurate and reasonable dose tracking and dose assignment practices and related procedures were identified to the licensee as Unresolved Item



(URI 50-325(324)/96-16-03), Unresolved Item for Lack of Accurate Dose Tracking and Dose Assignment Practices and Related Procedures.

c. Conclusions

The licensee's program for monitoring external exposure and tracking dose within the restricted area was determined to be effective. The licensee requires by procedure all radiation workers entering the restricted area to be monitored by TLD and all workers entering the RCA to be monitored with electronic dosimetry as well. The monitoring of all workers inside the restricted area by TLDs for dose of record purposes exceeds regulatory requirements in that only a fraction of the workers who actually enter the restricted area will exceed the 500 millirem threshold requiring monitoring. Outside the restricted area, however, licensee dosimetry procedures were deficient in that the monitoring and tracking of occupational dose in the controlled area was not adequately addressed in procedure. Specifically, procedures which require monitoring of dose in the controlled area for workers who are required to be monitored in the restricted area and practices for adjusting radiation worker dose assignments to eliminate all turbine shine dose were identified to the licensee as issues requiring further evaluation by the licensee and procedural treatment as appropriate. These issues are an unresolved item with respect to dose tracking, assignment of dose, and related procedural improvement. One violation was identified for a dosimetry issuance procedure which allowed declared pregnant women in the controlled area to go unmonitored for prospective radiation dose above 50 millirem contrary to the requirements of 10 CFR 1502 (a) (2).

R5 Staff Training & Qualification in Radiation Protection and Chemistry

R5.1 Training of Radiation Workers

a. Inspection Scope (88750)

The inspectors evaluated the adequacy of training of radiation workers who were receiving occupational exposure consistent with the requirements for training contained in 10 CFR 19.12. Also evaluated were the qualifications of a recently assigned Radiation Protection Manager to determine if all qualification requirements were satisfied consistent with Technical Specification 6.3.1 and Reg Guide 1.8.

b. Observations and Findings

The inspectors determined that workers in the licensee's controlled area and outside the restricted area were receiving occupational dose as defined in 10 CFR Part 20 (also reference above Paragraph R.1.4.b.). The intent of the training requirement of 10 CFR 19.12, Instruction to Workers, is that individuals who are permitted to receive occupational doses within occupational limits will receive appropriate training commensurate with associated radiological risk. Furthermore, when doses received by workers are in fact occupational dose, appropriate

instructions should inform the worker that he/she is subject to occupational dose limits rather than public dose limits. Plant workers have the right to be fully informed as to radiological hazards and conditions of their workplace in order that they may make informed decisions related to matters such as pregnancy declaration and the minimizing of occupational exposure. The inspectors determined through a review of training material and related quizzes that the intent of 10 CFR 19.12 training was met by the licensee's Radiation Worker Training course. The radiological training content of the licensee's Plant Access Training was minimal, did not meet the intent of 10 CFR 19.12, and was not sufficient to provide training commensurate with risk as specified in regulatory guidance. In order to ensure that workers who were receiving occupational dose were trained in accordance with 10 CFR 19.12, the inspectors reviewed training records for a large sample of workers whose normal work stations were in buildings in the controlled area. Through this review it was determined that one or more workers receiving occupational dose had not been trained in accordance with 10 CFR 19.12. These workers either currently were receiving or potentially could receive occupational dose that required the workers to have radiation worker training. The failure of the licensee to have trained all workers who were receiving occupational doses was determined to be a violation of the requirements of 10 CFR 19.12. Although this violation of regulatory requirements was NRC identified the violation will not be cited due its isolated nature and relatively low safety significance. The licensee committed to train the workers affected in accordance with 10 CFR 19.12 and committed to upgrade training for all workers in the controlled area. This would ensure that they were aware of the occupational doses being received to include a characterization of associated radiological risks, and to conduct a review of rad worker training adequacy in general to ensure that the full intent of 10 CFR 19.12 was being met for all workers receiving occupational exposures both in restricted and controlled areas. The failure of the licensee to train all workers in accordance with the requirements of 10 CFR 19.12, Instruction to workers, constitutes a violation of minor safety significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy (NCV 50-325(324)/96-16-04). Failure to Train Workers Receiving Occupational Dose in Accordance with 10 CFR 19.12.

A qualification review was conducted for a recently assigned Radiation Protection Manager (RPM) to determine if the individual assigned possessed the necessary qualifications for the position. Qualification requirements, as committed to through the licensee's Technical Specification 6.3.1, specify that the RPM will meet or exceed the qualifications outlined in Reg Guide 1.8, which include a bachelor's degree in science or engineering and five years experience in applied radiation protection.

c. Conclusions

Although the licensee was adequately training workers who work in the restricted area in accordance with 10 CFR 19.12, Instruction to Workers, the inspector identified a noncompliance with 10 CFR 19.12 in that not all workers who were receiving occupational dose were trained in accordance with 10 CFR 19.12. Specifically, examples of workers in the controlled area were identified who were receiving occupational dose but who were not trained in accordance with 10 CFR 19.12. This violation will be treated as a Non-Cited Violation consistent with Section IV of the NRC Enforcement Policy.

A qualification review of an individual recently assigned as Radiation Protection Manager concluded the individual was sufficiently qualified.

F2 Status of Fire Protection Facilities and EquipmentF2.1 Fire Protection Design Change and Plant Modificationsa. Inspection Scope (71750/64704)

The inspector reviewed the adequacy of a design change to a number of plant automatic fire suppression systems associated with ESR 94-00345. The inspector walked down the plant areas affected by the change to inspect the implementation of the modification in the field and observed portions of post-modification testing.

b. Observations and Findings

The inspector reviewed implementation of ESR 94-00345. The purpose of this modification was to decommission the Automatic Sprinkler Corporation "Model C", primed-preaction deluge valves by removal of the clapper, linkages, latching arm and sealing diaphragm, and sealing the valve diaphragm opening with a cover plate. This type of valve had been experiencing recurring failures including the inability to reset the latching arm and repeated rupturing of the latch arm diaphragm seal. Failure of the diaphragm seal resulted in continuous water leakage to the floor area near the valve assembly. This modification effectively eliminated the preaction valve function and converted the preaction system to a full flow wet-pipe sprinkler system design.

