



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

April 28, 2010

Mr. Michael J. Annacone  
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.: 05000325/2010002 AND 05000324/2010002**

Dear Mr. Annacone:

On March 31, 2010, the U.S. 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 March 30, 2010, with you 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.

The report documents two NRC-identified findings and one self-revealing finding of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they have been entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV, 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 addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Brunswick Steam Electric Plant. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of

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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, 324/2010002  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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 ADAMS: X Yes      ACCESSION NUMBER: ML101180517      X SUNSI REVIEW COMPLETE

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NAME	GWilson	JWorosilo	PO'Bryan	GKolcum	JSowa	BCollins	HGepford
DATE	04/25/2010	04/23/2010	04/23/2010	04/23/2010	04/23/2010	04/28/2010	04/26/2010
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DATE	04/26/2010	04/26/2010	94/26/2010	04/28/2010		4/ /2010	4/ /2010
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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Letter to Michael J. Annacone from Randall A. Musser dated April 28, 2010

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION  
REPORT NOS.: 05000325/2010002 AND 05000324/2010002

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R. Pascarelli, NRR

RidsNrrPMBrunswick Resource

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-325, 50-324

License Nos.: DPR-71, DPR-62

Report Nos.: 05000325/2010002, 05000324/2010002

Licensee: Carolina Power and Light (CP&L)

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road, SE  
Southport, NC 28461

Dates: January 1, 2010 through March 31, 2010

Inspectors: P. O'Bryan, Senior Resident Inspector  
G. Kolcum, Resident Inspector  
J. Sowa, Project Engineer  
B. Collins, Reactor Inspector (1R08)  
H. Gepford, Senior Health Physics Inspector (2RS6)  
R. Hamilton, Senior Health Physics Inspector (2RS1, 4OA1, 2RS06)  
G. Kuzo, Senior Health Physics Inspector (2RS07, 2RS04, 4OA5)  
A. Nielsen, Health Physics Inspector (2RS05)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000325/2010002, 05000324/2010002; 01/01/10 - 03/31/10; Brunswick Steam Electric Plant, Units 1 & 2; Refueling and Other Outage Activities, and Radioactive Gaseous and Liquid Effluent Treatment.

This report covers a three-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Two NRC-identified and one self-revealing findings of very low safety significance (Green) 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 cross-cutting aspects were determined using IMC 0305, Operating Reactor Assessment Program. Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review.

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

#### Cornerstone: Initiating Events

- Green. The inspectors identified a Green NCV of 10 CFR Part 50.65 (a)(4), Requirements for monitoring the Effectiveness of Maintenance at Nuclear Power Plants, after Unit 1 experienced a loss of normal reactor feedwater as a result of an abnormal plant configuration during shutdown of the reactor on February 26, 2010. The licensee did not adequately manage the increase in risk that resulted when the 1B reactor feed pump (RFP) was made unavailable while the 1A south condenser was isolated in the hours leading up to the reactor shutdown. This plant configuration led to a high level in the 1A south condenser hotwell soon after the reactor shutdown, which prevented adequate draining of the 1A RFP turbine casing, and led to the loss of the 1A RFP. After the loss of normal feedwater to the reactor, the licensee restored reactor level using the reactor core isolation cooling (RCIC) system. The licensee entered the issue into its corrective action program (AR #383636).

The failure to adequately evaluate and manage risk associated with equipment configuration during the Unit 1 shutdown is a performance deficiency. This finding is more than minor because it is associated with the initiating events cornerstone attribute of configuration control and it adversely affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions. Specifically, plant stability was upset by the loss of normal feedwater to the reactor. In accordance with IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process, this finding is of very low safety significance (Green) because the Incremental Core Damage Probability Deficit is  $<E-6$  and the Incremental Large Early Release Probability Deficit is  $<E-7$ . The inspectors determined that this finding had a cross-cutting aspect in the area of human performance, work control component, because the licensee did not appropriately plan work activities by incorporating risk insights (H.3(a)). Specifically, activities scheduled prior to the reactor shutdown were not properly evaluated to determine their impact on the normal reactor feedwater system. (Section 1R20)

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### Cornerstone: Mitigating Systems

- Green. A self-revealing Green NCV of Technical Specifications (TS) 5.4.1, Procedures, was identified when reactor head piping was disconnected prior to swapping shutdown range reactor water level transmitters resulting in inaccurate water level indication. The plant procedure for disconnection of the reactor head piping, OSMP-RPV501, Reactor Vessel Disassembly, used in conjunction with OGP-06, Cold Shutdown to Refueling, specifies that prior to removal of head piping, the Shutdown Range Reactor Water Level Transmitters shall be swapped from level transmitters, B21-LT-N027A and B21-LT-N027B, to level transmitters, B21-LT-7468A and B21-LT-7468B. Contrary to this requirement, the common reference leg to the level indicators was disconnected prior to swapping transmitters which resulted in loss of accurate indication of current reactor vessel water level. The licensee reinstalled the disconnected piping, refilled the reference legs for the transmitters, and entered the issue into their corrective action program (AR #383779).

The disconnection of the reference leg flange of the reactor vessel head piping prior to realignment of level instrumentation as required by plant procedures is a performance deficiency. The performance deficiency was more than minor because it is associated with the configuration control attribute of the Mitigating Systems cornerstone because it inappropriately altered the reactor level instrumentation reference leg piping. It affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inaccurate level indication degraded the operator's ability to control the reactor vessel water level in the prescribed procedural band and would inhibit their ability to diagnose and prevent loss of residual heat removal (RHR) scenario. In accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 8, the inspectors conducted a Phase 1 SDP screening and determined the finding required a Phase 2 analysis. The Phase 2 analysis determined the finding is of very low safety significance (Green) because adequate mitigation capability was maintained. The cause of this finding was directly related to the supervisory and management oversight cross-cutting aspect in the work practices component of the Human Performance cross-cutting area because plant supervisors failed to ensure an adequate pre-job brief, failed to enforce proper communications methods at the job site, and failed to properly supervise workers executing procedure steps (H.4(c)). (Section 1R20)

### Cornerstone: Public Radiation Safety

- Green. The inspectors identified a Green NCV of 10 CFR 20.1302(a) for failure to ensure surveys of particulate radioactive materials in effluents released to unrestricted areas from the reactor building roof vent were adequate to demonstrate compliance with dose limits for individual members of the public. This issue was initially identified as an unresolved item following an inspection in June 2008. The licensee entered the issue into its corrective action program (AR #292216 and AR #393340). The licensee is currently investigating this issue to identify applicable corrective actions.

Enclosure

The failure to ensure that the reactor building roof vent effluents were adequately monitored is a performance deficiency. This finding is more than minor because it is associated with the Public Radiation Safety Cornerstone attribute of Plant Facilities/Equipment and Instrumentation (Process Radiation Monitors) and adversely affects the cornerstone objective. Specifically, the cornerstone objective of providing assurance that adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian reactor operation was affected because the licensee did not ensure that reactor building effluents were accurately monitored. The finding was evaluated using the Public Radiation Safety SDP and determined to be of very low safety significance (Green). The finding, which involved the effluent release program, was determined to be of very low safety significance (Green) because it was not a failure to implement the effluent program and did not result in public dose exceeding the 10 CFR 50 Appendix I criterion or 10 CFR 20.1301(e). This finding does not have a cross-cutting aspect because the failure to evaluate the effect of line losses on particulate sampling is a historical issue. (Section 2RS6)

B. Licensee-Identified Violations

None.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at rated thermal power, and operated at or near full power until shutdown for a refueling outage on February 26, 2010. Unit 1 remained shutdown for the remainder of the inspection period.

Unit 2 began the inspection period at rated thermal power. On February 3, 2010, Unit 2 was shutdown for maintenance on the 1A feedwater heater and to repair a leak from the valve bonnet of the RHR system check valve 2-E11-F050A. Unit 2 was restarted and was critical on February 7, 2010, and was connected to the grid on February 8, 2010. Unit 2 began power ascension and reached rated thermal power on February 9, 2010. Unit 2 operated at or near rated thermal power for the remainder of the inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 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 emergency diesel generator building, the service water building, and emergency diesel generator four-day tank rooms 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 procedure (AOP) for mitigating the design basis flood to ensure it could be implemented as written. This inspection constitutes one external flooding sample as defined in Inspection Procedure 71111.01.

##### b. Findings

No findings of significance were identified.

Enclosure

## 1R04 Equipment Alignment

### .1 Quarterly Partial System Walkdowns

#### a. Inspection Scope

The inspectors performed partial system walkdowns of the following four risk-significant systems:

- The 1B train of the standby gas treatment (SBGT) system on January 13, 2010 during maintenance on the 1A SBGT train
- 1A loop of the residual heat removal (RHR) system with 1B loop of RHR out of service for chemical cleaning on January 20, 2010
- 1B loop of RHR with the 1A loop of RHR out of service for chemical cleaning on January 26, 2010
- The Unit 1 reactor building closed cooling water system when it was being relied upon for decay heat removal in conjunction with the fuel pool cooling and the supplemental spent fuel pool cooling systems when both trains of the RHR system were out of service on March 19, 2010

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, TS requirements, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify that system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Documents reviewed are listed in the attachment.

#### b. Findings

No findings of significance were identified.

