



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

July 30, 2008

Mr. Benjamin C. Waldrep  
Vice President  
Carolina Power and Light Company  
Brunswick Steam Electric Plant  
P. O. Box 10429  
Southport, NC 28461

**SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED  
INSPECTION REPORT NOS.: 05000325/2008003 AND  
05000324/2008003**

Dear Mr. Waldrep:

On June 30, 2008, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Unit 1 and 2 facilities. The enclosed integrated inspection report documents the inspection findings, which were discussed on July 9, 2008, with Mr. Ed Wills and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, two self-revealing findings and one NRC-identified finding of very low safety significance (Green) were identified. Two of the findings were determined to involve violations of NRC requirements. Additionally, one licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Randall A. Musser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket Nos.: 50-325, 50-324

License Nos.: DPR-71, DPR-62

Enclosure: Inspection Report 05000325, 324/2008003

w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to Benjamin C. Waldrep from Randall A. Musser dated July 30, 2008

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED  
INSPECTION REPORT NOS.: 05000325/2008003 AND  
05000324/2008003

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-325, 50-324

License Nos.: DPR-71, DPR-62

Report Nos.: 05000325/2008003, 05000324/2008003

Licensee: Carolina Power and Light (CP&L)

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road, SE  
Southport, NC 28461

Dates: April 1 to June 30, 2008

Inspectors: J. Austin, Senior Resident Inspector  
G. Kolcum, Resident Inspector  
H. Gepford, Senior Health Physicist, Sections 2PS1, 4OA1  
G. Kuzo, Senior Health Physicist, Section 4OA2  
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Approved by: R. Musser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000324/2008003, 0500325/2008003; 04/01/2008 - 06/30/2008; Brunswick Steam Electric Plant Unit 1 and Unit 2; Routine Baseline Inspection Report, Plant Modifications, Post Maintenance Testing, and Public Radiation Safety.

This report covered a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Two Green non-cited violations (NCV), an inspector identified finding, and one licensee identified violation were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified and Self-Revealing Findings

#### Cornerstone: Mitigating Systems

Green: A self-revealing Green non-cited violation of Technical Specification 5.4.1 was identified for an inadequate procedure used to specify configuration controls during a maintenance activity. The configuration management program implementation procedure, ADM-NGGC-0106, was not clear in determining whether additional actions should be taken to ensure Control Room Air Conditioning (AC) operation while preventative maintenance was being performed on the CREV system. The three Control Room AC subsystems tripped inadvertently during the performance of this planned preventive maintenance activity due to the supply fan dampers drifting shut, resulting in Unit 1 and Unit 2 entering LCO 3.0.3. This issue was entered into the licensee's Corrective Action Program (CAP) as AR 281950.

The finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of equipment performance. The finding was determined to be of very low safety significance because it did not represent an actual loss of safety function for greater than the TS allowed outage time. The finding has a cross-cutting aspect in the area of Human Performance of complete documentation because the licensee did not provide an adequate procedure that provided clear guidance in identifying intrusive maintenance on the CREV system such that appropriate actions were taken to ensure proper operation during preventative maintenance. (H.2.(c)) (Section 1R18)

Green: A self-revealing Green non-cited violation of Technical Specification 5.4.1 was identified for an inadequate procedure used for the calibration of the conventional service water pump logic relays in September 2007. Specifically, procedure OPM-RLY-001, PM GE HFA Relays, used to calibrate the conventional service water (CSW) pump relays was inadequate because the procedure was determined not to be applicable to the relay type. The incorrectly calibrated conventional service water pump relay resulted in improper operation of the conventional service water pump and could have affected proper emergency diesel generator operation during a Loss of Offsite Power (LOOP) Event. The finding is in the licensee's Corrective Action Program (CAP) as AR 245864.

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The finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of equipment performance. The finding was determined to be of very low safety significance because it did not contribute to improper emergency diesel generator operation. The finding has a cross-cutting aspect in the area of Human Performance of complete documentation because the licensee did not provide an adequate procedure to calibrate the CSW pump relays. (H.2.(c)) (Section 1R19)

Cornerstone: Public Radiation Safety

Green: The inspectors identified a Green finding (FIN) for failure to properly evaluate the potential causes of increased tritium (H-3) concentrations in groundwater samples collected and reviewed in accordance with Brunswick procedure E&RC-3250, "Environmental and Radiation Control." Specifically, the licensee failed to properly evaluate, and initiate actions to address increasing H-3 concentrations reported from 2003 through 2007 for quarterly samples collected from Environmental Sampling Station (ESS)-2C and ESS-16 monitoring wells. The failure to properly investigate the increasing H-3 concentrations resulted in the licensee continuing to attribute the subject results to a 1994 U2 radioactive liquid effluent waste line break without considering potential leakage of contaminated liquids from U2 storm drain piping. This issue has been entered in the licensee's CAP as NCR 268357.

The finding is more than minor because it is associated with the Program and Process attribute of the Public Radiation Safety Cornerstone and adversely affects the cornerstone objective because it relates to effluent measurement and abnormal releases. The licensee's failure to recognize the increasing groundwater tritium concentrations delayed actions to address and correct abnormal liquid releases within the switchyard area. Using the Public Radiation Safety Significance Determination Process, this finding was determined to be of very low safety significance (Green) because the performance deficiency did not result in offsite releases and resultant offsite doses to members of the public and was not a failure to implement the effluent program. Furthermore, the finding did not prevent the licensee from initiating appropriate corrective actions to determine extent of the contamination and to mitigate its effect on the surrounding environs. The cause of the finding was related to the cross cutting area of human performance, the component of work practices, and the aspect involving supervisory oversight of work activities, because the licensee failed to properly evaluate monitoring well sample data to determine the possible radiological effects of plant operation on the local groundwater. (H.4(c)) (Section 4OA2.2)

B. Licensee Identified Violations

Violations of very low safety significance, which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective actions are listed in Section 4OA7.

## REPORT DETAILS

### Summary of Plant Status

#### Unit 1

At the beginning of the inspection period, Unit 1 was in Mode 5 (Refueling). On April 25, 2008, operators commenced a reactor startup. Full power was achieved on May 3. On May 5, power was reduced to 93 percent to perform a control rod improvement. Power was returned to full power later that day. On May 6, power was reduced to 93 percent to perform a control rod improvement and later that day 100 percent power was restored. On May 9, power was reduced to 98 percent to perform a control rod improvement, and power was restored to full power later that day. On May 13, power was reduced to 96 percent to perform a control rod improvement, and full power was restored later that day. On May 18, power was reduced to 92 percent to perform a control rod improvement. Power was restored to 100 percent on May 19. The unit remained at full power for the remainder of the inspection period.

#### Unit 2

Unit 2 began the inspection period operating at 100 percent power. On April 5, 2008, power was reduced to 67 percent for valve testing. On April 6, there was a rod sequence exchange at 64 percent. Power was restored to full power on April 6. On April 7, power was reduced to 90 percent to perform a control rod improvement. Power was restored to 100 percent on April 8. On April 8, power was reduced to 95 percent to perform a control rod improvement. Power was restored to full power on April 9. On April 10, power was reduced to 98 percent to perform a control rod improvement, and power was returned to 100 percent later that day. On May 11, power was reduced to 70 percent for repair of a steam leak on 2-MD-V5003. Power was returned to full later that day. On May 25, power was reduced to 94 percent to rinse in the 2F condensate deep demineralizer (CDD). Power was restored to 100 percent later that day. On May 30, power was reduced to 95 percent to rinse in the 2B CDD. On June 15, power was reduced to 93 percent to perform a control rod improvement, full power was restored later that day. On June 20, power was reduced to 70 percent for scram time and valve testing. Power was restored to 100 percent later that day. On June 22, power was reduced to 94 percent to perform a control rod improvement, full power was restored later that day. On June 23, power was reduced to 95 percent to perform a control rod improvement. Power was returned to 100 percent later that day. On June 24, power was reduced to 94 percent to perform a control rod improvement and full power was restored later that day. The unit remained at full power for the remainder of the inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 Evaluate Summer Readiness of Offsite and Alternate AC Power Systems

Enclosure

a. Inspection Scope

The inspectors verified that plant features and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems during adverse weather were appropriate. The inspectors reviewed the licensee's procedures including the Brunswick Plant Voltage Support and Coordination, SORM-NUC-050, Revision 19, affecting these areas and the communications protocols between the transmission system operator (TSO) and the plant to verify that the appropriate information was being exchanged when issues arose that could impact the offsite power system. Examples of aspects considered in the inspectors' review included:

- The coordination between the TSO and the plant during off-normal or emergency events;
- The explanations for the events;
- The estimates of when the offsite power system would be returned to a normal state; and
- The notifications from the TSO to the plant when the offsite power system was returned to normal

The inspectors also verified that plant procedures addressed measures to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system prior to or during adverse weather conditions. Specifically, the inspectors verified that the procedures addressed the following:

- The actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant would not be acceptable to assure the continued operation of the safety-related loads without transferring to the onsite power supply
- The compensatory actions identified to be performed if it would not be possible to predict the post-trip voltage at the plant for the current grid conditions
- A re-assessment of plant risk based on maintenance activities which could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- The communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power was challenged.

Documents reviewed are listed in the Attachment to this report. The inspectors also reviewed corrective action program items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their corrective action program in accordance with station corrective action procedures.

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following Action Requests (ARs):

- AR 273113, U1 SAT flex link connection found loose bolts
- AR 273136, Electric power distribution enhancement opportunity
- AR 277845, Main power transformer fan failures
- AR 279544, Material condition of 230kV switchyard PCB housings/pads

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This inspection constitutes one readiness of offsite and alternate AC power systems sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings of significance were identified.

.2 Summer Seasonal Readiness Preparations

a. Inspection Scope

The inspectors reviewed the licensee's preparations for severe weather conditions prior to hurricane season and hot weather. The inspectors reviewed the results of multi-discipline-attended preparation meetings and reviewed the station's procedures for severe weather warnings (i.e., hurricanes). The inspectors toured and reviewed a sampling of design features (e.g., missile shields, severe weather doors, sumps) of the reactor, service water, and emergency diesel generator buildings to verify that they would remain functional when challenged by adverse weather.