The modification involved changes to the following fire suppression system deluge valves:

Reactor Buildings

1-FP-DV20, 2-FP-DV20, 1-FP-DV319,  
2-FP-DV319



Diesel Generator Building

2-FP-DV13, 2-FP-DV14, 2-FP-DV15,  
2-FP-DV16, 2-FP-DV17, 2-FP-DV18  
2-FP-DV19

Service Water Intake Building

2-FP-DV21, 1-FP-DV22, 2-FP-DV2,

Radwaste Building

2-FP-DV704

The licensee's engineers reviewed the internal flooding analysis and calculations for the Reactor Buildings, Diesel Generator Building, Radwaste Building, and Service Water Building and concluded that due to the physical separation of redundant safety-related equipment in the Reactor Buildings and documented conclusions of previous flooding analysis, the modification did not alter these analysis nor the redundancy of the systems. The inspector reviewed the history and assumptions for the modification and the 10 CFR 50.59 Safety Evaluation for the changes and determined that they were adequately evaluated. No unreviewed safety concerns were found, however, the inspector identified a UFSAR discrepancy associated with flooding protection in the reactor buildings.

UFSAR Section 2.4.2.1 states that Class I Motor Control Centers and instrument racks in the reactor buildings, when near (water) leakage sources, were provided with drip shields to minimize damage. During the walkdown of areas of the reactor buildings where automatic sprinkler protection is provided the inspector identified that Class I instrument racks H21-P009 on the 20' elevation and H21-P014, P017, P018, and P022 on the -17' elevation were not provided with drip shields. In some cases sprinklers heads and piping were installed within five feet above these instrument racks. Additional licensee walkdowns of other reactor building elevations indicated that drip shields had not been installed over any of the Class I instrument racks within areas provided with automatic wet-pipe sprinkler systems in the RBs.

After discussions with the licensee, Condition Report CR 96-03943 was issued to track the failure to provide drip shields over Class I instrument racks near leakage sources in the reactor buildings. This UFSAR discrepancy was identified by the inspector, and is discussed in Section F2.2.

A review of post modification testing for modification ESR 94-00345 was performed to confirm that appropriate National Fire Protection Association hydrostatic test pressures and duration had been specified. On November 25, 1996, the inspector observed the successful hydrostatic testing for a deluge system protecting the diesel generator building. No discrepancies were identified.

c. Conclusions

The inspectors concluded that the design change and plant modifications of the deluge valves were adequate, however, the design review failed to identify an UFSAR discrepancy associated with internal flooding in the reactor building.

F2.2 Special UFSAR Review

A recent discovery of a licensee operating the facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the UFSAR descriptions. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures, and/or parameters.

The licensee started a review of the UFSAR on July 1, 1996. After the first quarter of review, the licensee had written 23 condition reports for 70 discrepancies. This number of problems indicated a programmatic problem with maintaining the UFSAR current.

The inspector reviewed UFSAR Section 3.4.2.1, as part of the fire protection ESR modification walkdown activities. An inconsistency was noted in that the licensee failed to provide drip shields over Class I instrument racks near leakage sources in the reactor buildings. This issue is discussed in Section F2.1. This item will be identified as part of URI 325(324)/96-05-02.

V. Management Meetings

XI Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on December 12, 1996. On December 19, 1996, the licensee was informed that previous unresolved item 325/96-15-02, Loss of Shutdown Cooling, was changed to violation 325/96-16-01 discussed in this report. Post inspection briefings were conducted on November 7 and December 6, 1996. The licensee acknowledged the findings presented.

The licensee did not identify any materials used during the inspection as proprietary information.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. Barnes, Manager Training  
C. Barnhill, Dosimetry Supervisor, E&RC  
A. Brittain, Manager Security  
W. Campbell, Vice President, Brunswick Steam Electric Plant  
R. Crate, Radwaste Upgrade Project Manager  
B. Deacy, Outage Manager  
N. Gannon, Manager Maintenance  
J. Gawron, Manager Nuclear Assessment  
W. Icenogle, Corporate Dosimetry, Harris Energy & Environmental Center  
W. Levis, Director Site Operations  
R. Lopriore, General Plant Manager  
J. Lyash, Brunswick Engineering Support Section  
J. McGowan, Senior Specialist, Regulatory Affairs  
B. Nurnburger, Superintendent, Environmental and Chemistry  
C. Pardee, Manager Operations  
P. Sawyer, Acting Superintendent, Radiation Protection  
R. Schlichter, Manager Environmental and Radiation Control  
S. Tabor, Senior Specialist, Regulatory Affairs  
J. Terry, Program Analyst, E&RC  
M. Turkal, Supervisor Licensing and Regulatory Programs  
H. Wall, Training Supervisor

Other licensee employees or contractors included office, operation, maintenance, chemistry, radiation, and corporate personnel.