### .2 Semi-Annual Complete System Walkdown

#### a. Inspection Scope

The inspectors performed a complete system alignment inspection of the Unit 1 RHR system to verify the functional capability of the system. This system was selected

because it was considered both safety-significant and risk-significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment line-ups, electrical power availability, system pressure and temperature indications, as appropriate, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding work orders (WOs) was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program (CAP) database to ensure that system equipment alignment problems were being identified and appropriately resolved. The documents used for the walkdown and issue review are listed in the attachment.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Quarterly Resident Inspector Tours

a. Inspection Scope

The inspectors conducted fire protection walkdowns which were focused on availability, accessibility, and the condition of firefighting equipment in the following six risk-significant plant areas:

- Unit 2 Reactor Building North 20' Elevation (2PFP-RB2-1g N)
- Unit 2 Reactor Building South 20' Elevation (2PFP-RB2-1g S)
- Unit 2 Reactor Building East 50' Elevation (2PFP-RB2-1h E)
- Unit 2 Reactor Building West 50' Elevation (2PFP-RB2-1h W)
- Makeup Water Treatment Building (0PFP-MWT)
- Fire House (0PFP-FH)

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and had implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed, that transient material loading was

within the analyzed limits; and that fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

.1 Annual Review of Cables Located in Underground Bunkers/Manholes

a. Inspection Scope

The inspectors conducted an inspection of underground bunkers/manholes subject to flooding that contain cables whose failure could disable risk-significant equipment. The inspectors performed walkdowns of risk-significant areas, including manhole 2-MH-SY1 containing offsite power cables from the start-up transformer, to verify that the cables were not submerged in water, that cables and/or splices appeared intact and to observe the condition of cable support structures. When applicable, the inspectors verified proper dewatering device (sump pump) operation and verified level alarm circuits were set appropriately to ensure that the cables will not be submerged. Where dewatering devices were not installed, the inspectors ensured that drainage was provided and functioning properly.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's testing of the 1A RHR heat exchanger to verify that potential deficiencies did not mask the licensee's ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee's observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. Inspectors also visually inspected the service water side of the heat exchanger on March 8, 2010, to ensure that the heat exchanger was free of debris and biological growth.

b. Findings

No findings of significance were identified.

## 1R08 Inservice Inspection Activities

From March 1, 2010 through March 5, 2010, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the reactor coolant system, steam generator tubes, emergency feedwater systems, risk-significant piping and components and containment systems.

The inspections described in Sections 1R08.1 and 1R08.2 below constituted one inservice inspection sample as defined in Inspection Procedure 71111.08-05.

### .1 Piping Systems IS

#### a. Inspection Scope

The inspectors evaluated the following non-destructive examinations mandated by the ASME Code Section XI to verify compliance with the ASME Code Section XI and Section V requirements and, if any indications and defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement.

- Ultrasonic Testing (UT) examination of weld 1B11-RPV-N6A (Nozzle N6A), ASME Class 1, Reactor Coolant System, 3-inch diameter, Category B-D – Direct Observation
- Ultrasonic Testing (UT) examination of weld 1B11-RPV-N7 (Nozzle N7), ASME Class 1, Reactor Coolant System, 3-inch diameter, Category B-D – Direct Observation
- Remote VT-1 Visual Examination of Reactor Vessel Main Steam weld, ASME Class 1, 24-inch Category B-D – Direct Observation

The inspectors reviewed the following examination records (volumetric or surface) with recordable indications that were analytically evaluated and accepted for continued service against the ASME Code Section XI or an NRC-approved alternative.

- Indications found during VT of Reactor Vessel Jet Pump Riser welds "A," "D," "F," "G," and "K"

The inspectors reviewed documentation for the following pressure boundary welds completed for risk-significant systems during the outage to evaluate if the licensee applied the preservice non-destructive examinations and acceptance criteria required by ASME Code Section XI. In addition, the inspectors reviewed the welding procedure specification, welder qualifications, welding material certification and supporting weld procedure qualification records, to evaluate if the weld procedures were qualified in accordance with the requirements of Construction Code and the ASME Code Section IX.

- Work Order 1525781-01, Repair/Refurbishment of Main Steam Isolation Valve (MSIV) Backseat, ASME Class 1
- Work Order 1429662-03, Pre-Fabrication of Residual Heat Removal (RHR) piping for vent modification, ASME Class 2

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b. Findings

No findings of significance were identified.

.2 Identification and Resolution of Problems'

a. Inspection Scope

The inspectors performed a review of ISI-related problems entered into the licensee's corrective action program and conducted interviews with licensee staff to determine if;

- the licensee had established an appropriate threshold for identifying ISI-related problems
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions
- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program

a. Inspection Scope

On February 9, 2010, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance
- crew's clarity and formality of communications
- ability to take timely actions in the conservative direction
- prioritization, interpretation, and verification of annunciator alarms
- correct use and implementation of abnormal and emergency procedures
- control board manipulations
- oversight and direction from supervisors
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

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b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following two risk-significant systems:

- Out-of-tolerance calibration of reverse power relay 32PK for emergency diesel generators #1, 2, 3, and 4 on February 4, 2010. (AR #379246)
- 1B conventional service water pump breaker failure to shut after maintenance on February 22, 2010. (AR #382638)

The inspectors reviewed events where ineffective equipment maintenance may have resulted in equipment failure or invalid automatic actuations of Engineered Safeguards Systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- implementing appropriate work practices
- identifying and addressing common cause failures
- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance
- charging unavailability for performance
- trending key parameters for condition monitoring
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and verifying appropriate performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) or appropriate and adequate goals and corrective actions for systems classified as (a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified that maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization.

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 evaluation and management of plant risk for the six maintenance and emergent work activities affecting risk-significant equipment listed

below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- Week of January 4, 2010, with the 2B nuclear service water (NSW) pump and fire protection tank out of service.
- Week of January 11, 2010, with the 1A NSW pump out of service and final feedwater reduction manipulations on Unit 1.
- Yellow risk for Unit 1 with 1B loop RHR out of service for chemical cleaning on January 19, 2010.
- Yellow risk for cycling offsite power breakers on January 27, 2010.
- Unit 2 risk for the Wallace offsite power line out of service for maintenance on February 5, 2010.
- Unit 2 high pressure coolant injection system out of service and the 1C conventional service water pump out of service on February 24, 2010.

These activities were selected based on their potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified that plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following eight issues:

- Unit 1 A standby gas train (SBGT) high differential pressure reading on January 13, 2010 (AR #374826)
- Emergency diesel generator (EDG) #1 fuel rack limit cylinder air valve partially shut (AR #362139)
- Bus 2C to bus E4 circuit breaker trip while running EDG #4 for testing on February 2, 2010 (AR #379175)
- EDG #1 frequency oscillation during testing on February 10, 2010 (AR #380756);
- Unit 1 residual heat removal service water piping leak on March 2, 2010 (AR #384175)
- EDG vent piping design (AR #347133)
- Unit 2 A SBGT loop seal filter debris (AR #389573)

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- Unit 1 high pressure coolant injection suction strainer gap (AR #387576)

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations, to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications

a. Inspection Scope

The following three engineering design packages were reviewed and selected aspects were discussed with engineering personnel:

Temporary Plant Modifications:

- Supplemental Fuel Pool Cooling upgrades, engineering change (EC) 74422
- Leak repair of 2-E11-F050A, RHR check valve, EC 74658

Permanent Plant Modification:

- Repair of the Unit 1 high pressure coolant injection torus suction strainer, EC 76428

The inspectors reviewed the associated 10 CFR 50.59 screening against the system design bases documentation to verify that the modifications had not affected system operability/availability. The inspectors reviewed selected ongoing and completed work activities to verify that installation was consistent with the design control documents.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testinga. Inspection Scope

The inspectors reviewed the following five post-maintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- 2OP-43, Service Water System Operating Procedure for the 2B nuclear service water pump on January 8, 2010, after strainer maintenance
- 0PT-08.2.2b, Low pressure coolant injection (LPCI)/RHR System Operability Test – Loop B on January 22, 2010, after restoration from chemical cleaning
- 0PT-08.2.2c, LPCI/RHR System Operability Test – Loop A on January 30, 2010, after restoration from chemical cleaning
- 0PT-34.5.5.0, Diesel and Electric Fire Pump Functional Test on February 18, 2010, after restoration from plant maintenance
- 0PT-8.2.2c, LPCI/RHR System Operability Test – Loop A on March 29, 2010, after restoration following maintenance

The inspectors reviewed these post-maintenance tests to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee's test procedure to verify that the procedure adequately tested the safety function(s) that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s).

b. Findings

No findings of significance were identified.

1R20 Outage Activities.1 Refueling Outage Activitiesa. Inspection Scope

The inspectors reviewed the outage plan and contingency plans for the Unit 1 refueling outage, started on February 26, 2010, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below. Documents reviewed during the inspection are listed in the attachment.

- Licensee configuration management, including maintenance of defense-in-depth for key safety functions and compliance with the applicable TS when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error
- Controls over the status and configuration of electrical systems to ensure that TS and outage safety plan requirements were met, and controls over switchyard activities
- Monitoring of decay heat removal processes, systems, and components
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- Controls over activities that could affect reactivity
- Maintenance of secondary containment as required by TS
- Refueling activities, including fuel handling and sipping to detect fuel assembly leakage
- Licensee identification and resolution of problems related to refueling outage activities.

b. Findings

(1) Failure to Follow Procedure During Reactor Head Disassembly

Introduction: A self-revealing Green NCV of TS 5.4.1, Procedures, was identified when reactor head piping was disconnected prior to swapping shutdown range reactor water level transmitters resulting in inaccurate water level indication. The plant procedure for disconnection of the reactor head piping, OSMP-RPV501, Reactor Vessel Disassembly, used in conjunction with OGP-06, Cold Shutdown to Refueling, specifies that prior to removal of head piping, the Shutdown Range Reactor Water Level Transmitters shall be swapped from level transmitters, B21-LT-N027A and B21-LT-N027B, to level transmitters, B21-LT-7468A and B21-LT-7468B. Contrary to this requirement, the common reference leg to the level indicators was disconnected prior to swapping transmitters which resulted in loss of accurate indication of current reactor vessel water level. The licensee reinstalled the disconnected piping, refilled the reference legs for the transmitters, and entered the issue into its corrective action program.