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 282424, Service water system health
- AR 283274, 2B conventional service water pump discharge strainer through wall leak
- AR 279740, Concrete work in service water building
- AR 274129, 1B RHR room cooler degradation
- AR 275390, EDG #2 jacket water cooler shells
- AR 280409, 2B CSW pump motor stator temperature > 300 F
- AR 281336, Temporary fans used to cool equipment

This inspection constitutes one adverse weather sample as defined in Inspection Procedure 71111.01.

b. Findings

No findings of significance were identified.

.3 External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to

mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the protected area to identify any modification to the site which would inhibit site drainage during a probable maximum precipitation event or allow water ingress past a barrier. The inspectors also reviewed the abnormal operating procedures (AOP) for mitigating the design basis flood to ensure it could be implemented as written. Documents reviewed are listed in the Attachment.

This inspection constitutes one external flooding sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns

a. Inspection Scope

The inspectors performed three partial walkdowns of the below-listed systems to verify that the systems were correctly aligned while the redundant train or system was inoperable or out-of-service (OOS) or, for single train risk significant systems, while the system was available in a standby condition. The inspectors assessed conditions such as equipment alignment (i.e., valve positions, damper positions, and breaker alignment) and system operational readiness (i.e., control power and permissive status) that could affect operability. The inspectors verified that the licensee identified and resolved equipment alignment problems that could cause initiating events or impact mitigating system availability. The inspectors reviewed Administrative Procedure ADM-NGGC-0106, Configuration Management Program Implementation, to verify that available structures, systems or components (SSCs) met the requirements of the configuration control program. Documents reviewed are listed in the Attachment.

- Emergency Diesel Generators #2, #3, #4 when EDG #1 OOS on April 14, 2008 for maintenance
- Emergency Diesel Generators #1, #3, #4 when EDG #2 OOS on April 18, 2008 for maintenance
- Unit 1 Reactor Coolant Isolation Cooling (RCIC) pump when Unit 1 HPCI OOS on April 28, 2008 for main pump seal failure

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 274854, Oyster shells identified in EDG#1 jacket water cooler
- AR 275288, EDG #2 governor found with degraded bearing during outage
- AR 275329, EDG #1 manual voltage regulator transformer
- AR 275729, EDG #2 unexpected start during governor maintenance

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- AR 275830, EDG #2 overspeed start emergency booster cylinder
- AR 275836, EDG #2 EGA erratic
- AR 277188, Unit 1 HPCI main pump seal failure
- AR 277732, Unit 1 HPCI inboard seal failure
- AR 277790, Inadequate fill/vent procedures for HPCI, RCIC, and Core Spray
- AR 278209, HPCI crossover pipe residual air
- AR 278233, Repeat of inadequate planning for instrument line venting
- AR 282315, Unit 1 HPCI configuration control

b. Findings

No findings of significance were identified.

.2 Detailed Equipment Walkdown

a. Inspection Scope

The inspectors performed a complete walkdown of the accessible portions of the Unit 1 reactor core isolation cooling (RCIC) system the week of May 5, 2008. The inspectors focused on verifying adequate material condition and correct system alignment. The inspectors reviewed the Technical Specifications (TS), operating procedures, and the Updated Final Safety Analysis Report. The inspectors held discussions with the applicable plant personnel to review system status including a review of open system modifications and temporary modifications. The inspectors reviewed open work requests (WRs) for the system, operator work-arounds, and open adverse conditions or ARs to ensure that the impact on equipment functionality was properly evaluated. The inspectors reviewed the documents listed in the Attachment.

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 282422, Drain plug on RCIC oil bulb found loose
- AR 281162, RCIC check valve failure to close

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Fire Area Walkdowns

a. Inspection Scope

The inspectors reviewed ARs and work orders (WOs) associated with the fire suppression system to confirm that their disposition was in accordance with Administrative Procedure OAP-033, Fire Protection Program Manual. The inspectors

reviewed the status of ongoing surveillance activities to verify that they were current to support the operability of the fire protection system. In addition, the inspectors observed the fire suppression and detection equipment to determine whether any conditions or deficiencies existed which would impair the operability of that equipment. The inspectors toured the following eight areas important to reactor safety and reviewed the associated prefire plans to verify that the requirements for fire protection design features, fire area boundaries, and combustible loading were met. The inspectors reviewed Plant Operating Manual, Volume XIX, Prefire Plan 0PFP-DG, Diesel Generator Building Prefire Plans in preparing for the inspection.

- Diesel Generator Fuel Cells #1, #2, #3, and #4 (4 areas)
- E5, E6, E7, and E8 Switchgear Room 23' elevation (4 areas)

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 284360, Diesel fuel spill in the 4 day tank room #4
- AR 284402, Diesel generator halon inop for > 48 hrs
- AR 284406, Diesel generator fire detection inop for EC50932 > 14 days

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

.1 Internal Flooding

a. Inspection Scope

The inspectors performed a walkdown of the Diesel Generator fuel cells and the Unit 1 battery room to verify that internal flood protection features were consistent with the licensee's internal flooding analysis as described in UFSAR Section 3.4.2, Protection From Internal Flooding. The inspectors reviewed the effects of postulated piping failures for the area to verify that analysis assumptions and conclusions were based on the current plant configuration. The internal flooding design features and equipment for coping with internal flooding were also inspected. The walkdown included sources of flooding and drainage, sump pumps, level switches, watertight doors, curbs, pedestals and equipment mounting. The inspectors reviewed the procedures for coping with internal flooding.

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs and WRs:

- AR 276928, Safety shower activation in 1A battery room
- WR 339767, 1A battery room safety shower
- AR 281970, Poor reliability of EDG #4 day tank room sump pump

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification

.1 Quarterly Review

a. Inspection Scope

The inspectors observed licensed operator performance and reviewed the associated training documents during simulator-evaluated scenarios for training cycle 2008-02. The simulator observations and review included evaluations of emergency operating procedure and abnormal operating procedure utilization. The inspectors reviewed Procedure O TPP-200, Licensed Operator Continuing Training Program, to verify that the program ensures safe power plant operation. On May 20, 2008, simulator sessions were observed on anticipated and unanticipated plant transients during high pressure coolant injection (HPCI) logic power logs, loss of offsite power (LOOP), failure of EDG's to auto start/tie, small break loss of coolant accident (SBLOCA), automatic depressurization system (ADS) logic failure, and emergency depressurization. The scenarios tested the operator's ability to respond to failures. The inspectors reviewed operator activities to verify consistent clarity and formality of communication, conservative decision-making by the crew, appropriate use of procedures, and proper alarm response. Group dynamics and supervisory oversight, including the ability to properly identify and implement appropriate TS actions, regulatory reports, and notifications, were observed. The inspectors observed instructor critiques and preliminary grading of the operating crews and assessed whether appropriate feedback was planned to be provided to the licensed operators.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

For the five equipment issues described in the ARs listed below, the inspectors reviewed the licensee's implementation of the Maintenance Rule (10 CFR 50.65) with respect to the characterization of failures, the appropriateness of the associated Maintenance Rule a(1) or a(2) classification, and the appropriateness of the associated a(1) goals and corrective actions. The inspectors reviewed the work controls and work practices associated with the degraded performance or condition to verify that they were appropriate and did not contribute to the issue. The inspectors also reviewed operations logs and licensee event reports to verify unavailability times of components and systems, if applicable. Licensee performance was evaluated against the requirements of Procedure ADM-NGGC-0101, Maintenance Rule Program.

- AR 274159, Unit 1 SW-V100 taper pins were not fully driven in on April 8, 2008
- AR 282018, Lost unavailability time on EDG #4 outage
- AR 284886, Failure of 1-E51-F014 Unit 1 RCIC check valve on June 26, 2008
- AR 284888, RCIC system oil sampling on June 26, 2008
- AR 283660, Unit 1 supplemental spent fuel pool cooling trip due to severe weather

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's implementation of 10 CFR 50.65 (a)(4) requirements during scheduled and emergent maintenance activities, using Procedure OAP-025, BNP Integrated Scheduling and Technical Requirements Manual 5.5.13, Configuration Risk Management Program. The inspectors reviewed the effectiveness of risk assessments performed due to changes in plant configuration for maintenance activities (planned and emergent). The review was conducted to verify that, upon unforeseen situations, the licensee had taken the necessary steps to plan and control the resultant emergent work activities. The inspectors reviewed the applicable plant risk profiles, work week schedules, and maintenance WOs for the following six conditions:

- Emergency Diesel Generators #2, #3, #4 when EDG #1 OOS on April 14, 2008 for maintenance
- Emergency Diesel Generators #1, #3, #4 when EDG #2 OOS on April 18, 2008 for maintenance
- Unit 1 Reactor Coolant Isolation Cooling (RCIC) pump when Unit 1 HPCI OOS on April 28, 2008 for main pump seal failure
- AR 275722, Repetitive alarms on severe accident management guideline (SAMG) diesels on April 18, 2008
- Unit 1 risk condition yellow while the 4160 AC bus E1 was under clearance for scheduled maintenance on April 11, 2008, and verified redundant equipment protection and compensatory measures
- Unit 1 and Unit 2 risk condition yellow while the 4160 AC bus E2 was under clearance for scheduled maintenance on April 15, 2008, and verified redundant equipment protection and compensatory measures

b. Findings

No findings of significance were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors reviewed the operability evaluations associated with the five issues documented in the ARs listed below, which affected risk significant systems or components, to assess, as appropriate: 1) the technical adequacy of the evaluations; 2) the justification of continued system operability; 3) any existing degraded conditions used as compensatory measures; 4) the adequacy of any compensatory measures in place, including their intended use and control; and 5) where continued operability was considered unjustified, the impact on any TS limiting condition for operation and the risk significance. In addition to the reviews, discussions were conducted with the applicable system engineer regarding the ability of the system to perform its intended safety function.

- AR 274942, RHR room cooler service water plug concern
- AR 276444, IRM 'G' spiking upscale caused half scrams on the 'A' channel
- AR 275836, EDG #2 new governor erratic
- AR 278678, Cracks in service water motor endbell bolt holes
- AR 277171, RCIC bearing temperature alarm

b. Findings

No findings of significance were identified.

1R18 Plant Modifications.1 Temporary Modificationsa. Inspection Scope

The inspectors reviewed Plant Operating Manual 0PLP-22, Temporary Changes, to assess the need for implementation of a temporary modification during a maintenance activity (which was supported by the engineering change listed below) to replace solenoid valves in the Control Room Exhaust Ventilation System. The inspectors also assessed drawings and procedures for appropriate updating and post-modification testing.