E. Brown  
M. Janus  
C. Patterson  
W. Rankin  
G. Wiseman

## INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering  
 IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems  
 IP 61726: Surveillance Observations  
 IP 62707: Maintenance Observations  
 IP 71707: Plant Operations  
 IP 71714: Cold Weather Preparations  
 IP 71750: Plant Support Activities  
 IP 83724: External Occupational Exposure Control and Personal Dosimetry  
 IP 83750: Occupational Radiation Exposure During Power  
 IP 92901: Followup - Operations

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-325(324)/96-16-01 VIO Improper Work Planning Resulted in a Loss of Shutdown Cooling (Paragraph 02.1)  
 50-325(324)/96-16-02 VIO Failure to Implement a Radiological Control Procedure Consistent with 10 CFR 20.1502 (a)(2) (Paragraph R1.4)  
 50-325(324)/96-16-03 URI Unresolved Item for Lack of Accurate Dose Tracking and Dose Assignment Practices and Related Procedures (Paragraph R1.4)  
 50-325(324)/96-16-04 NCV Failure to Train Workers Receiving Occupational Dose in Accordance with 10 CFR 19.12 (Paragraph R5.1)

Closed

50-325/96-15-02 URI Loss of Shutdown Cooling (Paragraph 08.1)

Discussed

50-325(324)/96-05-02 URI UFSAR Discrepancies (Paragraph F2.2)

bottom of the cabinet were checked and found properly sealed. The inspection reviewed the WR/JO for the task. No deficiencies were noted.

c. Conclusion

The inspector concluded that the work observed on the MCC was in accordance with the instructions provided to provide sealing protection from a possible HELB. This WR/JO was one of many to correct EQ material condition problems with the MCCs in the reactor building for both units.

#### IV. Plant Support

##### **R1 Radiological Protection and Chemistry Controls**

###### **R1.1 General Radiological Controls**

###### **a. Inspection Scope(83750 & 83729)**

The inspectors evaluated the adequacy of the licensee's general radiological controls program with emphasis on exposure controls during outage operations, adequacy of pre-job health physics planning and briefings, effectiveness of the Radiation Work Permit (RWP) process, adequacy of current radiological surveys to support work activities, and the adequacy of Radiation Control (RC) Technician staffing for coverage of ongoing work.

###### **b. Observations and Findings**

The inspectors evaluated general controls for radiological exposures, such as the Radiation Work Permit (RWP) process, radiation surveys, and pre-job briefings, to determine if they met applicable regulatory requirements and were designed to maintain exposures As Low As Reasonably Achievable (ALARA). The inspectors reviewed several RWPs utilized to control ongoing outage work within the radiologically controlled area (RCA), including high dose activities, and noted that the rad controls observed were appropriate for the described tasks and radiological conditions. Several specific RWPs were reviewed to determine if the supporting radiological survey data was current and sufficient to support work to be conducted under the RWP. No discrepancies were noted. Radiological control requirements specified for the specific RWPs reviewed were determined to be adequate for the work scopes identified for each of these RWPs. The licensee utilizes special RWPs for specific plant locations and tasks primarily involving higher doses and for tasks needing more complex radiological controls. General RWPs are used for work not requiring as stringent radiation controls and are used for routine job coverage and are not valid for entry into very high radiation areas.

The inspectors reviewed the RWPs being utilized on the refuel floor for general maintenance tasks, routine job coverage, and inspection activity. Based on the inspectors review of these RWPs and discussions



with licensee personnel, the inspectors determined that the broad scope radiation work permits being utilized for general refuel floor work were appropriate and adequate for the tasks that were permitted under these RWPs. Specific tasks to be conducted on the refuel floor with significant radiological hazards and requiring special radiological controls require a special RWP. The licensee was able to demonstrate that appropriate RWPs had been prepared for those situations requiring a special RWP in accordance with licensee procedure Environmental and Radiation Control (E&RC) 0230, "Issue and Use of Radiation Work Permits" (Revision 33). No discrepancies in implementation of the licensee's RWP procedure or with regulatory requirements were identified during this evaluation of the licensee's RWP practices.

The inspectors evaluated the adequacy of the licensee's pre-job briefing program to ensure that ALARA/Radiation Control Briefings were in full compliance with the licensee's E&RC-0045 Procedure, Revision 5, "ALARA/Radiation Control Pre-Job Briefings" and were conducted in a manner fully sufficient to address radiological concerns of ongoing work. The inspectors attended pre-job briefings during this inspection, and had attended additional pre-job briefings during earlier 1996 inspection activity at BNP. The inspector consistently observed thorough and indepth pre-job briefings sufficient to minimize unnecessary exposure and to identify radiological risks to radiation workers. Also observed during these briefings was good specific planning as to how to minimize personnel exposure as well as good planning of the specific tasks to be conducted with full consideration of ALARA objectives. Without exception, for the pre-job briefings attended, good work evolution planning and good "What If?" questioning as to the work process and adequacy of radiation controls was observed. No procedural discrepancies were identified during observations of pre-job briefings.

The inspectors evaluated the adequacy of the licensee's radiation survey program to ensure that sufficient surveys were being conducted at the needed frequency to identify potential radiological hazards that may be present. The inspectors selected at random a broad sample of current surveys on file in the Radiation Control Office and evaluated the surveys against the requirements of Procedure E&RC-0100, "Routine/Special Dose Rate Survey", Revision 24. The representative surveys selected for review were surveys of areas in the reactor buildings, turbine buildings, and radwaste building and included specific areas such as the Unit 1 & Unit 2 Tip rooms. Several of the specific area surveys reviewed were selected in advance in order to determine that current radiological surveys were readily available and accessible to radiation workers and RC Technicians in order to support emergent work evolutions as needed. All surveys selected were available to the inspectors in the Radiation Control Office files although procedurally the licensee has no requirement to store these survey records in this location. Each of the selected surveys was determined to be in compliance with the licensee's procedure with respect to being up to date, of adequate detail and completeness to fully characterize radiological hazards, and sufficient

and current to support work planning needs with no discrepancies noted.