Description: On February 28, 2010, with Unit 1 in Mode 4 and reactor water level being maintained between 390 and 420 inches per the shutdown range reactor water level transmitters (B21-LT-N027A and B21-LT-N027B), the indicated water level suddenly increased from approximately 419 to 537 inches. The control room was notified that the reference leg flange of the level transmitters currently being used had been loosened. When the flange was loosened, the reference leg lost water level which resulted in the rise in indicated water level in the control room. The water level indicators were realigned from level transmitters, B21-LT-N027A and B21-LT-N027B, to level

transmitters, B21-LT-7468A and B21-LT-7468B. Upon realignment, the indicated water level stabilized at 385 inches. The control room then reconnected the reference leg piping, refilled the reference leg for the level transmitters, B21-LT-N027A and B21-LT-N027B, and level stabilized at 410 inches.

Procedure OGP-06, "Cold Shutdown to Refueling" step 5.1.14, directs that the level transmitters shall be swapped and authorization shall be given prior to removing reactor water level piping per OSMP-RPV501. The miscommunication between the control room operators and the maintenance group performing the disassembly of the reactor vessel head piping lead to loosening the flange of the common reference leg prior to the control room operators swapping from the level transmitters B21-LT-N027A and B21-LT-N027B, to level transmitters, B21-LT-7468A and B21-LT-7468B. This procedure violation caused an inaccurate reactor water level indication for approximately 40 minutes. The level indication inaccuracy degraded the plant operators' ability to control the reactor vessel water level in the prescribed procedural band.

Analysis: The disconnection of the reference leg flange of the reactor vessel head piping prior to realignment of level instrumentation as required by plant procedures is a performance deficiency. The performance deficiency was more than minor because it is associated with the configuration control attribute of the Mitigating Systems cornerstone because it inappropriately altered the reactor level instrumentation reference leg piping. It affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inaccurate level indication degraded the operator's ability to control the reactor vessel water level in the prescribed procedural band and would inhibit their ability to diagnose and prevent loss of residual heat removal (RHR) scenario. In accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 8, the inspectors conducted a Phase 1 SDP screening and determined the finding required a Phase 2 analysis. The Phase 2 analysis determined the finding is of very low safety significance (Green) because adequate mitigation capability was maintained. The cause of this finding was directly related to the supervisory and management oversight cross-cutting aspect in the work practices component of the Human Performance cross-cutting area because plant supervisors failed to ensure an adequate pre-job brief, failed to enforce proper communications methods at the job site, and failed to properly supervise workers executing procedure steps (H.4(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 (Safety Guide 33, November 1972). Section I.1 of Regulatory Guide 1.33, Appendix A, November 1972 (Safety Guide 33, November 1972) states that maintenance that can affect the performance of safety-related equipment should be properly planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. In addition, Section B.10 of Regulatory Guide 1.33, Appendix A, November 1972 (Safety Guide 33, November 1972) states that procedures used in preparation for refueling, refueling equipment operation, and core alterations should be covered by written procedures. Contrary to the above, the licensee failed to

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follow the integrated operations and maintenance procedures which require the operators to swap level transmitters prior to removal of reactor water level piping. The removal of the reference leg piping, prior to swapping level transmitters, resulted in inaccurate Unit 1 reactor water level indication for approximately 40 minutes on February 28, 2010. Because the finding is of very low safety significance and has been entered in the CAP (NCR 383779), and consistent with the NRC Enforcement Policy, this violation is being treated as a non-cited violation, and is designated as NCV 05000325/2010002-01, Failure to Follow Procedures During Reactor Head Disassembly.

(2) Inadequate Risk Evaluation for Removing the 1A South Condenser from Service

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50.65 (a)(4), Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, after Unit 1 experienced a loss of normal reactor feedwater as a result of an abnormal plant configuration during shutdown of the reactor on February 26, 2010. The licensee did not adequately assess the increase in risk that resulted when the 1B reactor feed pump (RFP) was made unavailable while the 1A south condenser was isolated in the hours leading up to the reactor shutdown. This plant configuration led to a high level in the 1A south condenser hotwell soon after the reactor shutdown, which prevented adequate draining of the 1A RFP turbine casing, and led to the loss of the 1A RFP. After the loss of normal feedwater to the reactor, the licensee restored reactor level using the reactor core isolation cooling (RCIC) system. The licensee entered the issue into its corrective action program (AR #383636).

Description: On February 26, 2010, the licensee was preparing to shutdown Unit 1 for a refueling outage. At 4:30 p.m., the licensee shutdown the 1B RFP to expedite maintenance activities on the 1B RFP that were planned during the outage. After shutting down the 1B RFP, licensee personnel noted that the 1B RFP continued to rotate approximately 100 rpm and torqued shut the 1B RFP suction valve. The licensee torqued shut the 1B RFP suction valve because they suspected it was leaking by preventing the 1B RFP from stopping. Torquing shut the suction valve to the 1B RFP rendered the pump immediately unavailable to plant operators. At 5:03 p.m. on February 26, 2010, the licensee isolated the 1A south condenser to aid in identifying the location of a tube leak in the condenser. Isolating the 1A south condenser isolates the cooling water to the condenser and the condensate out of the condenser, resulting in an increased hotwell level in the 1A south condenser.

At 1:16 a.m. on February 27, 2010, operators inserted a manual scram per the normal shutdown procedure. After the scram, reactor water level dropped as expected due to the drop in steam flow from the reactor (shrink). Operators took manual control of the reactor feed system per procedure; however, the automatic response of the reactor level control system prior to taking manual control of the system resulted in reactor water level increasing to the high level setpoint. High reactor water level caused an automatic trip of the 1A RFP. Operators then restarted the 1A RFP, but tripped it again fifteen minutes later due to high turbine casing drain level. The high turbine casing drain level was the result of the 1A south condenser being isolated with the 1A RFP and the condensate booster pump minimum flow inputs still being directed into the 1A south condenser.

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Having no RFPs available to maintain reactor water level, operators started the RCIC system and injected water into the reactor. Maintenance technicians were then dispatched to locally open the 1B RFP suction valve and 41 minutes after starting the RCIC system, the 1B RFP was started and put into service feeding the reactor. While the licensee did assess the risk of removing the 1B RFP from service using the Equipment Out of Service risk assessment tool, the licensee did not properly assess the risk of isolating the 1A south condenser with only the 1A RFP in service.

Analysis: The failure to adequately assess the risk associated with equipment configuration during the Unit 1 shutdown is a performance deficiency. This finding is more than minor because it is associated with the initiating events cornerstone attribute of configuration control and it adversely affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions. Specifically, plant stability was upset by the loss of normal feedwater to the reactor. In accordance with IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process, this finding is of very low safety significance (Green) because the Incremental Core Damage Probability Deficit is <E-6 and the Incremental Large Early Release Probability Deficit is <E-7. The inspectors determined that this finding had a cross-cutting aspect in the area of human performance, work control component, because the licensee did not appropriately plan work activities by incorporating risk insights (H.3(a)). Specifically, activities scheduled prior to the reactor shutdown were not properly evaluated to determine their impact on the normal reactor feedwater system.

Enforcement: 10 CFR Part 50.65 (a)(4) requires that, before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activity. Contrary to the above, on February 26, 2010, the licensee failed to adequately assess the risk associated with isolating the 1A south condenser with only the 1A RFP available. Because this violation is of very low significance (Green) and was entered into the licensee's corrective action program as AR #383636, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy. The violation is designated as NCV 05000325/2010002-02, Inadequate Risk Evaluation for Removing the 1A South Condenser from Service.

## .2 Other Outage Activities

### a. Inspection Scope

The inspectors evaluated outage activities for the Unit 2 maintenance outage, conducted February 3-8, 2010. The inspectors reviewed activities to ensure that the licensee considered risk in developing, planning, and implementing the outage schedule.

The inspectors observed or reviewed the reactor shutdown and cooldown, outage equipment configuration and risk management, electrical lineups, selected clearances, control and monitoring of decay heat removal, control of containment activities, startup and heatup activities, and identification and resolution of problems associated with the outage.



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 the test results for the following five activities to verify the tests met TS surveillance requirements, UFSAR commitments, inservice testing 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 or risk-significant functions.

- 0E&RC-1130, Chemical Addition and Determination of Sodium Pentaborate Solution in Standby Liquid Control Tank for Unit 1 on January 7, 2010
- 0E&RC-1130, Chemical Addition and Determination of Sodium Pentaborate Solution in Standby Liquid Control Tank for Unit 2 on January 7, 2010
- PT-06.1, Standby Liquid Control Operability Test for the Unit 2 pump on January 13, 2010
- PT-06.1, Standby Liquid Control Operability Test for the Unit 1 pump on January 14, 2010
- SMP-CBL-012, Tan Delta Testing of Wetted Cables, for the 1SY feeder cable on March 30, 2010

b. Findings

No findings of significance were identified.

.2 In-Service Testing (IST) Surveillance

a. Inspection Scope

The inspectors reviewed the performance of 0PT-09.7, HPCI System Valve Operability Test on February 25, 2010, to evaluate the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program for determining 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.

b. Findings

No findings of significance were identified.