- Engineering Change (EC) 69212RO, Choked Flow Calculation to Support Changing Solenoid Valves

b. Findings

Introduction: A self-revealing Green non-cited violation of Technical Specification 5.4.1 was identified for an inadequate procedure used to specify configuration controls during a maintenance activity. The configuration management program implementation procedure, ADM-NGGC-0106, was not clear in determining whether additional actions

should be taken to ensure Control Room Air Conditioning (AC) operation while preventative maintenance was being performed on the CREV system. The three Control Room AC subsystems tripped inadvertently during the performance of this planned preventive maintenance activity due to the supply fan dampers drifting shut, resulting in Unit 1 and Unit 2 entering LCO 3.0.3.

Description: On June 3, 2008, the licensee was performing planned preventative maintenance on solenoid valve, 1-VA-SV-928, which controls the cable spreading room supply fan damper. As a result of this planned preventative maintenance, the supply fan dampers closed and the three Control Room AC subsystems, required by TS 3.7.4, Control Room AC System, tripped. Unit 1 and Unit 2 entered TS 3.7.4, Required Action E.1, and entered LCO 3.0.3 immediately due to no operable Control Room AC Subsystem. The inspectors reviewed the configuration management program implementation procedure, ADM-NGGC-0106, and determined that the procedure does not make a clear identification of intrusive maintenance on the CREV system such that appropriate actions are taken to ensure Control Room Air Conditioning (AC) operation during preventative maintenance. While the Control Room subsystems were inoperable, performance of plant personnel and equipment in the Control Room were not adversely affected. The maximum Control Room back panel temperature during this event reached approximately 73 degrees F. This issue was entered into the licensee's Corrective Action Program (CAP) as AR 281950.

Analysis: Failure to have an adequate procedure required by TS 5.4.1 and Regulatory Guide 1.33 was a performance deficiency. The performance deficiency was more than minor because it impacted the equipment performance attribute of the Mitigating Systems Cornerstone objective to maintain the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance because it did not represent an actual loss of safety function for greater than the TS allowed outage time. The finding has a cross-cutting aspect in the area of Human Performance of complete documentation because the licensee did not provide an adequate procedure that provided clear guidance in identifying intrusive maintenance on the CREV system such that appropriate actions are taken to ensure proper operation during preventative maintenance. (H.2(c))

Enforcement: TS 5.4.1, Administrative Control (Procedures), requires that written procedures shall be established, implemented, and maintained, covering applicable procedures recommended in Regulatory Guide 1.33, Appendix A, November 1972. Regulatory Guide 1.33, Section I (1) states that maintenance that can affect the performance of safety-related equipment should be properly preplanned, and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. The configuration management program implementation procedure, ADM-NGGC-0106, is used by the licensee to identify any actions to be taken during intrusive maintenance on safety-related systems. Contrary to the above, the guidance in procedure ADM-NGGC-0106 was inadequate in identifying actions to be taken during intrusive maintenance on the CREV system. As a result, appropriate reviews of the impact on the CREV system operability were not performed and led to entering LCO 3.0.3 due to the loss of 3 Control Room AC units. Because this finding was of very low safety significance and has been entered into the licensee's corrective

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action program as AR 281950, and consistent with Section VI.A.1 of the NRC Enforcement Policy, this violation is being treated as a non-cited violation, and is designated as NCV 05000325,324/2008003-01, Inadequate Procedure for Performing Maintenance on the Control Room AC Subsystem.

.2 Permanent Modifications

a. Inspection Scope

The inspectors reviewed one permanent plant modification documented in the below-listed document. The inspectors reviewed the design adequacy of the modification for material compatibility which included functional properties, environmental qualification, and seismic evaluation. The review verified that the modification was consistent with the plant's design bases and the design assumptions. Where applicable, the review verified that modification preparation, staging, and implementation did not impair emergency/ abnormal operating procedure actions and key safety functions. Post-modification testing was reviewed to confirm that operability would be established, unintended system interactions would not occur, and the testing demonstrated that modification acceptance criteria were met. The following modification was reviewed:

- EC 62827, Once through ventilation

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

For the six maintenance activities listed below, the inspectors reviewed the post-maintenance test procedure and witnessed the testing and/or reviewed test records to confirm that the scope of testing adequately verified that the work performed was correctly completed. The inspectors verified that the test demonstrated that the affected equipment was capable of performing its intended function and was operable in accordance with TS requirements. The inspectors reviewed the licensee's actions against the requirements in Procedure OPLP-20, Post Maintenance Testing Program.

- WO 1146854, Troubleshoot repair Unit 1 control rod 18-35
- WR 332553, Unit 1 HPCI main pump seal leakage
- WO 968710, Solenoid replacement for control building ventilation
- WO192083, EDG #2 lower bearing on governor EGB-35C
- WR 333558, Unit 1 HPCI 1-E41-F001 lost local and remote indication
- WO 1135327, Undervoltage Relay Failed Functional Test

b. Findings

Introduction: A self-revealing Green non-cited violation of Technical Specification 5.4.1 was identified for an inadequate procedure used for the calibration of the conventional service water pump logic relays in September 2007. Specifically, procedure OPM-RLY-001, PM GE HFA Relays, used to calibrate the conventional service water (CSW) pump relays was inadequate because the procedure was determined not to be applicable to the relay type. The incorrectly calibrated conventional service water pump relay resulted in improper operation of the conventional service water pump and could have affected proper emergency diesel generator operation during a Loss of Offsite Power (LOOP) Event. The finding is in the licensee's Corrective Action Program (CAP) as AR 245864.

Description: During a planned shutdown in September 2007 on Unit 1 the 1A conventional service water (CSW) pump did not auto-start, as expected, on low header pressure. The licensee determined that the 27-1 permissive relay did not pick up as expected. The licensee placed the CSW pumps in "manual" (removing the 27-1 function) and put a tracking LCO in place. The function of this relay is to prevent an automatic start of the conventional service water pump(s) from interfering with the emergency diesel generator load sequencing during a Loss of Offsite Power (LOOP) event.

The licensee's investigation revealed that the relay was replaced during the Spring 2007 refueling outage. This original relay became obsolete and was replaced with a different model. The relay housing consists of several components, including a rectifier and a coil. The original relay and replacement relay were not identical. The coils in the relays are the same, however, the rectifiers are different. Calibration was completed using a generic procedure for the relays and the licensee failed to recognize that this procedure was not applicable for the calibration of the replacement model. The inadequate calibration was identified as the cause of the 27-1 relay not being set up correctly. Specifically, the relay was set too low and would not pick up when the bus was energized which resulted in the 1A CSW pump not auto-starting on low header pressure. The finding is in the licensee's Corrective Action Program (CAP) as AR 245864.

Analysis: The failure to establish and implement an adequate procedure for the calibration of the in the 27-1 permissive relay was identified as a performance deficiency. The performance deficiency was more than minor because it impacted the equipment performance attribute of the Mitigating Systems Cornerstone objective to maintain the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance because in this instance, it did not contribute to improper emergency diesel generator operation; however, mis-calibration of these relays could have led to improper diesel generator loading and precluded the auto-start of the CSW pumps on low header pressure. The finding has a cross-cutting aspect in the area of Human Performance of complete documentation because the licensee did not provide an adequate procedure that could have calibrated the CSW pump relays properly. (H.2.(c)).

Enforcement: TS 5.4.1, Administrative Control (Procedures), requires that written procedures shall be established, implemented, and maintained, covering applicable

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procedures recommended in Regulatory Guide 1.33, Appendix A, November 1972, section H(2), which states that specific procedures for surveillance tests, inspections, and calibrations should be written. Contrary to the above, procedure 0PM-RLY-001, PM GE HFA Relays, used to calibrate the CSW pump relay was inadequate because the procedure was determined not to be applicable to the relay type. The incorrectly calibrated conventional service water pump relay resulted in improper operation of the conventional service water pump and could have affected proper emergency diesel generator operation during a Loss of Offsite Power (LOOP) event. Because the finding is of very low safety significance and has been entered into the CAP (AR 245864), and consistent with Section VI.A.1 of the NRC Enforcement Policy, this violation is being treated as a non-cited violation, and is designated as NCV 05000325/2008003-03, Inadequate Calibration Procedure for the Conventional Service Water Relays.

1R20 Refueling and Other Outage Activities Unit 1 Refueling Outage B117R1

a. Inspection Scope

The inspectors evaluated Unit 1 Refueling Outage (RFO) B117R1 activities which commenced on March 15, 2008, and concluded on May 3, 2008, when the Unit was returned to full power. Documents reviewed are listed in the Attachment. The following specific areas were reviewed:

Outage Plan: The inspectors reviewed Brunswick Nuclear Plant Unit 1 Safe Shutdown Risk Assessment for RFO B117R1. The inspectors verified that the licensee had considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors' review of this report was compared to the requirements in Procedure 0AP-022, BNP Outage Risk Management. The review verified that for identified high risk significant conditions, contingency measures were identified. The inspectors frequently monitored the risk condition during the outage.

Licensee Control of Outage Activities: The inspectors observed and reviewed several specific activities, evolutions, and plan conditions to verify that the licensee maintained defense-in-depth commensurate with the outage risk control plan. The inspectors reviewed configuration changes due to emergent work and unexpected conditions were controlled in accordance with the outage risk control plan. The inspectors reviewed the following specific items, as specified:

- Decay Heat Removal, Spent Fuel Pool Cooling, and Reactor Coolant System Instrumentation. The inspectors reviewed decay heat removal procedures and observed decay heat removal systems' parameters to verify proper removal of decay heat and that reactor vessel level instruments were configured to provide accurate indication. The inspectors also conducted main control room panel walkdowns and walked down portions of the systems in the plant to verify system availability. The inspectors reviewed operational logs to verify that procedure and TS requirements to monitor and record reactor coolant temperature were met.