The inspectors reviewed the licensee's current organization and staffing levels as they related to maintaining an effective Environmental and Radiation Control organization in support of plant activities. Within the Radiation Protection subunit there were 47 currently authorized Radiation Control Technician positions although there were six vacancies at the time of the inspection which the licensee is not currently planning to fill. The licensee is currently supplementing this organization during peak workload periods, such as an outage, with shared resources from other licensee sites as well as with contract technician support. During plant walkdowns, to include observation of RC Tech coverage at the primary RCA access point and coverage on the spent fuel pool floor, the inspectors observed the utilization of RC Technician resources and determined that appropriate numbers of RC personnel were being employed to ensure adequate job coverage and adequate E&RC procedural adherence during heightened outage levels of work activity. The inspector evaluated the overall adequacy of operational RC Technician coverage and determined that adequate shift coverage was available to support operational requirements with no concerns noted.

c. Conclusions

Implementation of the radiological control areas of RWP processes, radiation surveys, pre-job briefings, and Radiation Control Technician staffing met regulatory requirements.

R1.2 Specific Radiological Controls

a. Inspection Scope (83750 & 83729)

Specific radiological control areas inspected included internal and external exposure controls, locked high and very high radiation area controls, radiation area postings, contamination area training corrective actions, and labeling of radioactive material.

b. Observation and Findings

The inspectors made frequent tours of the radiologically controlled area (RCA), observed compliance of licensee personnel with radiation protection procedures for high dose outage work evolutions, and conducted interviews with licensee personnel with respect to knowledge of radiological controls and working conditions.

During plant walkdowns within the RCA, the inspectors conducted brief interviews at random with radiation workers inside the RCA. The interviews were conducted with radiation workers of various disciplines in order to determine the level of understanding of radiation work permit (RWP) requirements from a representative cross-section of plant workers. All of the workers interviewed were verified to have signed



onto an RWP, were wearing electronic dosimetry appropriate to their work activities within the RCA in accordance with plant procedures, and were performing specific work activities on appropriate RWPs. The questions asked included the RWP number of the RWP signed in on, electronic dosimetry dose limits, and general radiological working conditions for the areas worked in. For the workers interviewed, a good knowledge of RWP requirements and a good knowledge of radiological working conditions was demonstrated.

The inspectors reviewed total whole body exposures for all Brunswick Nuclear Plant (BNP) radiation workers and determined that all whole body exposures assigned since the beginning of the SALP cycle (5/14/95) through the end of this inspection were within 10 CFR Part 20 limits. A review of licensee personnel exposure records indicated the following maximum individual exposures at the plant during this period: Total Effective Dose Equivalent (TEDE): 2212 mrem; Committed Effective Dose Equivalent (CEDE): 92 mrem; and Shallow Dose Equivalent (SDE) whole body: 2212 mrem. The inspectors determined the licensee had adequately monitored and tracked individual occupational radiation exposures in accordance with 10 CFR Part 20 requirements and that all doses reported were at a small percentage of applicable regulatory limits.

The inspectors reviewed and discussed with licensee representatives the program for controlling access to high radiation areas (HRAs), locked high radiation areas (LHRAs), and very high radiation areas (VHRAs). Control of these areas was also inspected during tours for proper posting and access controls. No HRAs, LHRAs, or VHRAs were identified where required posting were needed but not posted. Areas controlled as LHRAs were found locked in accordance with licensee procedure. The licensee had completed a posting upgrade with respect to radiation areas to achieve full conformance with the regulatory intent of 10 CFR 20.1902. The inspectors noted significantly upgraded and improved posting practices throughout the plant.

Key controls for entry into locked and very high radiation areas were evaluated against the requirements of the licensee's administrative control procedure. Appropriate keys were controlled in accordance with procedure. During a tour of the Unit 1 Spent Fuel Pool area the inspectors observed end of outage clean up and decontamination activities. Good radiological controls were in place in this area overall. A comprehensive sample of survey instruments and respirators available for issuance were inspected and all were determined to have current calibration dates. Radiation workers during peak traffic periods were observed exiting the RCA in accordance with procedures for frisking out of the RCA to include properly clearing small articles with the small articles monitor.

During tours of the plant, the inspectors observed HP technicians performing radiation and contamination surveys in accordance with procedure. Also, during inspection of the tool issuance rooms good controls for slightly contaminated tools inside the RCA and for clean tools outside the RCA were noted.

During a walkdown of the RCA near the scaffold warehouse a yellow rad material bag containing used protective clothing, laundry bags, and miscellaneous trash was found by the inspectors unlabeled and unattended. Also, a nearby dumpster located on the west side of the fabrication shop was found by the inspectors to contain green bags with purple tools indicative of fixed contamination in them. The container was designated for clean radioactive waste and was unlabeled. All material was later surveyed and determined to be less than 100 cpm over background and, therefore, no label was required by regulation (exemption for less than Appendix C per 10 CFR 20.1905 (a)) or by licensee procedure. However, control of the materials was below normal plant rad material control standards and the licensee initiated a radioactive material control condition report and promptly corrected the deficiencies. Also, outside the RCA between the radwaste building and the diesel generator building, one rad material label on a concrete vault containing resins was identified as labeled in minimal compliance with 10 CFR 20.1904. The licensee corrected this isolated example of a minimally sufficient label with the addition of an increased description of material contents.

c. Conclusions

The radiological controls program was being effectively implemented. Good occupational exposure controls were demonstrated during outage conditions. An upgrade in radiation area posting throughout the facility was evident. Minor discrepancies in radioactive material control were identified and corrected.