.3 Containment Isolation Valve Testing

The inspectors reviewed the test results for the following three activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- OPT-20.321, Local Leak Rate Testing for Feedwater System for 1-B21-F010A, feedwater line inlet check valve 'A', on March 3, 2010
- OPT-20.3-B21, Local Leak Rate Testing for Feedwater System for 1-B21-F032A, feedwater supply line 'A' isolation valve and 1-E41-F006, HPCI injection valve, on March 4, 2010
- OPT-20.3, Local Leak Rate Testing for 1-G31-F001, Reactor Water Cleanup Inlet Line Inboard Isolation Valve, on March 14, 2010

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; acceptance criteria were clearly stated and were consistent with the system design basis; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; and test data and results were accurate, complete, within limits, and valid. Inspectors verified that test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable; equipment was returned to a position or status required to support the performance of its safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

## 2. RADIATION SAFETY

Public and Occupational Radiation Safety Cornerstones

## 2RS1 Radiological Hazard Assessment and Exposure Controls

### a. Inspection Scope

Radiological Hazard Assessment and Exposure Controls. The inspectors evaluated licensee performance in assessing radiological hazards and controlling worker access to radiologically significant areas. The inspectors evaluated communications to the workers, contamination and radioactive material control, radiological hazard controls to include work coverage, controls and contingencies for risk significant high radiation and very high radiation areas, radiation worker practices and technician proficiency, and problem identification and resolution.

Radiological Hazard Assessment. During facility tours, the inspectors directly observed postings and physical controls for radiation areas, high radiation areas (HRAs), and potential airborne radioactivity areas established within the radiologically controlled area (RCA) of the reactor building, turbine building, and radioactive waste (radwaste) processing and storage locations. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. Results were compared to current licensee surveys and assessed against established postings and Radiation Work Permit (RWP) controls. Licensee key control and access barrier effectiveness were evaluated for selected Locked High Radiation Area (LHRA) and Very High Radiation Area (VHRA) locations. Changes to procedural guidance for LHRA and VHRA controls were discussed with health physics (HP) supervisors. Controls and their implementation for storage of irradiated material within the spent fuel pool (SFP) were reviewed and discussed. In addition, licensee controls for areas where dose rates could change significantly because of plant shutdown and refueling operations were reviewed and discussed. The licensee's deployment of constant air monitors was reviewed and the airborne radioactivity monitoring program was discussed.

Instructions to Workers. As part of the review, the inspectors reviewed the ALARA packages and RWPs for five major activities. These activities included control rod drive (CRD) change out, detensioning the reactor head, inboard main steam isolation valve (MSIV) repair, In-Service Inspections (ISI) and shielding. The inspectors observed radiation protection (RP) personnel providing entry briefings to workers. Container labeling was reviewed for legibility, currency and clarity in the reactor building, turbine building, radioactive waste processing areas and in the radiologically controlled areas of the yard.

Contamination and Radioactive Material Control. The inspectors observed the routine release of materials and personnel from the RCA. The sensitivity of the instrumentation was discussed with RP personnel. The inspectors reviewed the radioactive source inventory and verified the physical presence of the most radiologically significant sources. The inspectors reviewed a memo documenting the transmittal of database information submitted to the National Source Tracking System per 10 CFR 20.2207.

Radiological Hazards Control and Work Coverage. The inspectors reviewed radiological conditions for consistency with posted surveys, RWPs and worker briefings. The RP

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controls, including surveys, postings, contamination controls and RP job coverage was assessed. During the inspection the inspectors did not identify any work occurring in highly gradient fields that would require either multibadging or relocation of dosimetry, nor was there any work involving airborne radioactivity or internal exposures observed. The inspectors observed job coverage being performed on the refueling floor and the controls for highly activated or contaminated materials stored underwater. The inspectors observed some work activities via closed circuit television. During tours the inspectors routinely checked postings and verified locking on areas with dose rates greater than 1000 mrem/hr at 30 cm from the source.

Risk-Significant High Radiation Areas and Very High Radiation Area Controls. The inspectors discussed the controls for high risk HRAs and VHRAs with the Radiation Protection Manager. The procedures that would be implemented where conditions had changed or were reasonably expected to change resulting in the creation of HRAs, LHRAs or VHRAs were discussed with one of the operational RP Supervisors.

Radiation Workers and Technicians. The inspectors observed radiation worker performance and Technician proficiency during tours of plant areas. The inspectors reviewed corrective action program (CAP) documents identifying radiation worker performance issues and RP technician proficiency. The inspectors reviewed the corrective action documents for determination of reporting threshold, as well as adequacy of resolution of the reported problems. The review included evaluation of 34 electronic dosimeter alarms to determine if the identified events constituted exceeding the performance indicator reporting thresholds.

Radiation protection activities were evaluated against the requirements of UFSAR Section 12; TSs 5.7.1 and 5.7.2; 10 CFR Parts 19 and 20; and approved licensee procedures. Records reviewed are listed in Section RS01 of the Attachment.

Problem Identification and Resolution. Licensee CAP documents associated with access control to radiologically significant areas were reviewed and assessed. This included review of selected Condition Reports (CRs) related to radiation worker and HP technician performance. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with procedure CAP-NGGC-200, Corrective Action Program, Rev. 29. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Licensee CAP documents reviewed are listed in Attachment.

The inspectors completed the one required sample described in Inspection Procedure (IP) 71124.01.

b. Findings

No findings of significance were identified.

## 2RS4 Occupational Dose Assessment

### a. Inspection Scope

The inspectors evaluated current Radiation Protection (RP) program activities and results associated with internal and external radiation exposure monitoring of occupational workers. The review included program guidance, equipment and changes, as applicable; quality assurance activities, results, and responses to identified issues; and individual dose results for occupational workers.

External Dosimetry The inspectors reviewed and discussed RP program guidance for monitoring external and internal radiation exposures of occupational workers. The inspectors verified National Voluntary Laboratory Accreditation Program (NVLAP) certification data and discussed program guidance for storage, processing and results for active and passive personnel dosimeters currently in use. Comparisons between direct reading dosimeter (DRD) and thermoluminescent dosimeter (TLD) data were reviewed and discussed.

Internal Dosimetry Program guidance, instrument detection capabilities, and select results for the internally deposited radionuclides were reviewed in detail. The inspectors reviewed routine termination and follow-up *in vivo* (Whole Body Count) analyses, as well as, *in vitro* bioassays conducted for tritium monitoring for divers in calendar year (CY) 2009. In addition, guidance for collection and conduct of special bioassay sampling were discussed in detail.

Special Dosimetric Situations: The inspectors reviewed monitoring conducted and results for special dosimetric situations. The methodology and results of monitoring occupational workers within non-uniform external dose fields were evaluated. In addition, the adequacy of dosimetry program guidance and its implementation were reviewed for shallow dose assessments and supporting calculations for three separate discrete radioactive particle skin contamination events which occurred during the previous refueling outage. Neutron monitoring conducted for a February 7, 2010, Unit 2 'at power' drywell entry was reviewed and discussed. The inspectors reviewed monitoring conducted, and results for three declared pregnant workers documented in licensee records since January 1, 2008. In addition, proficiency of RP staff involved in conducting skin dose assessments, neutron monitoring, and WBC equipment operations were evaluated through direct interviews, onsite observations, and review and discussions of completed records and supporting data.

Corrective Action Program (CAP) Review The inspectors reviewed and discussed selected Corrective Action Program (CAP) documents associated with occupational dose assessment. The reviewed items included Nuclear Condition Report (NCR), self-assessment, and quality assurance audit documents. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve identified issues in accordance with licensee procedure Corrective Action Program (CAP) CAP-NGGC-0200, Corrective Action Program, Revision (Rev.) 29.

RP program occupational dose assessment guidance and activities were evaluated against the requirements of the Updated Final Safety Analysis Report (UFSAR) Section 12; Technical Specifications (TS) Sections 5.4 and 5.7; 10 Code of Federal Regulations (CFR) Parts 19 and 20; and approved licensee procedures. Records reviewed are listed in Section 2RS4 of the Attachment.

The inspectors completed all specified line-items detailed in Inspection Procedure (IP) 71124.04.

b. Findings

No findings of significance were identified.

2RS5 Radiation Monitoring Instrumentation

a. Inspection Scope

Radiation Monitoring Instrumentation During tours of the reactor buildings, spent fuel pool areas, and radiation control area (RCA) exit point, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARM), continuous air monitors (CAM), personnel contamination monitors (PCM), small article monitors (SAM), portal monitors (PM), and liquid and gaseous effluent monitors. The inspectors observed the physical location of the components, noted the material condition, and compared sensitivity ranges with UFSAR requirements.

In addition to equipment walk-downs, the inspectors observed source checks and alarm setpoint testing of various portable and fixed detection instruments, including ion chambers, telepoles, neutron detectors, PCMs, SAMs, and portal monitors. The inspectors reviewed the last two calibration records for selected ARMs, PCMs, portal monitors, SAMs, and containment high-range ARMs and the most recent calibration record for a whole body counter. Calibration source documentation was reviewed for the ARM high-range calibrator and the Cs-137 source used for portable instrument checks. The inspectors reviewed alarm setpoint values for selected ARMs, PCMs, portal monitors, SAMs, and effluent monitors. Calibration stickers on portable survey instruments were noted during inspection of storage areas for 'ready-to-use' equipment. The most recent 10 CFR Part 61 analysis for dry active waste (DAW) was reviewed to determine if calibration and check sources are representative of the plant source term. The inspectors also reviewed count room quality assurance records for germanium detectors and liquid scintillation detectors.

Operability and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR Part 20; NUREG-0737, Clarification of TMI Action Plan Requirements; TS Section 3; UFSAR Chapters 11 and 12; and applicable licensee procedures. Documents reviewed during the inspection are listed in sections 2RS5 and 2RS6 of the Attachment.

Problem Identification and Resolution The inspectors reviewed selected NCRs in the area of radiological instrumentation. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure CAP-NGGC-0200, Corrective Action Program, Rev. 29. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Documents reviewed are listed in section 2RS5 of the Attachment.