- Reactivity Control: The inspectors observed licensee performance during shutdown, outage and refueling activities to verify that reactivity control was conducted in accordance with procedures and TS requirements. The inspectors conducted a review of outage activities and risk profiles to verify activities that could cause reactivity control problems were identified.
- Inventory Control and Containment Closure: The inspectors observed operator monitoring and control of reactor temperature and level profiles and monitored outage work and configuration control for activities that had the potential to drain the reactor vessel. This was performed to verify that they were performed in accordance with the outage risk plan. The inspectors verified that the licensee maintained secondary containment in accordance with TS.
- Electrical Power: The inspectors reviewed the following licensee activities related to electrical power during the refueling outage to verify that they were in accordance with the outage risk plan:
  - Controls over electrical power system and components to ensure emergency power was available as specified in the outage risk report
  - Controls and monitoring of electrical power systems and components and work activities in the power transmission yard
  - Operator monitoring of electrical power systems and outages to ensure that TS requirements were met

Refueling Activities: The inspectors reviewed refueling activities to verify fuel handling operations were performed in accordance with TS and fuel handling procedures and that controls were in place to track fuel movement. The inspectors reviewed refueling floor and plant controls to verify that the foreign material exclusion controls were established.

Monitoring of Heatup and Startup Activities: The inspectors conducted a thorough inspection and walkdown of containment prior to reactor startup. The inspectors verified on a sampling basis, that TS, license conditions, and other requirements, commitments, and administrative procedure prerequisites for mode changes were met prior to changing modes or plant configurations. The inspectors verified RCS integrity by reviewing RCS leakage calculations, and verified containment integrity by reviewing the status of containment penetrations and containment isolation valves. Containment isolation valve, 1-CAC-V172 was reviewed for leakage. Reactor physics testing results were verified that core operating limit parameters were consistent with the design.

Identification and Resolution: The inspectors reviewed ARs to verify that the licensee was identifying problems related to refueling outage activities at an appropriate threshold and entering them in the corrective action program. The inspectors attended AR review meetings throughout the refueling outage to verify appropriate prioritization of planned resolution of deficiencies discovered during the outage. The inspectors reviewed the following issues identified during the outage to verify that the appropriate corrective actions were implemented:

- AR 268430, 1-CAC-V172 internal damage
- AR 273840, SRM and IRM spiking events
- AR 273692, Alternate temperature indication for natural circulation
- AR 274667, Fuel bundle miss-orientation
- AR 274936, Unit 1, Refuel bridge mast camera failure
- AR 274942, RHR Room cooler service water plug concern
- AR 274945, 1-SW-V100 and 1-SW-V101 flange torque values
- AR 275497, Unexpected trip of the SSFPC primary pump A
- AR 275832, Minor dent observed on nitrogen supply tubing for SRV 'L'

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

.1 Routine Surveillance Testing

a. Inspection Scope

The inspectors either observed surveillance tests or reviewed test data for the six risk significant SSC surveillances, listed below, to verify the tests met TS surveillance requirements, UFSAR commitments, inservice testing (IST) requirements, and licensee procedural requirements. The inspectors assessed the effectiveness of the tests in demonstrating that the SSCs were operationally capable of performing their intended safety functions.

- Unit 1, 1PT-24.1.1 Service Water Pump System and Discharge Valve Operability Test Revision 55 on May 18, 2008
- Unit 1, OPT-08.1.6 Suppression Pool Level Indicator Operability Revision 31 on May 10, 2008
- Unit 1, OPT-10.1.1 RCIC System Operability Test Revision 91 on June 25, 2008
- Unit 2, OPT-10.1.1 RCIC System Operability Test Revision 91 on June 26, 2008
- Unit 1/2, OSP-07-010 Load Test for SAMG Diesels Revision 2 on June 27, 2008
- Unit 2, OPT-12.8.1 Breaker Alignment Operability Test Revision 8 on EDG #4 on June 27, 2008

b. Findings

No findings of significance were identified.

.2 In-service Surveillance Testing

a. Inspection Scope

The inspectors reviewed the performance of Periodic Test OPT-09.7, High Pressure Coolant Injection (HPCI) System Valve Operability Test, Revision 24, performed on

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Unit 1 on May 23, 2008. The inspectors evaluated the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program to determine equipment availability and reliability. The inspectors evaluated selected portions of the following areas: 1) testing procedures; 2) acceptance criteria; 3) testing methods; 4) compliance with the licensee's IST program, TS, selected licensee commitments, and code requirements; 5) range and accuracy of test instruments; and 6) required corrective actions. The inspectors also assessed any applicable corrective actions taken.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS) and Public Radiation Safety

2OS3 Radiation Monitoring Instrumentation and Protective Equipment

a. Inspection Scope

The inspectors reviewed and evaluated the accuracy and operability of radiation monitoring instruments that are used for the protection of occupational workers; area radiation monitors associated with transient high and very high radiation areas including those used in remote emergency assessment; and the adequacy of the program to provide self-contained breathing apparatus (SCBA) for personnel entering and working in areas of known/unknown radiological hazards.

The inspectors reviewed portable radiation detection instrumentation, including instruments used for job coverage in high radiation areas, other temporary area radiation monitors currently used in the plant, and continuous air monitors. The inspectors also reviewed radiation monitoring instrument deficiencies.

Inspectors reviewed calibration and performance test records for instruments used to monitor internal exposures, including the whole body counter and screening portal monitors. Internal exposures exceeding 50 mrem committed effective dose equivalent (CEDE) were reviewed to determine if the affected personnel were properly monitored utilizing calibrated equipment, the data was analyzed properly, and the internal exposures were properly assessed.

Additionally, radiation detection instruments utilized for personnel release from the radiologically controlled area were reviewed. The licensee's 10 CFR Part 61 source term data was reviewed to determine if the calibration sources used were representative of the plant source term and to determine if the licensee was properly scaling hard-to-detect radionuclides.

Inspectors reviewed the status and surveillance records for SCBA staged and ready for use in the plant. The licensee's capability for refilling and transporting SCBA air bottles

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to and from the control room and operations support center during emergency conditions was evaluated. Licensee records were reviewed to determine if control room operators, radiation protection, and other emergency response personnel were qualified in the use of SCBA (including personal bottle change-out). Manufacturer-certified training and qualification records were examined for personnel who performed maintenance and repairs on SCBA components vital to the unit's function.

Licensee guidance documents, records, and data reviewed are listed in Section 2OS3 of the report Attachment.

The inspectors completed 9 of 9 required line-item samples for IP 71121.03.

b. Findings

No findings of significance were identified.

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

a. Inspection Scope

Effluent Monitoring and Radwaste Equipment: During inspector walk-downs, accessible sections of the Unit 1 (U1) and Unit 2 (U2) liquid and gaseous radioactive waste (radwaste) and effluent systems were assessed for material condition and conformance with the UFSAR. The inspection included the waste collector tanks, drain tanks, sample tanks, salt water tanks, compressors, pumps, liquid radwaste piping and valves, Liquid Radwaste Effluent monitor, U2 Reactor Building Roof Vent monitor, U2 Stack monitor, U1/U2 SJAЕ monitors, U1/U2 Turbine Building monitors, and associated airborne effluent sample lines. The inspectors interviewed chemistry and engineering staff regarding radwaste equipment configuration requirements for operation, representative sampling, and effluent monitor operation.

The inspectors reviewed and discussed the changes made to the U2 turbine building ventilation effluent monitoring system, including installation and validation testing of isokinetic sampling equipment, associated with the implementation of Engineering Change 62827R8, U2 Once-Through Ventilation. The U2 turbine building effluent flow path and monitoring equipment, for both recirculation mode and once-through ventilation mode, were evaluated during plant walk-downs. The inspectors reviewed procedures for aligning/programming the monitoring equipment when changing ventilation modes, performing effluent dose calculations, and performing sampling from the new monitoring skid equipment.

The inspectors reviewed performance records and calibration results for selected effluent radiation monitors and flowmeters. The inspectors evaluated out-of-service effluent monitor events and reviewed select compensatory actions taken during the period of November 2006 to April 2008.

Installed configuration, material condition, operability, and reliability of selected effluent sampling and monitoring equipment were reviewed against details documented in the

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following: 10 CFR Part 20; RG 1.21, Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials In Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants; ANSI - N13.1 - 1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities; TS Section 6; the Offsite Dose Calculation Manual (ODCM), Rev. 29; and UFSAR, chapters 11 and 12. Procedures and records reviewed during the inspection are listed in Section 2PS1 of the report Attachment.

Effluent Release Processing and Quality Control (QC) Activities: QC activities related to gamma spectroscopy and beta-emitter detection were discussed with count room technicians and chemistry supervision. The inspectors reviewed daily QC data logs for January 1, 2008 through June 18, 2008, for high purity germanium (HPGe) detectors 1, 2, 3, and 4, and the liquid scintillation counter (LSC). The inspectors reviewed calibration records for HPGe No. 2 (select counting geometries) and the LSC. In addition, quarterly results of the radiochemistry cross-check program for first quarter 2006 through first quarter 2008 were reviewed.

Selected portions of procedures for effluent sampling, processing, and release were evaluated for consistency with licensee actions. Select liquid and gaseous release permits were reviewed against ODCM specifications for pre-release sampling and effluent monitor setpoints. The inspectors discussed the performance of pre-release sampling and analysis, release permit generation, and radiation monitor setpoint adjustment with chemistry staff. The inspectors also directly observed pre-release liquid (U1 saltwater release tank) and gaseous (U2 stack) sampling, isotopic analysis of liquid and gaseous samples, and opening/closing of gaseous release permits by chemistry technicians. The inspectors reviewed the 2006 and 2007 annual effluent reports to evaluate reported doses to the public and ODCM changes. Public dose calculations were reviewed and discussed with cognizant licensee personnel. In addition, changes to the radwaste and effluent systems were discussed with engineering and chemistry personnel.

Observed task evolutions, count room activities, and offsite dose results were evaluated against details and guidance documented in the following: 10 CFR Part 20 and Appendix I to 10 CFR Part 50; ODCM; RG 1.21; RG 1.33, Quality Assurance Program Requirements (Operation); and TS Section 6. Procedures and records reviewed during the inspection are listed in Section 2PS1 of the report Attachment.

Ground Water Protection/Tritium Monitoring: The inspectors reviewed and evaluated current and proposed licensee actions for identifying and monitoring leakage of liquids containing radioactive materials, mainly elevated concentrations of tritium (H-3), from onsite systems, structures, and components (SSCs) into the surrounding environs. Specifically, the inspectors reviewed procedural guidance for groundwater monitoring, verified selected liquid radwaste system modifications and their resultant effect on selected effluent source terms, reviewed results of initiatives regarding site hydrology determination and groundwater monitoring programs, and discussed proposed monitoring and mitigation strategies for contaminated groundwater resulting from previous U1 and U2 turbine building (TB) swamp-cooler condensate releases through the storm drain collector basin (SDCB) to the storm drain stabilization pond (SDSP). In

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addition, notifications made to local, state, and government authorities in accordance with the Nuclear Energy Institute voluntary groundwater monitoring initiative were reviewed.