R1.3 Contamination Controls

a. Inspection Scope (83750)

The inspectors evaluated the licensee's personnel contamination events (PCEs) experience and the adequacy of corrective actions and related followup. Also evaluated was the adequacy of contaminated area controls.

b. Observations and Findings

During the Unit 1 Fall outage through November 6, 1996 the site had incurred 52 Personnel Contamination Events (PCE) which was substantially less than the initial Unit 1 outage goal of 71. This superior PCE Unit 1 outage performance was noteworthy due to the relatively high number of PCEs experienced by the licensee earlier in 1996 primarily during the Unit 2 outage. The licensee significantly exceeded the Unit 2 PCE outage goal of 81 during the Spring 1996 outage by approximately 200 percent necessitating a revised annual PCE goal of 320. As of the date of this inspection the licensee was achieving much improved PCE performance relative to the earlier 1996 Unit 2 Spring outage performance and the revised goal should be met at year end. The inspectors evaluated the licensee's PCE reduction initiative and identified several contributors to the improved PCE performance to

include: 1) Increased work group ownership for PCE goals; 2) Improved training to include development of Double Step-Off Pad training; and 3) Increased and more prompt E&RC management oversight for each PCE occurrence. The inspectors also selectively reviewed the higher assigned dose PCE reports and noted no assessment or procedural errors. Where a skin dose assessment was required by licensee procedure based on the level of skin activity in corrected counts per minute, the inspectors were able to verify the assessment had been performed as per procedure with conservative dose assessment methodology utilized.

c. Conclusions

Although the licensee experienced a high level of personnel contamination events through 1996, significantly improved PCE performance was identified during the Unit 1 outage. No deficiencies were identified with respect to adequacy of followup on individual personnel contaminations. Licensee actions with respect to improving personnel contamination controls were determined to be appropriate with no regulatory concerns noted.

R1.4 External Occupational Exposure Control and Personal Dosimetry

a. Inspection Scope(83724)

The inspectors evaluated the adequacy of the licensee's program for monitoring external occupational exposures during normal operations and the adequacy of the licensee's personal dosimetry program. Emphasis was given to the licensee's monitoring of occupational dose in buildings close to but outside the restricted area fence that are within the licensee's controlled area.

b. Observations and Findings

The inspectors reviewed area Thermoluminescent Dosimeter (TLD) results for the period of January 11, 1996, through October 10, 1996, with focus on exposures in buildings occupied by personnel adjacent to the licensee's restricted area boundary fence. A review of these TLD results averaged for a 2000 hour work year indicated several work areas outside the fence with elevated doses above the regulatory public dose limit of 100 millirem per year. Doses for an average work year were found to range from a high of 229 millirem on the second floor of the Administrative Building to doses under 100 millirem in the TAC Building. The elevated doses above the public dose limit were primarily attributable to N-16 Turbine Shine resultant from the licensee's use of Hydrogen Water Chemistry. The licensee's area TLD monitoring network confirmed that doses to workers were the highest for those workers whose offices were the closest to the source (Turbine Building) as might be expected. Doses above the public dose limit were identified in the Administrative Annex (Old Training) and Document Control Buildings although these doses were less on average than those doses in the Administrative Building. The inspectors review of licensee dosimetry, monitoring, and general radiation control procedures indicated the

licensee did not treat dose to occupational workers in these buildings in the controlled area as occupational dose and licensee procedures were generally deficient in this regard. However, as defined in the regulation, dose above the public dose limit which is received by a worker in the course of employment during which the worker's assigned duties involve exposure to radiation from licensed sources is occupational dose. The licensee was aware that some workers outside of the restricted area were receiving occupational doses above the public dose limit incidental to their occupational activities based on limited data contained in a dosimetry technical report (95-08) dated August 28, 1995. However, this report failed to address the issue comprehensively other than to conclude that no workers exceeded the 500 millirem monitoring threshold based on an analysis of actual individual summed doses inside and outside the restricted area during mid 1995 and, therefore, there was no regulatory requirement for the monitoring of individuals in the controlled area.

The inspectors reviewed available dose data for radiation workers outside the restricted area and determined that no workers were exceeding regulatory limits. However, the inspectors reviewed dose monitoring procedures as well as dose records of other categories of individuals including members of the public, casual visitors, and the exposure monitoring practices/procedures for declared pregnant women and the embryo/fetus. No concerns were identified with respect to public or casual visitors. However, because the regulatory limits for declared pregnant women are at one tenth of occupational dose limits for exposure and monitoring the full population of declared pregnant women at the site was reviewed for the prior two years. Of this population of workers none were identified that exceeded regulatory limits with respect to radiation exposure. A review of licensee actions with respect to declared pregnant women indicated the licensee had taken actions with respect to these workers post pregnancy declaration to minimize occupational exposure. Licensee actions included reassignment of workers to less dose intensive duties to lower their exposures. However, the licensee was not monitoring declared pregnant women who were working in the controlled area and had no procedural provision for declared pregnant women who may work in buildings with exposure levels above public dose limits. These workers, based on a review of area TLD monitoring results for office space located in the controlled area, have potential to receive during a nine month gestation period doses in excess of the 50 millirem occupational dose limit at which monitoring is required. Although no declared pregnant women were identified who would actually exceed the 50 millirem monitoring limit based on specific declaration dates and remaining periods of pregnancy, the workers reviewed approached the limit (maximum prospective dose was 43 millirem) indicating the need for monitoring as a conservative measure.

Incidental to this review the inspectors identified a defect with respect to the applicable procedure for dosimetry issuance for the monitoring of declared pregnant women. Carolina Power & Light Company Nuclear Generation Group Standard Procedure DOS-NGGC-0002, "Dosimetry Issuance", Revision 1, Effective Date August 12, 1996, states within



paragraph 9.9.5, Individual Monitoring of Declared Pregnant Women, "If the woman works solely in the controlled area (does not enter the restricted area), then individual monitoring is not required if the dose is not likely to exceed 100 mrem in a year, the public dose limit." This procedure directly contradicts the requirements of 10 CFR 20.1502 (a) (2) which requires licensees to monitor exposures to radiation for declared pregnant women likely to receive in one year from sources external to the body a dose in excess of 50 millirem. The failure to implement a radiological control procedure consistent with the requirements of 10 CFR 20.1502 (a) (2) is a violation of regulatory requirements (VIO 50-325(324)/96-16-02), Failure to Implement a Radiological Control Procedure Consistent with 10 CFR 20.1502 (a)(2).