The inspectors completed all specified line-items detailed in IP 71124.05.

b. Findings

No findings of significance were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment

.1 Baseline Inspections

a. Inspection Scope:

Program Reviews: The inspectors evaluated gaseous and liquid effluent treatment system waste storage, processing, and release activities. The evaluation included a review and discussion of procedural guidance and changes to the effluent treatment systems as detailed in the ODCM, UFSAR, and 50.59 screening/review documents issued since January 1, 2008. In addition, Annual Radiological Effluent Release Report (ARERR) documents for calendar year (CY) 2008 and CY 2009 were reviewed for trends in the liquid and gaseous effluent release data reported. Operability issues and program evaluations associated with processing and storage of high conductivity radioactive liquids were discussed in detail with responsible staff. Quality assurance program activities including review of inter-laboratory comparison results and recent audit results and licensee actions were reviewed and discussed.

Equipment Walk downs: The inspectors walked down selected components of the gaseous and liquid discharge systems to ascertain material condition, configuration and alignment. To the extent practical, the inspector observed the material condition of abandoned in place liquid waste processing equipment for indications of degradation or leakage that could constitute a possible release pathway to the environment. The walk downs included material condition and configuration of tanks, piping, valves and liquid waste radiation monitors, a material condition review of a steam jet air ejector sampling skid, U1 wide range gas monitor (WRGM), U2 once through ventilation sampling skid and monitor, and stand-by gas treatment system (SBGT). The inspectors reviewed surveillances for the SBGT and walked down the filter housings to ascertain material condition. The inspectors observed the material condition of portable instrumentation that would give early indication of an unexpected effluent release to include continuous air monitors, and telemetric dose rate instrumentation used for monitoring various rad waste processes.

Effluents: The inspectors reviewed the administrative controls for the release of liquids and gaseous effluents. The inspectors observed routine release permit preparation

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activities including the administrative activities at the control room, flow rate determination, air sampling in the unit 1 turbine building, the subsequent counting and computer data entry and the dose evaluation when a permit was closed. The licensee's 10 CFR 61 analysis was reviewed for expected nuclide distribution from the aspects of quantifying effluents and the treatment of hard to detect nuclides. The inspectors evaluated the effects of changing ventilation alignments on gaseous effluents released from the turbine building (TB).

Ground Water Protection: The licensee's implementation of the Industry Ground Water Protection Initiative was reviewed for consistency with the industry commitments outlined in NEI 07-07. Changes to the ODCM and UFSAR related to surface water evaporation and the potential for groundwater intrusion from the storm drain stabilization pond were reviewed and discussed. This review included review of documentation of onsite monitoring in wells, electrical vaults, manholes, and holding ponds. The review also included discussion with plant personnel about suspected leaks and spills at or below the reporting criteria. The inspectors reviewed the 10 CFR 50.59 (g) records for the period of January 2007 to January 2010. The follow-up to the commitment to establish a ground water protection program is documented in section 40A5.

Effluent treatment and release activities were evaluated against the guidance detailed in NUREG-1302; Regulatory Guide (RG) 1.109, RG 1.21 and RG 4.1; TS Sections 5.5.1, 5.5.4, and 5.5.7; UFSAR Section 11; and 10 CFR Part 20 and Part 50. Documents reviewed are listed in sections 2RS5, 2RS6 and 2RS7 of the Attachment.

The Inspectors completed all line items detailed in IP 71124.06.

b. Findings

No findings of significance were noted.

.2 (Closed) Unresolved Item 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

a. Inspection Scope

Instrumentation and Equipment. The inspectors performed an in-office review and evaluation of documentation provided by the licensee concerning the representativeness of radioactive particulate sampling by the sampling skids used to monitor gaseous effluent releases from the turbine building ventilation system, reactor building vent, and the plant stack. Previously, the inspectors identified one or more tee connections and/or elbows on the inlet side of the particulate sample filter on each of the specified sampling skids during plant walk downs. Because the licensee had no evaluation of the impact of these bends on the transmission of particles through the sampling lines, unresolved item (URI) 05000325,324/2008003-01 was opened.

In an effort to determine the amount of particulate deposition along the sampling lines of the sample skids for the Unit 1 and 2 reactor buildings, the turbine building ventilation,

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and the plant stack, the licensee used the computer code Deposition 2001a (DEPO 2001a), an industry recognized software program for calculating sampling line losses. Each vent was analyzed using standard configurations for input such as ambient temperature, ambient pressure, flow rate, free stream velocity, and particle diameter. The measurements for the reactor building vent sampling lines were obtained from engineering drawings. The licensee selected a particle size of 0.3 microns, as it was believed to be the most predominant particle size. However, no actual particle size studies were performed. The output from the DEPO 2001a code indicated a minimum of 99.9% of the particles were transmitted through the sampling lines.

Although routine testing (i.e. dispersed oil particulate (DOP) testing) of the high-efficiency particulate air (HEPA) filters on each system was not performed, the licensee demonstrated that a particle size of less than 0.3 microns could be supported for effluent streams to the turbine building ventilation system and the plant stack. Specifically, the differential pressure on the turbine building ventilation system HEPA filters and charcoal filter is monitored when the system is in use; filter efficiency is evaluated when the differential pressure falls outside of procedurally defined values. Similarly, gaseous effluents to the plant vent are processed through the Augmented Off-Gas (AOG) system, the purpose of which is to prevent the release of air entrained particulate contaminants to the environment. The system accomplishes this through the use of a 30-minute holdup volume and a HEPA filter. Although not routinely tested at the time of the inspection, a differential pressure test of the AOG HEPA filter for each unit was completed satisfactorily on February 15, 2010. A quarterly surveillance will be performed in the future.

However, the licensee was unable to provide any documentation or other basis to demonstrate representative sampling from the reactor building roof vent.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR 20.1302(a) for failure to ensure surveys of particulate radioactive materials in effluents released to unrestricted areas from the reactor building roof vent were adequate to demonstrate compliance with dose limits for individual members of the public. This issue was initially identified as an unresolved item following an inspection in June 2008. The licensee entered this issue into its corrective action program as AR #292216, and after further review by the inspector, the licensee initiated AR #393340.

Description: During walk-downs and discussions regarding the reactor building vent monitor sampling line operating characteristics, the inspectors identified concerns associated with sample representativeness for particulate radioactive material collected to continuously monitor gaseous effluents in accordance with Offsite Dose Calculation Manual Table 7.3.7-1. Specifically, the inspectors identified tee connections and elbows on the inlet side of the particulate sample filter of the reactor building vent monitor.

Regulatory Guide 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, states that effluent monitoring is required to

demonstrate compliance with technical specifications and/or 10 CFR Part 20 effluents limits. It further states that a sample should be representative of the bulk stream of effluent from which it is taken and that the general principles for obtaining valid samples of airborne radioactive material are contained in ANSI N13.1-1969. ANSI N13.1-1969, Guide to Sampling Airborne Radioactive Material in Nuclear Facilities, specifies that elbows in sampling lines should be avoided and that to estimate the total fractional line loss due to gravitational settling, turbulent flow, and other types of deposition, the depletion of each particle size must be determined.

The licensee used the code DEPO 2001a to calculate the sampling line losses. However, because there is no filtration for the reactor building vent, and because no evaluation was performed to determine the typical particle size distribution in the reactor building, the inspectors concluded that the evaluation was based on an unsupported particle size assumption of 0.3 microns.

Analysis: The failure to ensure that the reactor building roof vent effluents were adequately monitored is a performance deficiency. This finding is more than minor because it is associated with the Public Radiation Safety Cornerstone attribute of Plant Facilities/Equipment and Instrumentation (Process Radiation Monitors) and adversely affects the cornerstone objective. Specifically, the cornerstone objective of providing assurance that adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian reactor operation was affected because the licensee did not ensure that reactor building effluents were accurately monitored. The finding was evaluated using the Public Radiation Safety SDP and determined to be very low safety significance. The finding, which involved the effluent release program, was determined to be of very low safety significance (Green) because it was not a failure to implement the effluent program and did not result in public dose exceeding the 10 CFR 50 Appendix I criterion or 10 CFR 20.1301(e). This finding does not have a cross-cutting aspect because the failure to evaluate the effect of line losses on particulate sampling is a historical issue. (Section 2RS6)

Enforcement: 10 CFR 20.1302(a) requires licensees to make surveys of radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits for individual members of the public. Regulatory Guide 1.21 states that effluent monitoring is required to demonstrate compliance with technical specifications and/or 10 CFR Part 20 effluents limits and that ANSI N13.1-1969 provides general principles for obtaining valid samples of airborne radioactive materials. ANSI N13.1-1969 specifies that elbows in sampling lines should be avoided and that to estimate the fractional line loss the depletion of each particle size must be determined. Contrary to the above, the licensee failed to determine the line loss through the sampling line and elbows as a function of known particle sizes for the reactor building vent monitor skids. Because the failure to determine the line loss fraction was determined to be of very low safety significance and has been entered into the licensee's corrective action program (AR 292216 and AR 393340), this violation is being treated as an NCV, consistent with the NRC Enforcement Policy: NCV 05000325,324/2010002-03, Failure to Ensure Representative Sampling of Particulate Effluents Released from the Reactor Building Roof Vent.

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## 2RS7 Radiological Environmental Monitoring Program (REMP)

### a. Inspection Scope

REMP Implementation The inspectors reviewed and discussed data detailed in the Annual Radiological Environmental Operating Report (AREOR) documents submitted for calendar year (CY) 2007 and CY 2008. ODCM Changes to the ODCM implemented since January 1, 2007, were reviewed and evaluated for their impact on program activities and reported results.

The inspectors observed selected environmental monitoring program sample collection and monitoring activities as specified in the licensee's ODCM. The inspectors observed material condition and verified weekly airborne particulate filter and iodine cartridge sampling equipment flow rates and total volumes for selected atmospheric sampling stations. The location and material condition of select environmental TLDs were verified by direct observation. Land use census results, missed samples, and changes to the ODCM and sample collection/processing activities were discussed with environmental technicians and knowledgeable licensee staff. The inspectors conducted walkdowns and discussed licensee evaluations of selected system structures and components containing licensed material for potential leakage to groundwater, and also reviewed 10 CFR 50.75 files as part of Temporary Instruction 2515/173 as documented in section 40A5 of the report.