Actions to mitigate the tritium source term to the SDCB and SDSP were evaluated. The inspectors walked-down temporary modifications and verified implementation of Engineering Change 67241R0, regarding a temporary modification to divert excess condensate containing tritium from the U1 and U2 TB ventilation 'swamp cooler' evaporative basins to the TB equipment drain sumps or U1 saltwater release tanks. Tritium concentration data for SDCB samples decreased significantly subsequent to implementation of this temporary modification in January 2008. In addition, the inspectors reviewed and discussed proposed initiatives to identify and prioritize onsite SSCs for potential leakage of contaminated liquids to the surrounding environs. Current site hydrology studies and groundwater monitoring initiatives were reviewed and discussed. The licensee completed an initial hydrology study of the SDSP area and adjacent onsite environs and established routine sampling of approximately 15 to 20 shallow (sentinel) wells, seven intermediate wells, and several deep groundwater monitoring wells. In addition, six wells in the marsh environs surrounding the SDSP were established for onsite environmental monitoring activities and approximately 17 surface water locations onsite and offsite currently are sampled for H-3 concentrations.

The licensee has determined that liquid releases from the SDSP have impacted the shallow aquifer adjacent to the SDSP within the owner controlled area, with measured H-3 concentrations ranging up to maximum concentration of approximately 750,000 picocuries per liter (pCi/L). Sample results from only one onsite intermediate well adjacent to the SDSP reported detectable H-3 concentrations, with a maximum concentration of 24,000 pCi/L. Releases from the SDSP had no measureable impact on the deep aquifer. All reported H-3 concentrations from samples collected from offsite locations were less than analytical detection limits or significantly less than the drinking water standard of 20,000 pCi/l established by the Environmental Protection Agency. Based on the observed monitoring results, the licensee currently is evaluating a proposed remedial action strategy using focused groundwater extraction with containment and monitored natural attenuation for the SDSP area. If implemented, the remedial action is expected to mitigate H-3 groundwater migration to both onsite and offsite areas, control releases of H-3 contaminated water to the surrounding environs, and reduce H-3 concentrations in all onsite groundwater to less than 20,000 pCi/l.

In addition, licensee representatives discussed additional groundwater monitoring well locations proposed for characterizing the site's hydrology and monitoring for additional plumes of groundwater contamination. The locations for the additional monitoring wells included the onsite pumping station, discharge canal, storage areas, dredge and recovery ponds, dry fuel storage facility, plant support, construction laydown areas, protected and switchyard areas, and an area north of Nancy Creek.

Problem Identification and Resolution: Several Nuclear Condition Reports (NCRs) and a self-assessment associated with effluent release activities, liquid/gaseous radwaste processing, and the groundwater monitoring program were reviewed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve selected

issues in accordance with procedure SPP-3.1, Corrective Action Program, Rev. 13. Reviewed documents are listed in Section 2PS1 of the report Attachment.

The inspectors completed 3 of the 3 required line-item samples for IP 71122.01.

b. Findings

An unresolved item (URI) was identified regarding the representativeness of radioactive particulate sampling by the sampling skids used to monitor gaseous effluent releases from the turbine building ventilation system, reactor building roof vent, and plant stack. During plant walk-downs, the inspectors identified one or more "T" connections and/or elbows on the inlet side of the particulate filter on each of the specified monitoring skids. The licensee had no evaluation of the impact of these bends on the transmission of particles through the sampling lines. The licensee has contacted the vendor requesting documentation of particle transmission studies that may have been performed for the monitors. This item is unresolved pending NRC review and evaluation of any vendor-supplied documentation on the particle transmission data obtained by the licensee. URI 05000325,324/2008003-01, Evaluate Representativeness of Particulate Sampling for the Reactor Building Roof Vent Monitors, Turbine Building Wide Range Gas Monitors, and Plant Stack Wide Range Gas Monitors.

2PS3 Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope

REMP Implementation: The inspectors observed routine sample collection and surveillance activities as required by the licensee's environmental monitoring program. The inspectors noted the material condition and operability of airborne particulate filter and iodine cartridge sample stations and observed collection of weekly air samples at selected monitoring locations. Environmental thermo luminescent dosimeters at selected sites were checked for material condition. In addition, an automatic water sampler was inspected for material condition near the intake canal. The inspectors determined the current location of selected sample points using NRC global positioning system instrumentation. Land use census results, changes to the ODCM, and sample collection/processing activities were discussed with environmental technicians and licensee staff.

The inspectors reviewed the last two calibration records for selected environmental air samplers. The inspectors also reviewed the 2006 and 2007 Radiological Environmental Operating Reports, results of the 2006 and 2007 inter-laboratory cross-check program, and procedural guidance for environmental sample collection and processing. Selected environmental measurements were reviewed for consistency with licensee effluent data, evaluated for radionuclide concentration trends, and compared with detection level sensitivity requirements.

Procedural guidance, program implementation, and environmental monitoring results were reviewed against: 10 CFR Part 20; Appendix I to 10 CFR Part 50; TS Section 5.0; ODCM; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal

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Operation) - Effluent Streams and the Environment; and the Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program - 1979. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Meteorological Monitoring Program: During tours of the meteorological tower and local data collection equipment, the inspectors observed the physical condition of the tower and its instruments and discussed equipment operability and maintenance history with a technician. The inspectors evaluated transmission of locally generated meteorological data to other licensee groups such as main control room operators and offsite meteorology contractors. For the meteorological measurements of wind speed, wind direction, and temperature, the inspectors reviewed calibration records for applicable tower instrumentation and evaluated measurement data recovery for 2006 and 2007.

Licensee procedures and activities related to meteorological monitoring were evaluated against the ODCM; UFSAR Chapter 2; ANSI/ANS-2.5-1984, Standard for Determining Meteorological Information at Nuclear Power Sites; and Safety Guide 23, Onsite Meteorological Programs. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Unrestricted Release of Materials from the Radiologically Controlled Area (RCA)

The inspectors observed surveys of material and personnel being released from the RCA using small article monitor, personnel contamination monitor, and portal monitor instruments. The inspectors also reviewed source check documentation of these instruments and discussed equipment sensitivity and release program guidance with licensee staff. The inspectors evaluated the appropriateness and accuracy of release survey instrumentation for radionuclides identified in recent 10 CFR 61 waste stream analyses. This was accomplished by comparing the waste stream analysis results with radionuclides used in current calibration sources and performance check sources. The inspectors also reviewed the last two calibration records for selected release point survey instruments.

Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, Control of Radioactively Contaminated Material. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Problem Identification and Resolution: The inspectors reviewed selected NCRs in the areas of environmental monitoring, meteorological monitoring, and release of materials. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with CAP-NGGC-0200, Corrective Action Program, Rev. 22. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Documents reviewed are listed in section 2PS3 in the Attachment to this report.

The inspectors completed 10 of the specified line-item samples detailed in IP 71122.03.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors sampled licensee data for the performance indicator (PI) listed below. To verify the accuracy of the PI data reported during the period reviewed, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, and Rev. 5 was used to verify the basis for each data element.

Reactor Safety Cornerstone

The inspectors sampled licensee submittals for the Units 1 and 2 PIs listed below for the period April 2007 through March 2008.

- Emergency AC Power System
- Cooling Water Support System
- Safety System Functional Failures

Public Radiation Safety Cornerstone

To evaluate the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences PI the inspectors reviewed data for April 2007 through March 2008. This included records, such as monthly, quarterly, and annual effluent dose calculations and liquid/gaseous release permits, that are used by the licensee to identify occurrences of doses from liquid and gaseous effluents in excess of the values specified in the NEI 99-02 guidance. The inspectors also interviewed licensee personnel responsible for collecting and reporting the PI data. In addition, licensee procedural guidance for classifying and reporting PI events was evaluated. Reviewed documents are listed in Sections 2PS1 and 4OA1 of the report Attachment.

The inspectors completed four of the required samples for IP 71151.

b. Findings

No findings of significance were identified.

## 4OA2 Identification and Resolution of Problems

### .1 Routine Review of ARs

To aid in the identification of repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed frequent screenings of items entered into the licensee's CAP. The review was accomplished by reviewing daily ARs.

### .2 Annual Sample Review

#### a. Inspection Scope

The inspectors reviewed and evaluated licensee corrective actions to identify, mitigate the spread, and correct unanticipated tritium contamination in onsite SSCs or the onsite groundwater environs. The evaluation focused on licensee identification of potential sources for the subject contamination, their extent of condition determinations, and the adequacy of the corrective actions implemented.

Since May 2007, licensee corrective action program (CAP) documents have documented unanticipated tritium contamination in liquids sampled from onsite structures, i.e., electrical manholes; in seepage from the SDSP to the intake canal, in shallow groundwater wells installed to monitor a 1994 Unit 2 liquid radwaste line spill, and in shallow (sentinel) groundwater monitoring wells installed adjacent to the SDSP. For the majority of subject CAP documents, the root-cause summary identified the tritium contamination in the onsite groundwater to be the result of seepage from the unlined SDSP to the surrounding surface and or groundwater environs. The SDSP routinely received liquid radioactive effluents containing elevated H-3 concentrations via overflow of condensate from the TB swamp coolers.

In addition, several of the CAP documents attributed current elevated tritium groundwater concentrations identified within the protected area to a 1994 U2 liquid radioactive waste effluent line break.

Since May 2007, the licensee has initiated the following NCR documents to address unanticipated or unexpected trends in tritium concentrations in onsite structures or groundwater environs and their effect on offsite doses:

NCR 232383, Tritium in electrical manholes MW5 and MW6, 05/07/07

NCR 233053, Tritium release to the intake canal, 05/14/07

NCR 233427, Tritium release to the intake canal, 05/17/07

NCR 233865, Detectable levels of H-3 measured in surface and groundwater around the external perimeter of the unlined SDSP due to leaching, 05/21/07

NCR 233857, Airborne tritium pathway analysis, 05/22/07

NCR 236175, Tritium release to the intake canal, 06/12/07

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NCR 243456, Groundwater sample data not included in 2006 report, 08/18/07

NCR 268357, From 2005 through March 2008, increased tritium concentrations noted for samples collected from ESS-2C and ESS-16, 02/29/08

b. Findings

Introduction: The inspectors identified a Green finding (FIN) for failure to properly evaluate the potential causes of increased tritium (H-3) concentrations in groundwater samples collected and reviewed in accordance with Brunswick procedure E&RC-3250, "Environmental and Radiation Control." Specifically, the licensee failed to properly evaluate, and initiate actions to address increasing H-3 concentrations reported from 2003 through 2007 for quarterly samples collected from Environmental Sampling Station (ESS)-2C and ESS-16 monitoring wells. The failure to properly investigate the increasing H-3 concentrations resulted in the licensee continuing to attribute the subject results to a 1994 U2 radioactive liquid effluent waste line break without considering potential leakage of contaminated liquids from U2 storm drain piping.