The inspectors evaluated the licensee's procedures and practices with respect to the monitoring and tracking of occupational dose for radiation workers. The licensee was unable to demonstrate adequately during the period of inspection that occupational dose received by workers in the controlled area was being considered in the prospective analysis used to determine if workers required monitoring in accordance with the requirements of 10 CFR 20.1502. Radiation workers who are required to be monitored for radiation work in restricted areas, i.e., workers who are likely to receive greater than 500 millirem in a year based on a prospective analysis of likely dose, are also required to be monitored for occupational dose received in controlled areas. The licensee was unable to produce records or reference procedures which demonstrated full compliance with the requirements of 10 CFR 20.1502 for monitoring occupational exposure. Additionally, the licensee was asked to demonstrate, as conservative to radiological safety and within regulatory requirements, the current dosimetry practice of subtracting 100% of turbine shine dose from the sitewide personnel TLDs stored in racks at the entrances to the restricted area. The inspectors stated to the licensee that this practice appeared nonconservative with respect to the accurate reporting of dose both in terms of cumulative site dose and individual dose assignments. The licensee was unable to provide any data to demonstrate this practice as conservative or reasonable during the week of inspection. A subtraction of less than 100% of the turbine shine dose would be a reasonable approach in the view of the inspectors due to the fact that most of the TLDs actively in use are typically on personnel inside the restricted area for 2000 hours or more during a usual workyear. The subtraction from worker dose assignments of the full turbine shine dose component as detected on the area TLDs in the vicinity of the TLD racks (which includes the turbine shine dose workers receive while working in the restricted area and while wearing their TLDs) does not appear reasonable. Subtracting the turbine shine dose component incurred by radiation workers during normal working hours when the TLDs are being worn by the radiation workers is not clearly justifiable or conservative with respect to dose assignment practices.

The licensee indicated further evaluation and time to prepare a response was necessary due in part to the need to coordinate a response with corporate dosimetry personnel who worked offsite in the Harris Energy and Environmental Center at New Hill, N. C. These inspector concerns

were unresolved at the end of the inspection and will require further evaluation of licensee data. These issues regarding demonstration of accurate and reasonable dose tracking and dose assignment practices and related procedures were identified to the licensee as Unresolved Item (URI 50-325(324)/96-16-03), Unresolved Item for Lack of Accurate Dose Tracking and Dose Assignment Practices and Related Procedures.

c. Conclusions

The licensee's program for monitoring external exposure and tracking dose within the restricted area was determined to be effective. The licensee requires by procedure all radiation workers entering the restricted area to be monitored by TLD and all workers entering the RCA to be monitored with electronic dosimetry as well. The monitoring of all workers inside the restricted area by TLDs for dose of record purposes exceeds regulatory requirements in that only a fraction of the workers who actually enter the restricted area will exceed the 500 millirem threshold requiring monitoring. Outside the restricted area, however, licensee dosimetry procedures were deficient in that the monitoring and tracking of occupational dose in the controlled area was not adequately addressed in procedure. Specifically, procedures which require monitoring of dose in the controlled area for workers who are required to be monitored in the restricted area and practices for adjusting radiation worker dose assignments to eliminate all turbine shine dose were identified to the licensee as issues requiring further evaluation by the licensee and procedural treatment as appropriate. These issues are an Unresolved Item with respect to dose tracking, assignment of dose, and related procedural improvement. One violation was identified for a dosimetry issuance procedure which allowed declared pregnant women in the controlled area to go unmonitored for prospective radiation dose above 50 millirem contrary to the requirements of 10 CFR 1502 (a) (2).

**R5 Staff Training & Qualification in Radiation Protection and Chemistry**

**R5.1 Training of Radiation Workers**

a. Inspection Scope (83750)

The inspectors evaluated the adequacy of training of radiation workers who were receiving occupational exposure consistent with the requirements for training contained in 10 CFR 19.12. Also evaluated were the qualifications of a recently assigned Radiation Protection Manager to determine if all qualification requirements were satisfied consistent with Technical Specification 6.3.1 and Reg Guide 1.8.

b. Observations and Findings

The inspectors determined that workers in the licensee's controlled area and outside the restricted area were receiving occupational dose as defined in 10 CFR Part 20 (also reference above Paragraph R.1.4.b.). The intent of the training requirement of 10 CFR 19.12, Instruction to

Workers, is that individuals who are permitted to receive occupational doses within occupational limits will receive appropriate training commensurate with associated radiological risk. Furthermore, when doses received by workers are in fact occupational dose, appropriate instructions should inform the worker that he/she is subject to occupational dose limits rather than public dose limits. Plant workers have the right to be fully informed as to radiological hazards and conditions of their workplace in order that they may make informed decisions related to matters such as pregnancy declaration and the minimizing of occupational exposure. The inspectors determined through a review of training material and related quizzes that the intent of 10 CFR 19.12 training was met by the licensee's Radiation Worker Training course. The radiological training content of the licensee's Plant Access Training was minimal, did not meet the intent of 10 CFR 19.12, and was not sufficient to provide training commensurate with risk as specified in regulatory guidance. In order to ensure that workers who were receiving occupational dose were trained in accordance with 10 CFR 19.12, the inspectors reviewed training records for a large sample of workers whose normal work stations were in buildings in the controlled area. Through this review it was determined that one or more workers receiving occupational dose had not been trained in accordance with 10 CFR 19.12. These workers either currently were receiving or potentially could receive occupational dose that required the workers to have radiation worker training. The failure of the licensee to have trained all workers who were receiving occupational doses was determined to be a violation of the requirements of 10 CFR 19.12. Although this violation of regulatory requirements was NRC identified the violation will not be cited due its isolated nature and relatively low safety significance. The licensee committed to train the workers affected in accordance with 10 CFR 19.12 and committed to upgrade training for all workers in the controlled area. This would ensure that they were aware of the occupational doses being received to include a characterization of associated radiological risks, and to conduct a review of rad worker training adequacy in general to ensure that the full intent of 10 CFR 19.12 was being met for all workers receiving occupational exposures both in restricted and controlled areas. The failure of the licensee to train all workers in accordance with the requirements of 10 CFR 19.12, Instruction to Workers, constitutes a violation of minor safety significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy (NCV 50-325(324)/96-16-04), Failure to Train Workers Receiving Occupational Dose in Accordance with 10 CFR 19.12.