The inspectors reviewed calibration and maintenance surveillance records for the installed environmental air sampling stations air flow and totalizer equipment. Inter-laboratory cross-check program results, and changes to current procedural guidance for environmental sample collection and processing were reviewed and discussed. Selected environmental measurements were reviewed for consistency with licensee effluent data and evaluated for radionuclide concentration trends. The inspectors independently verified detection level sensitivity requirements for surface water tritium quantitative radionuclide analyses.

Procedural guidance, program implementation, quantitative analysis sensitivities, and environmental monitoring results were reviewed against 10 CFR Part 20; Appendix I to 10 CFR Part 50; TS Sections 5.5.1, and 5.5.4; ODCM; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; and the Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program - 1979.

Meteorological Monitoring Program The inspectors toured the site meteorological tower location and directly observed local data collection equipment readouts. The inspectors observed the physical condition of the tower and its surrounding environs; and reviewed and discussed equipment operability and maintenance history with responsible licensee staff. The inspectors evaluated transmission of locally generated meteorological data to the main control room operators. For the meteorological measurements of wind speed, wind direction, and temperature, the inspectors reviewed applicable calibration records for tower instrumentation and evaluated measurement data recovery for calendar years 2008 and 2009. In addition, the inspectors discussed licensee actions to confirm the

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accuracy of meteorological data transmission to the licensee's Emergency Offsite Facilities and to the NRC Operations Center.

Licensee procedures and activities related to meteorological monitoring were evaluated against: ODCM; UFSAR; RG 1.23, Meteorological Monitoring Programs For Nuclear Power Plants, and ANSI/ANS-2.5-1984, Standard for Determining Meteorological Information at Nuclear Power Sites. Documents reviewed are listed in Section 2RS7 of the 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. 29. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Documents reviewed are listed in sections 2RS6, 2RS7 and 4OA5 in the Attachment. The inspectors completed all specified line-item samples detailed in IP 71124.07.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

.1 Initiating Events Cornerstone

a. Inspection Scope

To verify the accuracy of the PI data reported to the NRC, the inspectors compared the licensee's basis in reporting each data element listed below to the PI definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, Regulatory Assessment Indicator Guideline.

- Unplanned scrams per 7000 Critical Hours
- Unplanned power changes per 7000 Critical Hours
- Unplanned scrams with complications

The inspectors sampled licensee submittals for the performance indicators listed above for the period from the first quarter 2009 through the fourth quarter 2009. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC inspection reports for the period to validate the accuracy of the submittals.

b. Findings

No findings of significance were identified.

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## .2 Occupational Radiation Safety Cornerstone

### a. Inspection Scope

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from January 2009 to March 2010. For the assessment period, the inspectors reviewed Electronic Dosimeter (ED) alarm logs and selected Nuclear Condition Reports (NCRs) related to controls for exposure significant areas. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in Section RS1 and 4OA1 of the Attachment.

### b. Findings

No findings of significance were identified.

## .3 Public Radiation Safety Cornerstone

### a. Inspection Scope

The inspectors reviewed the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences PI results from January through December 2009. The inspectors reviewed CAP documents, effluent dose data, and licensee procedural guidance for classifying and reporting PI events. The inspectors also interviewed licensee personnel responsible for collecting and reporting the PI data. On February 9, 2010, the inspectors observed sample collection, release permit generation and closeout dose calculations being performed. Reviewed documents are listed in Section 4OA1 of the Attachment.

### b. Findings

No findings of significance were identified.

## 4OA2 Identification and Resolution of Problems

### .1 Routine Review of Items Entered Into the Corrective Action Program

#### a. Inspection Scope

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 corrective action program. The review was accomplished by reviewing daily action request reports.

#### b. Findings

No findings of significance were identified.

#### 4OA3 Follow-up of Events

##### .1 Licensee Declaration of an Unusual Event – February 19, 2010

###### a. Inspection Scope

The inspectors reviewed the plant's response to an inadvertent actuation of the CO<sub>2</sub> fire suppression system in the high pressure coolant injection (HPCI) system room in the Unit 1 reactor building on February 19, 2010. The CO<sub>2</sub> fire suppression system actuation occurred when a plant worker bumped a manual pull station actuator in an adjacent room, which caused the main CO<sub>2</sub> bank to discharge into the HPCI room. Inspectors determined that the CO<sub>2</sub> system actuation did not affect the operability or availability of any risk-significant plant equipment. The licensee entered the issue into its corrective action program (AR #382296).

###### b. Findings

No findings of significance were identified.

##### .2 Licensee Declaration of an Unusual Event – March 26, 2010

###### a. Inspection Scope

The inspectors reviewed the plant's response to a small fire in the Unit 1 turbine building, which resulted in an NRC notification of an unusual event due to the fire lasting for more than 15 minutes. The fire was initiated by a post-weld heat treating blanket, which electrically shorted and caused a small amount of combustible tape to smolder. Unit 1 was shutdown at the time of the fire. Inspectors determined that the fire did not have the potential to affect areas of the plant containing safe-shutdown equipment or upset plant stability while the plant was in mode 5. The licensee entered the issue into its corrective action program (AR #389643).

###### 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

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integral part of the inspectors' normal plant status reviews and inspection activities.

b. Findings

No findings of significance were identified.

.2 (Closed) Temporary Instruction 2515/173 Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative.

a. Inspection Scope

The inspectors reviewed elements of the licensee's environmental monitoring program to evaluate compliance with the voluntary Groundwater Protection Initiative (GPI) as described in Nuclear Energy Institute (NEI) 07-07, Industry Ground Water Protection Initiative – Final Guidance Document, August 2007 (ADAMS Accession Number ML072610036). Inspectors interviewed personnel, performed walk-downs of selected areas, and reviewed the following items:

- Records of the site characterization of geology and hydrology
- Evaluations of systems, structures, and or components that contain or could contain licensed material and evaluations of work practices that involved licensed material for which there is a credible mechanism for the licensed material to reach the groundwater
- Implementation of an onsite groundwater monitoring program to monitor for potential licensed radioactive leakage into groundwater
- Procedures for the decision making process for potential remediation of leaks and spills, including consideration of the long term decommissioning impacts
- Records of leaks and spills recorded, if any, in the licensee's decommissioning files in accordance with 10 CFR 50.75(g)
- Licensee briefings of local and state officials on the licensee's groundwater protection initiative
- Protocols for notification to the local and state officials, and to the NRC regarding detection of leaks and spills
- Protocols and/or procedures for thirty-day reports if an onsite groundwater sample exceeds the criteria in the radiological environmental monitoring program
- Groundwater monitoring results as reported in the annual effluent and/or environmental monitoring report

- Licensee and industry assessments of implementation of the groundwater protection initiative. (Note the NEI audit of GPI implementation was in-progress at the time of the inspection but unavailable for NRC review).

Documents reviewed are listed in sections 2RS6, 2RS7 and 4OA5 in the Attachment.

The inspectors completed all specified line-item samples detailed in Temporary Instruction 2515/173.

b. Findings

No findings of significance were identified with the licensee's implementation of NEI 07-07. This completes the Region II inspection requirements.

4OA6 Meetings, Including Exit

On February 12, 2010, the inspectors discussed preliminary results of the onsite radiation protection inspection (sections 2RS4, 2RS5, 2RS6.1, 2RS7, and 4OA5.2) with Mr. Michael Annacone, Site Vice President, and other responsible staff. The inspectors noted that proprietary information was reviewed during the course of the inspection but would not be included in the documented report.

On March 4, 2010, the inspectors discussed results of the onsite radiation protection inspection (sections 2RS1, 4OA1.2, and 4OA1.3) with Mr. Michael Annacone, and other responsible staff. The inspectors noted that they had not reviewed any proprietary documentation and that documents containing personally identifying information (names and social security numbers) had been redacted and would be destroyed upon completion of the report. The redacted documents were destroyed on March 11, 2010.

On March 5, 2010, the inspectors discussed results of the ISI with licensee management. All proprietary material provided to the inspectors during the inspection was returned to the licensee.

On March 30, 2010, the inspectors presented the inspection results of the resident inspectors' baseline inspections to Mr. Michael Annacone and other responsible staff. The inspectors confirmed that proprietary information was not provided or examined during the inspection period.