Description: In January 2008, the inspectors identified trends of increasing H-3 concentrations reported for groundwater samples collected from monitoring wells ESS-2C and ESS-16 between calendar year 2003 through 2007. For example, tritium concentration data for samples collected between calendar year (CY) 2005 and CY 2008 increased from approximately 493,000 to 1,800,000 picocuries per liter (pCi/l) in samples collected from well ESS-2C and from 2,200 to 64,400 pCi/l for well ESS-16.

Based on discussions with licensee representatives, the inspectors noted that these trends of increased H-3 concentrations in samples collected from ESS-2C and ESS-16 were not noticed nor were potential causes for the observed trends evaluated. These subject monitoring wells are located adjacent to the switchyard on the east side of an area where the discharge cooling water tunnels pass under the security fence before heading to the discharge weir.

These monitoring wells were installed in CY 1995 and were sampled and monitored routinely for tritium released as a result of a line break associated with the U2 radioactive waste effluent line leak which occurred in CY 1994.

Initial H-3 concentration results for CY 1995 samples collected from ESS-2C and ESS-16 wells were reported as 46,000 and 35,000 pCi/l respectively. Subsequent elevated H-3 concentration results reported for these wells routinely have been attributed to the 1994 U2 effluent line spill. For example, the inspectors noted that NCR 243456, Ground water sample data not included in 2006 report, initiated on 08/17/07, provided amended data to be included in the 2006 Annual Radiological Effluent Release Report. The amended report concentration data ranged from approximately 1,300,000 to 1,600,000 pCi/l for ESS-2C and from 8,200 to 65,700 pCi/l for ESS-16, with the results attributed to 'an historical leak that occurred in the radwaste discharge lines in the 1990's.'

The inspectors noted that recent tritium concentration data for the subject wells were significantly elevated relative to expected values based the original concentrations reported for CY 1995, a lack of additional effluent waste line leaks, and a significant time for physical decay of the H-3 isotope (12.32 year physical half-life). The subject wells are in the vicinity of the U2 storm drain piping network which transports condensate from the TB swamp coolers to the SDCB and subsequently to the SDSP areas. NCR 26566, Degradation observed in storm drain piping initiated on 12/14/2000, documented the potential for additional sources of tritium input into the wells from the storm drain piping, based on the unexplained elevated H-3 concentrations. Although the storm drain pipes were determined to be intact, the evaluation conducted in CY 2001 noted that the subject piping was not designed to be leak tight during water solid conditions normally experienced during times of heavy rainfall. The documented corrective actions included actions to monitor and trend the monitoring well data and development of the SDCB Management Program to mitigate release of contaminate liquids from the subject piping. However, the inspectors noted that corrective actions did not eliminate use of the storm drain piping to transport condensate containing elevated concentrations of H-3 from the TB chillers to the SDCB.

Following implementation of the SDCB Management Program in 2001, licensee representatives noted a decrease in H-3 concentration data and routinely attributed the observed results to the CY 1994 U2 radwaste effluent line spill. Although the licensee was reviewing the quarterly sample results, they failed to evaluate long term trends. Based on discussions with licensee representatives, the inspectors noted that personnel and program changes, and inadequate supervisory review of the monitoring results for trends as specified in procedure E&RC-3250, Groundwater Monitoring Program, Rev. 20, contributed to the licensee's failure to identify the significant trends of increasing H-3 concentrations for ESS-2C and ESS-16 groundwater samples collected between CY 2003 and CY 2007, and to subsequently identify potential sources of the contamination, and to take appropriate corrective actions.

Analysis: The inspectors determined that this finding is a performance deficiency. As described in the Brunswick procedure E&RC-3250, the licensee is expected to monitor and properly evaluate the results of their groundwater monitoring program to identify potential for release of contaminated liquids to both onsite and offsite environs. The finding is more than minor because it is associated with the Program and Process attribute of the Public Radiation Safety Cornerstone and adversely affects the cornerstone objective because it relates to effluent measurement and abnormal releases.

The licensee's failure to recognize the increasing groundwater tritium concentrations in monitoring wells adjacent to the switchyard delayed proper analysis and identification of causes for groundwater tritium data collected as part of the industry-wide groundwater monitoring initiative.

Using the Public Radiation Safety Significance Determination Process, this finding was determined to be of very low safety significance (Green) because the performance deficiency did not result in offsite releases and resultant offsite doses to members of the public and was not a failure to implement the effluent program. Furthermore, the finding

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would not prevent the licensee from determining the extent of the contamination and mitigating its effect on the surrounding environs. The cause of the finding was related to the cross cutting area of human performance, the component of work practices, and the aspect involving supervisory oversight of work activities, H.4(c), because the licensee failed to properly evaluate monitoring well sample data to determine the possible radiological effects of plant operation on the local groundwater. Because this finding does not involve a violation of regulatory requirements and has very low safety significance, it is identified as FIN 50-325, 324/2008003-01: Failure to Conduct Adequate and Timely Evaluations of Onsite Groundwater Monitoring Well Tritium Concentration Trend Data.

Enforcement: No violation of regulatory requirements occurred. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. This finding has been entered into the licensee's corrective action program as NCR 268357.

### .3 Semi-Annual Trend Review

#### a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The review was focused on repetitive equipment issues but also considered the results of frequent inspector CAP item screening, licensee trending efforts, and licensee human performance results. The review considered the period of January through June 2008. The review further included issues documented outside the normal CAP in major equipment lists, repetitive and/or rework maintenance lists, operational focus list, control room deficiency list, outstanding work order list, quality assurance audit/surveillance reports, key performance indicators, and self-assessment reports. The inspectors compared and contrasted their results with the results contained in the Brunswick Plant CAP Rollup and Trend Analysis report for the 1st quarter 2008. Corrective actions associated with a sample of the issues identified in the licensee's trend reports were reviewed for adequacy. The inspectors also evaluated the reports against the requirements of the licensee's CAP as specified in Nuclear Generation Group Standard Procedure CAP-NGGC-0200, Corrective Action Program, and 10 CFR 50, Appendix B.

#### b. Assessment and Observations

No findings of significance were identified. The inspectors noted a trend in work control process. In particular, in the area of work planning and implementation, adverse effects had been identified on system performance. This was exemplified by the following identified issues:

- Unit 1 full Group 1 isolation occurred while performing maintenance (AR 270475)
- Control room air conditioning subsystems tripped inadvertently during maintenance (AR 281950)
- Unit 1 HPCI main pump vent procedure

- Conventional service water pump logic relays inaccurately calibrated (AR 245864).

The inspectors concluded that while the licensee has been providing additional focus to this area, more attention and follow-up is needed. The inspectors will follow-up on this issue.

#### 4OA3 Event Follow-up

##### .1 Personnel Performance During Plant Evolutions

###### a. Inspection Scope

The inspectors reviewed the operator response to an unplanned LCO 3.0.3 entry for loss of control room AC which occurred on June 3, 2008. To assess operator performance during the transient, the inspectors reviewed operator logs, plant computer data, associated operator actions as well as Operating Procedure 37, Control Building Ventilation System.

###### b. Findings

No findings of significance were identified.

#### 4OA5 Other Activities

##### .1 Quarterly Resident Inspector Observations of Security Personnel and Activities

###### a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours. These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

###### b. Findings

No findings of significance were identified.

##### .2 Institute of Nuclear Power Operations (INPO) Plant Assessment Report

###### a. Inspection Scope

The inspectors reviewed the final report for the INPO plant assessment of the Brunswick station conducted in August 2007. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of licensee performance

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and to verify if any significant safety issues were identified that required further NRC follow-up.

b. Findings

No findings of significance were identified.

- .3 (Discussed) URI 05000325,324/2008002-02: Review the Significance of the Storm Drain Stabilization Pond Evaporation Pathway Dose Compared to Doses from All Other Pathways, was previously opened to evaluate whether the evaporation from the SDSP was a significant pathway that needed to be included in the ODCM as specified by RG 1.109, "Calculating of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I." As part of the review of the 2007 Annual Radiological Effluent Release Report, the inspectors assessed the doses calculated to members of the public from established ODCM pathways. The inspectors also evaluated the calculated doses from pathways not currently in the ODCM, including evaporation and seepage of tritiated water from the SDSP. The inspectors determined that the doses calculated for ODCM pathways are based on hypothetical individuals and, depending on the maximally exposed individual in specific pathway, may be either an adult or infant. In addition, the pathways vary as to whether they are assessed at the site boundary or at 4.75 miles from the site, and in which direction from the site. The doses calculated for the SDSP releases, in contrast, were based on the actual adult member of the public living nearest the site boundary. The inspectors discussed the observations with NRR and determined that insufficient guidance existed at present to close the URI. Therefore, this item will remain open pending guidance from NRR.