A qualification review was conducted for a recently assigned Radiation Protection Manager (RPM) to determine if the individual assigned possessed the necessary qualifications for the position. Qualification requirements, as committed to through the licensee's Technical Specification 6.3.1, specify that the RPM will meet or exceed the qualifications outlined in Reg Guide 1.8, which include a bachelor's degree in science or engineering and five years experience in applied radiation protection.



c. Conclusions

Although the licensee was adequately training workers who work in the restricted area in accordance with 10 CFR 19.12, Instruction to Workers, the inspector identified a noncompliance with 10 CFR 19.12 in that not all workers who were receiving occupational dose were trained in accordance with 10 CFR 19.12. Specifically, examples of workers in the controlled area were identified who were receiving occupational dose but who were not trained in accordance with 10 CFR 19.12. This violation will be treated as a Non-Cited Violation consistent with Section IV of the NRC Enforcement Policy.

A qualification review of an individual recently assigned as Radiation Protection Manager concluded the individual was sufficiently qualified.

**R8 Miscellaneous Radiation Protection and Chemistry Issues**

**R8.1 ALARA Program Effectiveness**

a. Inspection Scope (83750)

Part 20 to the Code of Federal Regulations requires that licensees use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as reasonably achievable. The ALARA area was evaluated to determine whether the licensee was establishing and tracking performance against ALARA goals, whether continuing ALARA initiatives are ongoing to reduce dose, and to evaluate the overall effectiveness of the ALARA program.

b. Observations and Findings

Through November 6, 1996, the licensee projected a Unit 1 Refueling Outage dose of 210.7 person rem and actually achieved a dose of 210.8 rem which was approximately equal to the goal. The outage dose goal was revised upward by approximately 10 rem to allow for emergent work. The licensee was on track to achieve their annual dose goal of 688 rem based on good dose performance during the Unit 1 refueling outage and low dose accrual during power operation periods during 1996. The annual dose goal, if achieved, is still at a relatively high level but represents good dose performance for the site during a year with Unit 1 and Unit 2 refueling outages. The inspectors observed pre job ALARA briefings and evaluated ALARA pre work packages for select high dose outage activities. The inspectors noted thorough and detailed pre-job planning for specific high dose activities and observed good task analysis as well as a questioning attitude as to potential dose saving opportunities for planned activities. The inspectors reviewed with the licensee current and planned ALARA initiatives. During 1996, the licensee had undertaken several dose reduction initiatives including expanded application of shielding, additional advanced radiation worker training, and additional emphasis on ALARA practices and dose ownership by all organizational units. The licensee established an exposure goal for 1996

which, if achieved, will represent good dose performance at the site during a year with two refueling outages. Notwithstanding this dose performance, overall dose at the site remains relatively high. The licensee did not undertake a full system chemical decon during B111R1 but did realize some dose reduction through hot spot flushing, zinc injection in recirc piping, and a system hydrogen peroxide wash. The licensee did not commit to a chemical decon based on a negative cost benefit analysis using a site standard of \$10,000 per rem and an estimated saving of 55 rem for a full system decon during the B111R1 outage as well as additional rem savings during future outages. Despite the decision not to undertake a full system chemical decon, the licensee indicated an intent to evaluate the feasibility of conducting full system chemical decons as an ALARA initiative during future outages. Overall, the inspectors determined that collective dose is being effectively controlled and reduced.

c. Conclusions

Overall, based on an evaluation of ALARA initiatives and ALARA work plans for high dose work evolutions, the inspectors concluded that the licensee's ALARA program was adequately controlling collective dose and that collective dose was on a favorable reducing trend. However, site dose remains relatively high and continued ALARA initiatives to reduce source term and reduce site dose are warranted.

**F2 Status of Fire Protection Facilities and Equipment**

**F2.1 Fire Protection Design Change and Plant Modifications**

a. Inspection Scope (71750, 64704)

The inspector reviewed the adequacy of a design change to a number of plant automatic fire suppression systems associated with ESR 94-00345. The inspector walked down the plant areas affected by the change to inspect the implementation of the modification in the field and observed portions of post-modification testing.

b. Observations and Findings

The inspector reviewed implementation of ESR 94-00345. The purpose of this modification was to decommission the Automatic Sprinkler Corporation "Model C", primed-preaction deluge valves by removal of the clapper, linkages, latching arm and sealing diaphragm, and sealing the valve diaphragm opening with a cover plate. This type of valve had been experiencing recurring failures including the inability to reset the latching arm and repeated rupturing of the latch arm diaphragm seal. Failure of the diaphragm seal resulted in continuous water leakage to the floor area near the valve assembly. This modification effectively eliminated the preaction valve function and converted the preaction system to a full flow wet-pipe sprinkler system design.