On April 6, 2010, the public radiation safety inspectors held a telephone exit to discuss the results of the in-office review of documentation and subsequent closure of URI 05000325, 324/2008003-01 (section 2RS6.2) with Mr. Michael Annacone, and other responsible staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

M. Annacone, Site Vice President  
C. Barnhill, Dosimetry Specialist  
L. Beller, Superintendent, Operations Training  
W. Brewer, Manager – Maintenance  
A. Brittain, Manager – Security  
A. Clay, AREVA NDE Level III  
K. Crocker, Supervisor, Licensing/Regulatory Programs  
B. Davis, Manager – Engineering  
P. Dubrouillet, Supervisor - Operations Support  
L. Grzeck, Lead Engineer - Technical Support  
K. Hirsch, Supervisor Radiation Control (Crystal River)  
S. Howard, Manager – Outage and Scheduling  
R. Ivey, Manager – Nuclear Oversight Services  
J. Johnson, Manager – Environmental and Radiological Controls  
S. Larson, ISI Program  
M. McGowan, Environmental Supervisor  
P. Mentel, Manager - Support Services  
M. Millinor, Environmental Monitoring Specialist  
W. Murray, Licensing Specialist  
J. Piepmeyer, Superintendent Environmental and Chemistry  
A. Pope, Supervisor – Licensing and Regulatory Affairs  
J. Rhodes, Superintendent Radiation Protection (Robinson)  
E. Rochelle, Supervisor - Radiological Controls Supervisor  
T. Sherrill, Engineer - Technical Support  
J. Sullivan, IWE/IWL Programs  
G. Spry, Site Welding/Repair & Replacement  
S. Taylor, Supervisor – Radioactive Waste Shipping  
J. Titrington, Superintendent – Design Engineering  
M. Turkal, Lead Engineer - Technical Support  
J. Vincelli, Superintendent - Environmental and Radiological Controls  
M. Williams, Manager - Training  
S. Williams, Vessel Internals Program  
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

05000325/2010002-01	NCV	Failure to Follow Procedures During Reactor Head Disassembly
05000325/2010002-02	NCV	Inadequate Risk Evaluation for Removing the 1A South Condenser from Service
05000325,324/2010002-03	NCV	Failure to Ensure Representative Sampling of Particulate Effluents Released from the Reactor Building Roof Vent

### Closed

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
05000325, 324/2515/173	TI	Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative

## **LIST OF DOCUMENTS REVIEWED**

### **Section 1R01: Adverse Weather Protection**

0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake  
0A1-68, Brunswick Nuclear Plant Response to Severe Weather Warnings  
0PEP-02.1, Initial Emergency Actions  
0PEP-02.6, Severe Weather  
0O1-01.03, Non-Routine Activities

### **Section 1R04: Equipment Alignment**

1OP-17, Residual Heat Removal System Operating Procedure  
AR 349218, Gas Voids Located in 1A RHR Loop Following Fill and Vent  
AR 349572, 1C RHR SW Booster Pump – Degraded Appearance of Oil in Pump  
AR 351225, Unplanned LCO Entry 1C RHRSW Booster Pump  
AR 357358, 1D RHRSW Pump Seal Leakage  
SD 17, Residual Heat Removal System (RHR)  
Drawing D-25025, sheets 1A and 1B, drawing D-25026, sheets 2A and 2B, Piping Diagram for Unit 1 RHR Loops A and B  
0OP-13.1, Supplemental Spent Fuel Pool Cooling System Operating Procedure  
1OP-13, Fuel Pool Cooling and Cleanup System Operating Procedure  
1OP-21, Reactor Building Closed Cooling Water System Operating Procedure  
1OP-10, Standby Gas Treatment System Operating Procedure

### **Section 1R05: Fire Protection**

0PFP-PBAA, Power Block Auxiliary Areas Prefire Plans SW, RW, AOG, TY, EY  
0PFP-013, General Fire Plan  
2PFP-RB, Reactor Building Prefire Plans Unit 2  
0OP-41, Fire Protection and Well Water System  
0PFP-MBPA, Miscellaneous Buildings Pre-Fire Plans – Protected Area  
0PT-34.11.2.0, Portable Fire Extinguisher Inspection

### **Section 1R06: Flood Protection**

EGR-NGGC-0351, Condition Monitoring of Structures  
EGR-NGGC-0507, Cable Aging Management Program  
EGR-NGGC-0512, License Renewal Aging Management Activities  
EGR-NGGC-0156, Environmental Qualification of Electrical Equipment Important to Safety  
NRC Generic Letter 2007-01, “Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients.”  
NRC Information Notice 2002-012, “Submerged Safety Related Electrical Cables”

### **Section 1R07: Heat Sink Performance**

0ENP-2704, Administrative Control of NRC Generic Letter 89-13 Requirements  
NLS-90-005, CP&L Response to NRC Generic Letter 89-13  
0ENP-2705, Performance Trending of RHR Heat Exchangers

Calculation 0SW-0096, Calculation for Tube Plugging and Fouling of Service Water Safety Related Heat Exchangers

### **Section 1R08: Inservice Inspection Activities**

#### Procedures

OPT-90.1, Vessel Internal Remote Examinations, Revision 35  
 NDEP-0452, Manual Ultrasonic Examination PDI-UT-6 for Reactor Pressure Vessel Welds, Rev. 1  
 NDEP-0456, Manual Ultrasonic Examination – Nozzle Inner Corner Radius Area, ASME XI, App. VIII, Rev. 3

#### Calculations

OPT-90.1, Vessel Internal Remote Examinations, Revision 35  
 BNP-PA-01, UT Indication Sizing Calculation for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/11/2008  
 NDEP-0452, Manual Ultrasonic Examination PDI-UT-6 for Reactor Pressure Vessel Welds, Rev. 1  
 NDEP-0456, Manual Ultrasonic Examination – Nozzle Inner Corner Radius Area, ASME XI, App. VIII, Rev. 3

#### Corrective Action Documents

NCR 383799, Drywell Bolting Exhibits Heavy Rusting, dated 12/15/2010  
 NCR 384175, Initial Structural Evaluation – RHR SW Pinhole Leak, dated 3/2/2010

#### Other

0B11-0036, Jet Pump Thermals Sleeve-to-Riser Elbow Weld Flaw Evaluation, Rev. 3  
 0BNP-TR-013, Basis Document for Reactor Pressure Vessel & Internals, Revision 3  
 AREVA Certificate of Personnel Qualification (Clay), dated September 18, 2009  
 AREVA Certificate of Vision Examination (Clay), dated August 24, 2009  
 AREVA Sensitivity, Resolution & Contrast Log – B118R1, dated 3-10-2010  
 AREVA Visual Inspection of RPV Interior Surfaces – B118R1, dated 3-10-2010  
 BNP-PA-01, UT Exam Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/11/2008  
 Performance Demonstration Initiative Program Certification, PDI-UT-6 (Smith), dated 10-Jun-04  
 Performance Demonstration Initiative Program Certification, PDI-UT-6 (Blecha), dated 10-Jun-04  
 PQR 193A, Procedure Qualification Record, Rev. 2  
 PQR 193B, Procedure Qualification Record, Rev. 2  
 PQR 193C, Procedure Qualification Record, Rev. 0  
 PQR 193D, Procedure Qualification Record, Rev. 0  
 Sonic Systems International Certificate of Qualification (Blecha), dated 12-4-09  
 Sonic Systems International Visual Acuity Record (Blecha), dated 6/17/2009  
 UT-08-093, UT Calibration/Examination Report for 1E1144-15-SWA Elbow-to-Pipe Weld, dated 4/9/2008  
 UT-08-094, UT Calibration/Examination Report for 1E1144-15-SWA Elbow-to-Pipe Weld, dated 4/9/2008  
 UT-08-112, UT Calibration/Examination Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe

End Weld, dated 4/4/2008  
 UT-08-113, UT Calibration/Examination Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/4/2008  
 UT-08-114, UT Calibration/Examination Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/4/2008  
 UT-08-115, UT Calibration/Examination Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/4/2008  
 UT-08-116, UT Calibration/Examination Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/4/2008  
 UT-10-031, UT Calibration/Examination Report for 1B11-RPV-N6A Nozzle-to-Vessel Weld, dated 3/17/2010  
 UT-10-032, UT Calibration/Examination Report for 1B11-RPV-N7 Nozzle-to-Vessel Weld, dated 3/17/2010  
 UT-10-033, UT Calibration/Examination Report for 1B11-RPV-N6B Nozzle-to-Vessel Weld, dated 3/17/2010  
 VEN-08-067, UT Exam Report for 1B11N9-RPV-FW1CRD274 Nozzle-to-Safe End Weld, dated 4/11/2008  
 W-08-13, Relevant Indication Notification Form for "G" Riser, dated April 2<sup>nd</sup>, 2008  
 W-08-14, Relevant Indication Notification Form for "K" Riser, dated April 2<sup>nd</sup>, 2008  
 W-08-17, Relevant Indication Notification Form for "D" Riser, dated March 31<sup>st</sup>, 2008  
 W-08-21, Relevant Indication Notification Form for "F" Riser, dated April 5<sup>th</sup>, 2008  
 W-08-22, Relevant Indication Notification Form for "A" Riser, dated April 6<sup>th</sup>, 2008  
 Wesdyne International Certificate of Qualification (Smith), dated 12-18-09  
 Wesdyne International Visual Acuity Record (Smith), dated 2/11/10  
 WO 01429662-03, Pre-Fabrication of Vent Piping, dated 10/22/09  
 WPS 01 2 02, Weld Procedure Specification – Manual GTAW, Rev. 1

### **Section 1R11: Licensed Operator Regualification**

OTPP, Licensed Operator Continuing Training Program  
 1EOP-01-LPC, Level/Power Control  
 OPEP-2.1.1, Emergency Control – Notification of Unusual Event, Alert, Site Area Emergency, or General Emergency  
 OPEP-02.1, Initial Emergency Actions

### **Section 1R12: Maintenance Effectiveness**

ADM-NGGC-0101, Maintenance Rule Program  
 NUMARC 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants  
 ADM-NGGC-0203, Preventive Maintenance and Surveillance Testing Administration  
 EGR-NGGC-0351, Condition Monitoring of Structures  
 ADM-NGGC-0203, Preventive Maintenance and Surveillance test Administration  
 0AP-022, BNP Outage Risk Management

### **Section 1R13: Maintenance Risk Assessment and Emergent Work Control**

0AP-022, BNP Outage Risk Management

ADM-NGCC-0104, Work Management Process  
 0AI-144, Risk Management  
 ADM-NGGC-0006, Online EOOS Model

### **Section 1R15: Operability Evaluations**

OPS-NGGC-1305, Operability Determinations  
 OPS-NGGC-1307, Operational Decision making

### **Section 1R18: Plant Modifications**

EGR-NGGC-0005, Engineering Change  
 EGR-NGGC-0011, Engineering Product Quality

### **Section 1R19: Post Maintenance Testing**

0PLP-20, Post Maintenance Testing Program

### **Section 1R20: Outage Activities**

1OP17, Residual Heat Removal System Operating Procedure  
 0GP-01, Prestartup Checklist  
 0GP-02, Approach to Criticality and Pressurization of the Reactor  
 0GP-03, Unit Startup and Synchronization  
 0GP-12, Power Changes  
 0SMP-RPV502, Reactor Vessel Reassembly