4OA6 Meetings

On July 9, 2008, the inspectors presented the inspection results to Mr. Ed Wills and members of his staff. The licensee was informed that proprietary information was not reviewed as part of the inspection and personally identifiable information was reviewed as part of the inspection.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI.A.1 of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV. TS 5.4.1, Administrative Control (Procedures), requires that written procedures shall be establish, implemented, and maintained covering applicable procedures recommended in Regulatory Guide 1.33, Appendix A, November 1972. Regulatory Guide 1.33, Section I (1) states that maintenance that can affect the performance of safety-related equipment should be properly preplanned, and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to the above, the licensee's procedure MCP-NGGC-0401, Material Acquisition, Revision 23, a procurement procedure, was inadequate because it contained unclear maintenance actions which resulted in a premature declaration of

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operability of the Unit 1, 'B' nuclear service water system. On March 28, 2008, work was complete on 1-SW-V20 and the nuclear service water header was declared operable. The licensee then discovered that valve 1-SW-V20 had not been cleared of the conditional release, which would have verified that the valve was fully qualified, because the maintenance personnel involved was unaware of their responsibilities in clearing the conditional release. Once this was discovered, the Unit 1 NSW header was declared inoperable until valve 1-SW-V20 was fully qualified. As a result, Emergency Diesel Generator #3 incurred unnecessary unavailability time. Because the finding is of very low safety significance and has been entered into the CAP (AR 272531), this finding is being treated as an NCV, consistent with Section VI.A of the Enforcement Policy.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee Personnel

G. Atkinson, Supervisor - Emergency Preparedness, Licensing/Regulatory Programs  
L. Beller, Superintendent, Operations Training  
A. Brittain, Manager – Security  
B. Davis, Manager – Engineering  
J. Fergusen, Manager - ER&C  
D. Griffith, Manager - Training Manager  
L. Grzeck, Lead Engineer - Technical Support  
S. Howard, Manager - Operations  
R. Ivey, Manager - Site Support Services  
J. Johnson, Chemistry Manager  
M. Millinor, Environmental  
W. Murray, Licensing Specialist  
T. Pearson, Supervisor - Operations Training  
A. Pope, Manager - Maintenance  
E. Rochelle, RC Supervisor  
T. Sherrill, Engineer - Technical Support  
J. Titrington, Manger - Nuclear Assessment Services  
M. Turkal, Lead Engineer - Technical Support  
J. Vincelli, RC Manager  
B. Waldrep, Site Vice President  
M. Williams, Manager - Operations Support  
E. Wills, Plant General Manager

#### NRC Personnel

Randall A. Musser, Chief, Reactor Projects Branch 4, Division of Reactor Projects Region II

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened and Closed

05000325,324/2008003-01	NCV	Inadequate Procedure for Performing Maintenance on the Control Room AC Subsystem (1R18)
05000325/2008003-02	NCV	Inadequate Calibration Procedure for the Conventional Service Water Relays (1R19)
05000325,324/2008003-01	FIN	Failure to Conduct Adequate and Timely Evaluations of Onsite Groundwater Monitoring Well Tritium Concentration Trend Data (4OA2.3)

#### Opened

05000325,324/2008003-01	URI	Evaluate Representativeness of Particulate Sampling for the Reactor Building Roof Vent Monitors, Turbine Building Wide Range Gas Monitors, and Plant Stack Wide Range Gas Monitors (2PS1)
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#### Closed

None

Discussed

05000325,324/2008002-02      URI      Review the Significance of the Storm Drain  
Stabilization Pond Evaporation Pathway Dose  
Compared to Doses from All Other Pathways (2PS1)

**LIST OF DOCUMENTS REVIEWED****Section 1R01: Adverse Weather**

Plant Operating Manual (POM), Volume XXI, Abnormal Operating Procedure, 0AOP-13.0,  
Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 41  
POM, Volume I, Administrative Instruction, 0AI-68, Brunswick Nuclear Plant Response to  
Severe Weather Warnings, Rev. 30  
POM, Volume XIII, Plant Emergency Procedure 0PEP-02.6, Severe Weather, Rev. 12  
POM, Volume XIII, Plant Emergency Procedure 0PEP-02.1, Initial Emergency Actions, Rev. 50

**Section 1R04: Equipment Alignment**

POM, Volume III, Operating Procedure 0OP-50.1, Diesel Generator Emergency Power System  
Operating Procedure, Rev. 71  
POM, Volume III, Operating Procedure 1OP-16, Reactor Core Isolation Cooling System  
Operating Procedure, Rev. 67  
POM, Volume III, Operating Procedure 1OP-19, High Pressure Cooling Injection System  
Operating Procedure, Rev. 70  
POM, Volume III, Operating Procedure 2OP-19, High Pressure Cooling Injection System  
Operating Procedure, Rev. 113

**Section 1R06: Flood Protection Measures**

Plant Operating Manual (POM), Volume XXI, Abnormal Operating Procedure, 0AOP-13.0,  
Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 41

**Section 1R20: Refueling and Other Outage Activities**

POM, Volume III, Operating Procedure 1OP17, Residual Heat Removal System Operating  
Procedure, Rev. 95  
POM, Volume IV, General Plant Operating Procedure 0GP-01, Prestartup Checklist, Rev. 174  
POM, Volume IV, General Plant Operating Procedure 0GP-02, Approach to Criticality and  
Pressurization of the Reactor, Rev. 89  
POM, Volume IV, General Plant Operating Procedure 0GP-03, Unit Startup and  
Synchronization, Rev. 69  
POM, Volume IV, General Plant Operating Procedure 0GP-12, Power Changes, Rev. 53  
POM, Volume XII, Special Maintenance Procedure 0SMP-RPV502, Reactor Vessel  
Reassembly, Rev. 7  
POM, Volume XII, Maintenance Management Manual 0MMM-015, Operation and Inspection of  
Cranes and Material Handling Equipment, Rev. 43

**Section 20S3: Radiation Monitoring Instrumentation and Protective Equipment**  
Procedures and Guidance Documents

0E&RC - 0339, Revision 12, Calibration of the SPM Portal Monitor  
 0E&RC - 0344, Revision 8, Calibration and Use of APTEC Personnel Monitors  
 0E&RC - 0116, Revision 3, Calibration of Eberline PM-7 Personnel Monitors  
 0E&RC - 0358, Revision 14, Area Radiation Monitors Radiation Response Monthly Test  
 0E&RC - 0115, Revision 14, Use and Calibration of the Small Article Monitors  
 0E&RC - 0214, Revision 5, Calibration and Operation of Clean Material Conveyor Monitor  
 0E&RC - 0292, Revision 4, SCBA Use and Maintenance  
 HPS-NGGC - 0020, Revision 0, Calibration and Use of the Eberline AMS-4 Air Monitor  
 OPIC - ES002, Revision 7, GE 112C2235G1 Area Radiation Monitor Power Supply Calibration  
 OPIC - ETU003, Revision 24, GE Area Radiation Monitor Indicators and Trip Unit Model  
 129B2802, G1 and G11-G17 Calibration  
 OPIC - RE004, Revision 16, GE Area Radiation Monitor 194X927G11, G12, G13, and G17  
 Sensor and Converter Calibration

Records

ARM Monthly Data Sheets (January - April 2008)

ARM Calibration Records for selected ARMs:

Work Order Package 00391842, completed 8/9/05 (ARM 1-21)  
 Work Order Package 00329829, completed 6/18/04 (ARM 1-30)  
 Work Order Package 00408792, completed 5/11/05 (ARM 2-6/8)  
 Work Order Package 00456702, completed 5/18/05 (ARM 2-21)  
 Work Order Package 00349465, completed 5/5/05 (ARM 2-25)  
 Work Order Package 00976822, completed 12/19/06 (ARM 2-25)

Drywell High Range Area Monitoring System calibrations:

Work Order Package 00762088, completed 3/28/07  
 Maintenance Surveillance - OMST-AMI11R, Revision 5, AMI Post Accident High  
 Range Rad Mon One Point Cal Check, completed 3/28/07  
 Work Order Package 00461128, completed 3/18/05  
 Maintenance Surveillance - OMST-AMI11R, Revision 2, AMI Post Accident High  
 Range Rad Mon One Point Cal Check, completed 3/18/05

Whole Body Counter: Daily checks for June 2008, Calibration August 2007

Current 10 CFR 61 Analysis and Evaluation

Selected evaluations of portable instruments found not operable

Calibration Records for Continuous Air Monitors: NMC#9 (04/27/08); CAM#25 (10/31/07);  
 CAM#14 (09/05/07); CAM#17 (09/06/07); NM#29 (04/10/08); NMC#1 (04/27/08);  
 CAM#27 (10/31/07); NMC#20 (04/06/08); CAM#26 (10/31/07)

Calibration Records for AMS-4 Air Monitors: 1134 (11/10/07); 1477 (03/24/08); 1135 (11/10/07);  
 1478 (02/19/08); 1136 (02/20/08); 1479 (02/20/08); 1137 (03/13/08); 1480 (02/11/08);  
 1358 (02/13/08); 1481 (02/18/08); 1359 (02/19/08); 1769 (02/18/08); 1360 (02/18/08);  
 1770 (01/16/08); 1476 (03/11/08); 1930 (03/24/08)

Conveyor Monitor Calibration Records (03/16/07 & 03/26/08)

PM-7 Daily Check forms (June 2007 - March 2008)

Portal Monitor Calibration Records: 777587 (04/25/08, 04/30/07); 777591 (04/25/08, 04/30/07);  
 777589 (04/25/08, 04/30/07); 777590 (12/01/07); 777588 (08/01/07); 1609500  
 (04/15/08, 04/09/08); 368 (02/15/08, 03/14/08); 440 (07/27/07, 01/19/08); 441  
 (01/19/08, 03/13/08)

SCBA Training and Qual Records for 18 individuals  
 SCBA Maintenance & Inspection Qual Records for 3 individuals  
 SCBA Certified Repair Qual record  
 SCBA Inspection Records (Quarterly/Monthly 03/28/08; Monthly 02/24/08; Monthly 04/25/08)  
 SCBA Practical Training Lesson Plan  
 SCBA Bottle Change-out Lesson Plan  
 Respiratory Protection Training Student Handout  
 Breathing Air Quality Analysis: SCBA Compressor (10/22/07); 1RB 20' SW (10/22/07); 2RB 20'  
 SW (10/22/07); Sandblast Yard Ingersoll Rand (10/24/07); Sandblast Yard BNP 67  
 (10/24/07); U1 TB 20' (04/13/08); U1 RB 20' (04/13/08); U2 RB 20' (04/13/08); U2 TB  
 20' (04/13/08)  
 Breathing Air Quality and Certified Grade D: U2 RB 20' SW (01/22/08); U1 RB 20' SW  
 (01/22/08); SCBA Compressor - fire house (01/23/08); Sandblast hill BNP  
 Compressor (01/24/08); Sandblast hill Ingersoll Rand Compressor (01/24/08)

### **Section 2PS1: Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems**

#### Procedures, Reports, and Guidance Documents

Annual Radiological Effluent Release Report, 2006  
 Annual Radiological Effluent Release Report, 2007  
 Offsite Dose Calculation Manual, Rev. 30  
 OE&RC-4200, Determination of Compliance to 40CFR190, Rev. 6  
 OE&RC-1706, Sampling of the Once Through Ventilation System, Rev. 2  
 OE&RC-1008, Operation of the Radwaste Building Sample Station, Rev. 12  
 OE&RC-2009, Radioactive Liquid Effluent Releases and Reports, Rev. 22  
 OE&RC-3250, Groundwater Monitoring program, Rev. 29  
 OOP-06.4, Discharging Radioactive Liquid Effluents to the Discharge Canal, Rev. 42  
 CAP-NGGC-0200, Corrective Action Program, Rev. 22