The modification involved changes to the following fire suppression system deluge valves:

Reactor Buildings

1-FP-DV20, 2-FP-DV20, 1-FP-DV319,  
2-FP-DV319

Diesel Generator Building

2-FP-DV13, 2-FP-DV14, 2-FP-DV15,  
2-FP-DV16, 2-FP-DV17, 2-FP-DV18  
2-FP-DV19

Service Water Intake Building

2-FP-DV21, 1-FP-DV22, 2-FP-DV2,

Radwaste Building

2-FP-DV704

The licensee's engineers reviewed the internal flooding analysis and calculations for the Reactor Buildings, Diesel Generator Building, Radwaste Building, and Service Water Building and concluded that due to the physical separation of redundant safety-related equipment in the Reactor Buildings and documented conclusions of previous flooding analysis, the modification did not alter these analysis nor the redundancy of the systems. The inspector reviewed the history and assumptions for the modification and the 10 CFR 50.59 Safety Evaluation for the changes and determined that they were adequately evaluated. No unreviewed safety concerns were found, however, the inspector identified a UFSAR discrepancy associated with flooding protection in the reactor buildings.

UFSAR Section 3.4.2.1 states that Class I Motor Control Centers and instrument racks in the reactor buildings, when near (water) leakage sources, were provided with drip shields to minimize damage. During the walkdown of areas of the reactor buildings where automatic sprinkler protection is provided the inspector identified that Class I instrument racks H21-P009 on the 20' elevation and H21-P014, P017, P018, and P022 on the -17' elevation were not provided with drip shields. In some cases sprinklers heads and piping were installed within five feet above these instrument racks. Additional licensee walkdowns of other reactor building elevations indicated that drip shields had not been installed over any of the Class I instrument racks within areas provided with automatic wet-pipe sprinkler systems in the RBs.

After discussions with the licensee, Condition Report CR 96-03943 was issued to track the failure to provide drip shields over Class I instrument racks near leakage sources in the reactor buildings. This

UFSAR discrepancy was identified by the inspector, and is discussed in Section F2.2.

A review of post modification testing for modification ESR 94- 00345 was performed to confirm that appropriate National Fire Protection Association hydrostatic test pressures and duration had been specified. On November 25, 1996, the inspector observed the successful hydrostatic testing for a deluge system protecting the diesel generator building. No discrepancies were identified.

c. Conclusions

The inspectors concluded that the design change and plant modifications of the deluge valves were adequate, however, the design review failed to identify an UFSAR discrepancy associated with internal flooding in the reactor building.

F2.2 Special UFSAR Review

A recent discovery of a licensee operating the facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the UFSAR descriptions. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures, and/or parameters.

The licensee started a review of the UFSAR on July 1, 1996. After the first quarter of review, the licensee had written 23 condition reports for 70 discrepancies. This number of problems indicated a programmatic problem with maintaining the UFSAR current.

The inspector reviewed UFSAR Section 3.4.2.1, as part of the fire protection ESR modification walkdown activities. An inconsistency was noted in that the licensee failed to provide drip shields over Class I instrument racks near leakage sources in the reactor buildings. This issue is discussed in Section F2.1. This item will be identified as part of URI 325(324)/96-05-02.

V. Management MeetingsXI Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on December 12, 1996. On December 19, 1996, the licensee was informed that previous unresolved item 325/96-15-02, Loss of Shutdown Cooling, was changed to violation 325/96-16-01 discussed in this report. Post inspection briefings were conducted on November 7 and December 6, 1996. The licensee acknowledged the findings presented.

The licensee did not identify any materials used during the inspection as proprietary information.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. Barnes, Manager Training  
C. Barnhill, Dosimetry Supervisor, E&RC  
A. Brittain, Manager Security  
W. Campbell, Vice President, Brunswick Steam Electric Plant  
R. Crate, Radwaste Upgrade Project Manager  
B. Deacy, Outage Manager  
N. Gannon, Manager Maintenance  
J. Gawron, Manager Nuclear Assessment  
W. Icenogle, Corporate Dosimetry, Harris Energy & Environmental Center  
W. Levis, Director Site Operations  
R. Lopriore, General Plant Manager  
J. Lyash, Brunswick Engineering Support Section  
J. McGowan, Senior Specialist, Regulatory Affairs  
B. Nurnburger, Superintendent, Environmental and Chemistry  
C. Pardee, Manager Operations  
P. Sawyer, Acting Superintendent, Radiation Protection  
R. Schlichter, Manager Environmental and Radiation Control  
S. Tabor, Senior Specialist, Regulatory Affairs  
J. Terry, Program Analyst, E&RC  
M. Turkal, Supervisor Licensing and Regulatory Programs  
H. Wall, Training Supervisor

Other licensee employees or contractors included office, operation, maintenance, chemistry, radiation, and corporate personnel.

E. Brown  
M. Janus  
C. Patterson  
W. Rankin  
G. Wiseman



## INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering  
 IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems  
 IP 61726: Surveillance Observations  
 IP 62707: Maintenance Observations  
 IP 71707: Plant Operations  
 IP 71714: Cold Weather Preparations  
 IP 71750: Plant Support Activities  
 IP 83724: External Occupational Exposure Control and Personal Dosimetry  
 IP 83729: Occupational Radiation Exposure During Outage  
 IP 83750: Occupational Radiation Exposure During Power  
 IP 92901: Followup - Operations

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-325(324)/96-16-01	VIO	Improper Work Planning Resulted in a Loss of Shutdown Cooling (Paragraph 02.1)
50-325(324)/96-16-02	VIO	Failure to Implement a Radiological Control Procedure Consistent with 10 CFR 20.1502 (a)(2) (Paragraph R1.4)
50-325(324)/96-16-03	URI	Unresolved Item for Lack of Accurate Dose Tracking and Dose Assignment Practices and Related Procedures (Paragraph R1.4)
50-325(324)/96-16-04	NCV	Failure to Train Workers Receiving Occupational Dose in Accordance with 10 CFR 19.12 (Paragraph R5.1)

Closed

50-325/96-15-02	URI	Loss of Shutdown Cooling (Paragraph 08.1)
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Discussed

50-325(324)/96-05-02	URI	UFSAR Discrepancies (Paragraph F2.2)
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