#### Records and Data

WO 1107728-01, 0MST-RLE11Q, U1 Liquid Radwaste Effluent Flow Channel Calibration and  
 Functional Test, 5/16/08  
 WO 1071766-01, 0MST-RLE11Q, U1 Liquid Radwaste Effluent Flow Channel Calibration and  
 Functional Test, 2/15/08  
 WO 702778-04, 0RST-71.0, General Atomic Stack Radiation Monitor Channel Calibration (2-  
 D12-RM-23S), 11/15/06  
 WO 1310211, 0RST-71.0, General Atomic Stack Radiation Monitor Channel Calibration (2-D12-  
 RM-23S), 3/8/08  
 WO 319507-02, 0RST-70.2, U1 SJAЕ Radiation Monitor Linearity Determination, 3/24/04  
 WO 616835-02, 0RST-70.2, U1 SJAЕ Radiation Monitor Linearity Determination, 3/20/06  
 WO 600006-02, 0RST-73.0, U2 Reactor Building Roof Vent Radiation Monitor Channel  
 Calibration CAC-AQH-1264, 5/19/06  
 WO 297678-2, 0RST-73.0, U2 Reactor Building Roof Vent Radiation Monitor Channel  
 Calibration CAC-AQH-1264, 7/1/04  
 WO 831637-34, U2 Turbine Building Once-Thru Ventilation RSCS Testing, 3/11/08  
 WO 831637-35, U2 Turbine Building Once-Thru Ventilation 3-D Ventilation Flow Testing, 3/4/08  
 Liquid Release Permit 081828, U1 Salt Water Release Tank, 6/17/08  
 Calibration of HPGe detector #2, miscellaneous geometries, 5/18/08

Lab QA of 2900 TR liquid scintillation detector, 1/2/08-4/1/08  
 Analytics Cross Check Program Results, 1<sup>st</sup> Quarter 2006 – 1<sup>st</sup> Quarter 2008  
 Reactor Building Roof Vent Radiation Monitor Channel Calibration, 7/31/85  
 Calibration of the Mid and High Range Channels of the Wide Range Noble Gas Monitors at  
 Brunswick Steam Electric Plant, 9/12/85  
 Calibration Report for Model RD-52 Offline Beta Detector, 10/84  
 TSD 08-011, Preliminary Assessment of One-Through Ventilation System and Associated  
 Sampling System Performance at the Brunswick Nuclear Plant, 3/19/08  
 Engineering Change 62827R8, B00 Design: U2 Once-Through Ventilation  
 Engineering Change 62827R8, B03 Design: Once-Through Ventilation Testing - ODCM  
 Requirements, Aux Sampling, etc.  
 Drawing 03849004, Once-Through Ventilation Isokinetic Nozzle Assembly  
 Engineering Change 0000067241RO, Temporary Modification to Divert excess water from the  
 U1 and U2 TB ventilation "swamp" evaporative cooler basins to the U1/U2 TB floor  
 drain sumps, U1/U2 TB equipment drain sumps and or the U1 salt water release  
 tanks, 10/11/07  
 Counting Analysis Gamma Scan and Tritium Data Sheet Results: 05/07/07, 05/14/07, 01/07/08,  
 01/14/08, 06/12/08  
 Storm Drain Collector Basin Tritium Concentrations (picocuries per liter); 10/10/06 through  
 06/01/08  
 Turbine Building Wide Range Gas Monitor General Response data 04/20/08-06/19/2008

#### Corrective Action Program Documents

B-EC-07-01, Environmental and Chemistry Assessment  
 NCR 201624, SJAE rad monitor increase without obtaining required samples, 7/06  
 NCR 203880, LLD requirement for liquid release 06-2221 not met, 8/06  
 NCR 204599, U2 SJAE sample decay time, 8/06  
 NCR 215410, 1-CAC-AQH-1262-2 rework identified, 12/06  
 NCR 233857, Airborne tritium pathway, 5/07  
 NCR 245647, Evaluate groundwater pathways, 9/07  
 NCR 246686, Stab pond liquid effluent flow found out of cal, 9/07  
 NCR 263468, U2 TB WRGM inoperable due to loss of flow signal, 1/08  
 NCR 266824, Unexpected WRGM response required OTV WO planning change, 2/08  
 NCR 272671, U2 once-through ventilation auxiliary sample pump, 3/08  
 NCR 208653, Brunswick Nuclear Plant (BNP) Groundwater Initiative (NEI) Action Plan,  
 10/09/06  
 NCR 269295, Review radwaste effluent line test methodology, 03/06/08  
 NCR 268357, Tracking and trending initiative for Wells ESS-2C and ESS-16 established to  
 monitor a 1994 Unit 2 radwaste effluent line failed to identify increasing H-3  
 concentration trends, 02/29/08  
 NCR 243456, Groundwater sample data not included in 2006 report, 08/17/07  
 NCR 233427, Tritium release to intake canal, 05/17/07  
 NCR 233857, Airborne tritium pathway, 05/22/07  
 NCR 233865, Water samples obtained from two electrical manholes located outside of  
 protected area in the vicinity of the SDSP, indicated measurable levels of tritium,  
 05/21/07

NCR 26566, Inspection of storm drain piping done 12/4-6/2000 revealed potential degradation of storm drain line transporting contaminated water from TB air wash system to SDCP, 12/14/2000

### **Section 2PS3: Radiological Environmental Monitoring Program**

#### Procedures and Guidance Documents

HPS-NGGC-0013, Personnel Contamination Monitoring, Decontamination, Reporting, Rev. 7  
 0E&RC-0215, Removal of Materials from the Radiological Control Area, Rev. 39  
 0E&RC-3101, Radiological Environmental Monitoring Program, Rev. 27  
 EVC-NGGC-0007, The Reporting of Anomalous Results, LLD Requirements, A Priori Calculations, and Interlaboratory Comparison Program Acceptance Criteria Evaluation for Radiological Environmental Samples, Rev. 14  
 CAP-NGGC-0200, Corrective Action Program, Rev. 22

#### Records

2006 and 2007 Annual Radiological Environmental Operating Reports  
 Environmental Air Sampler Calibration Records, Designator BNP-1 through BNP-11, 3/17/07, 11/20/07, and 3/30/08  
 Air Sample Location 204 (Control), Gamma Isotopic Results, 2/15/94 – 6/16/08  
 Harris Energy & Environmental Center, Interlaboratory Crosscheck Results, 4<sup>th</sup> quarter 2005 – 3<sup>rd</sup> quarter 2007  
 Meteorological Data Recovery Evaluations, Wind speed, Wind direction, Delta temperature, 2006 and 2007  
 Meteorological Tower Bi-weekly Surveillances, 3/17/08 and 4/2/08  
 Meteorological Tower Sensor Calibration/Replacement Packages, 5/30/07 and 4/2/08  
 10 CFR Part 61 Analysis, Dry Active Waste Stream (most recent)  
 Calibration Records for Small Article Monitors: 003 (03/11/07, 03/08/08); 106 (03/11/07, 03/08/08); 066 (02/27/07, 02/25/08); 192 (03/11/07, 03/10/08); 067 (03/05/07, 03/04/08); 358 (03/11/07, 03/10/08); 101 (08/15/07, 09/26/07); 362 (03/11/07, 03/10/08)  
 Calibration Records for BAM Bag Monitors: 240 (02/2007, 02/25/08); 405 (08/10/06, 07/25/07)

#### Corrective Action Program Documents

Nuclear Assessment Section Report B-EC-07-01, BNP Environmental & Chemistry Assessment, 9/12/07  
 NCR 274720, Contaminated pump sent to clean trash, 4/11/08  
 NCR 216231, Trees surrounding met tower should be cut back, 12/12/06  
 NCR 226347, Low level radioactivity identified in BSF facility sewer sludge, 3/19/07  
 NCR 229054, Low level tritium identified (614 pCi/L) in discharge canal monthly composite, 4/10/07  
 NCR 261652, Environmental TLDs missing due to power poles being removed, 1/10/08  
 NCR 267497, Environmental inter-laboratory cross-check fell outside of acceptance criteria, 2/25/08  
 NCR 211934, Iodine-131 was identified at environmental air-sample location 205, 11/8/06  
 NCR 283599, Environmental TLD No. 6 found out of position during NRC REMP run, 6/17/08

**Section 40A1: Performance Indicator Verification****Procedures**

REG-NGGC-0009, NRC Performance Indicators and Monthly Operating Report Data, Rev. 8

**Records and Data**

Monthly PI Reports, June 2007 – March 2008

Compensatory sampling results:

Monthly gaseous effluents report reviews, including select release permits: 12/1/07-12/31/07;  
3/1/08-3/31/08; 5/1/08-5/30/08

Monthly liquid effluents report reviews, including select release permits: 12/1/07-12/31/07;  
3/1/08-3/31/08; 5/1/08-5/30/08

**List of Acronyms and Abbreviations**

ALARA	As Low As Reasonably Achievable
B117R1	Brunswick Unit 1 Cycle 17 Refueling Outage
B218R1	Brunswick Unit 2 Cycle 18 Refueling Outage
CAP	Corrective Action Program
CY	calendar year
DRD	Direct Reading Dosimeter
ESS	Environmental Sampling Station
H-3	tritium
HPGe	high purity germanium
HPT	Health Physics Technician
HRA	High Radiation Area
LHRA	Locked High Radiation Area
LSC	liquid scintillation counter
NCR	Nuclear Condition Report
ODCM	Offsite Dose Calculation Manual
pCi/L	picocuries per liter
QC	quality control
radworker	radiation worker
RCA	radiologically controlled area
REMP	Radiological Environmental Monitoring Program
RP	Radiation Protection
RWP	Radiation Work Permit
SCBA	self-contained breathing apparatus
SDCB	storm drain collector basin
SDSP	Storm Drain Stabilization Pond
SFP	Spent Fuel Pool
SSC	systems, structures, and components
TB	turbine building
U1	Unit 1
U2	Unit 2
VHRA	Very High Radiation Area