### **Section 2RS1: Radiological Hazard Assessment and Exposure Controls**

#### Procedures, Guidance Documents, and Manuals

0E&RC-0020, Radiological Pre-Job Briefing, Rev. 8  
 0E&RC-0040, Administrative Controls For High Radiation Areas, Locked High Radiation Areas,  
 And Very High Radiation Areas, Rev. 31  
 0E&RC-0100, Radiation Surveys Methods, Rev. 33  
 0E&RC-0111, Survey Methods For Removable Surface Contamination, Rev. 32  
 0E&RC-0112, Hot Particle Control, Rev. 4  
 0E&RC-0117, Control Of Work In The Hot Machine Shop, Rev. 1  
 0E&RC-0120, Routine/Special Airborne Radioactivity Survey, Rev. 23  
 0E&RC-0145, Response To The AOG Building Airborne Radiation Monitor Alarm  
 0E&RC-0175, Radiological Controls For Diving Operations, Rev. 5  
 0E&RC-0241, Health Physics Coverage In The Drywells During Fuel And Irradiated Component  
 Movement, Rev. 14  
 0E&RC-0261, Drywell Entry, Rev. 24  
 0E&RC-0290, Control Of Brunswick Nuclear Plant Radiography Activities, Rev. 12  
 0E&RC-0293, Storage Of Radioactive Materials At BNP, Rev. 2  
 0E&RC-0495, Failed Fuel Response, Rev. 0  
 0E&RC-4100, ALARA Program, Rev. 11  
 0E&RC-4101, ALARA Review Of Plant Modifications And Ec, Rev. 3

0E&RC-4102, ALARA Review Of Plant Procedures, Rev. 2  
 0E&RC-4104, ALARA And Radwaste Reduction Suggestions, Rev. 5  
 ADM-NGGC-0104, Work Management Process, Rev. 35  
 ADM-NGGC-0105, ALARA Planning, Rev. 8  
 HPS-NGGC-0003, Radiological Posting, Labeling And Surveys, Rev. 15  
 HPS-NGGC-0009, Operation Of Radiation/Contamination Survey Istruments/Equipment, Rev. 6  
 HPS-NGGC-0013, Personnel Contamination Monitoring, Decontamination, And Reporting  
 HPS-NGGC-0014, Radiation Work Permits, Rev. 6

#### Records and Data

Reviewed 34 DRD Alarm Evaluations  
 ALARA Work Plan, 09-015, B118R1 Integrated Inspections  
 RWP 4952 01 Task 01635527 01 01, HRA ISI Inspections  
 RWP 4953 00 Task 01635527 07 01, LHRA ISI Inspections  
 RWP 4956 00 Task 01635527 13 01, LHRA ISI Inspections  
 RWP 4908 01 Task 01635527 21 01, ISI Eddy Current (Includes Maintenance Support)  
 RWP 4982 00 Task 01635527 27 01, DW-ISI Inspection (Includes Maintenance Support)  
 RWP 4996 00 Task 01635527 42 01, DW- ISI Inspections Requiring Multibadging  
 ALARA Work Plan, 09-018, B118R1 Shielding  
 RWP 4915 Task 1635548 01 01, LHRA Temporary Shielding Activities  
 RWP 4916 Task 1635548 03 01, HRA Temporary Shielding Activities  
 RWP 4927 Task 1635548 05 01, HRA Temporary Shielding Activities  
 RWP 4969 Task 1635548 07 01, DW/ Cavity- Shielding – Install / Remove  
 ALARA Work Plan, 09-017, B118R1 CRDM Exchange Project  
 RWP 4912 00 Task 1635570 01 01, RB-CRD Support /HP Support (Excludes Tent Work)  
 RWP 4913 00 Task 1635570 03 01, RB-CRD Activities (Tent Support) (Includes HP)  
 RWP 4914 00 Task 1635570 04 01, RB-CRD Management Support in Clean Areas  
 RWP 4938 00 Task 1635570 05 01, CRD-Setup /Demobe/ Decon- No Drywell  
 RWP 4939 00 Task 1635570 06 01, CRD-Activities Requiring Multibadging- No Drywell  
 RWP 4980 00 Task 1635570 07 01, DW-CRD Exchange- Support / Setup  
 RWP 4981 01 Task 1635570 12 01, DW-CRD Exchanges (Multibadging Activities)  
 ALARA Work Plan 09-036, Refuel Floor Activities  
 RWP 4933 00 Task 1635662 03 01, RX Vessel Disass / Reass- Cavity (ED setpoints:  
 500/150/500)  
 RWP 4934 00 Task 1635662 07 01, U/1 117' -Removal of Highly-Contaminated Equipment  
 from Water.  
 RWP 4935 00 Task 1635662 08 01, Refuel Floor Activities- No Cavity Work(ED  
 Setpoints:300/75/150)  
 RWP 4936 00 Task 1635662 18 01, Refuel Floor Decon Support-Cavity (ED  
 Setpoints:500/150/500)  
 RWP 4959 00 Task 1635662 20 01, DW LPRM String Replacement  
 RWP 4920 00 Task 1635662 01 01, Refuel Floor Activities (ED Setpoints 50/30/10)[Crane  
 Operator]

#### CAP Documents

NCR 00322575 BRAC Survey Results Not as Expected.  
 NCR 00323732 Worker Received a Dose Rate Alarm in the U2 SJAE Room  
 NCR 00323877 Workers did not check in with HP Control Point.

NCR 00324977 Individuals went from one work area to another and did not change RWPs and both received dose rate alarms.  
 NCR 00330249 Worker entered an area posted as a high radiation area on an RWP that did not allow entry into a high radiation area  
 NCR 00361079 LHRA Master Keys  
 NCR 00384048 5 workers signed in on the low risk RWP instead of the moderate risk RWP and received dose alarms.  
 NCR 00366972 Out of tolerance /calibration survey instrument  
 NCR 00323769 Individual received dose alarm  
 NCR 00323531 Work group not using the correct RWP making dose tracking difficult  
 NCR 00321770 OAOP-05 Radioactive Spills, High Radiation and Airborne Activity  
 NCR 00328712 OREX Radioactive Material Bags Improperly Stored.

#### **Section 2RS4: Occupational Dose**

##### Procedures, Guidance Documents and Manuals

Nuclear Generating Group Standard Procedure (DOS-NGGC-0007) Internal Dose Calculations, Revision (Rev. II)  
 DOS-NGGC-0007, In Vitro Bioassay, Rev. 9  
 HPS-NGGC-0016, Access Control, Rev. 5  
 OE&RC-0175, Radiological Controls for Diving Operations, Rev. 5

##### Records and Data Reviewed

National Voluntary Laboratory Accreditation Program (NVLAP), Scope of Accreditation to ISO/IEC 17025:2005, 2009-10-01 through 2010-09-30, Progress Energy of Carolinas, Inc., Harris Energy and Environmental Center:  
 NAVLAP Proficiency Testing Report, 2<sup>nd</sup> Quarter 2009  
 Dosimeter Irradiation Report, September 8-29, 2009  
 Skin Dose from Contamination Evaluation conducted 3/15/2009, NCR 324427,  
 Skin Dose from Contamination Evaluation conducted 4/08/2009, NCR 325195,  
 Skin Dose from Contamination Evaluation conducted 4/13/2009, NCR 324427,  
 BNP Radiological Survey No. 020719-014, 02/07/2010  
 Declared Pregnant Worker Dose Evaluations: January 1, 2008, January 31, 2009  
 Diving Operation Intake Assessments, March – April 2008  
 Estimated Neutron Dose Assessment for RWP 5399-19-01, 02/07/10  
 Radiological Survey Number 020710-014, U2 17 Foot Drywell Floor Level, 2/7/2010  
 BSEP ICRP-30 Ingestion Nuclide Library, 31 August 2009  
 BSEP ICRP-30 Inhalation Nuclide Library, 31 August 2009

##### Corrective Action Program

Nuclear Condition Report Number (NCR) 00271689, Lost Electronic Dosimeter, 03/23/08  
 NCR 00270771, RP Technician without Hearing Assisted ED Device, 03/17/08  
 NCR 00290919, GEDDS Not Updating in Radwaste Control Room, 08/09/08  
 NCR 00326882, Damaged EPDS, 03/23/09  
 NCR 00354185, Missing DRDs, 09/08/09  
 NCR 00364445, Missing DRDs, 11/05/09  
 NCR 00371719, Missing DRDs, 12/18/09



## **Section 2RS5: Radiation Monitoring Instrumentation**

### Procedures and Guidance Documents

0E&RC-0115, Use and Calibration of the Small Article Monitors, Rev. 17  
 0E&RC-0344, Calibration and Use of Canberra Personnel Monitors, Rev. 13  
 HPS-NGGC-0009, Operation of Radiation/Contamination Survey Instruments/Equipment  
 OPT-01.14b, Equipment and Instrument Channel Checks, Rev. 47  
 OPT-04.2.4, Hardened Wetwell Vent Radiation Monitor Channel Functional Test, Rev. 6  
 SD-11.0, Process and Radiation Monitoring System, Rev. 6  
 SD-11.1, Area Radiation Monitoring System, Rev. 4  
 1APP-UA-25, Annunciator Procedure for Panel UA-25, Rev. 51  
 OPEP-03.4.7, Automation of Off-site Dose Projection Procedures, Rev. 20  
 EMG-NGGC-0002, Off-site Dose Assessment, Rev. 0  
 CAP-NGGC-0200, Corrective Action Program, Rev. 29

### Records

WO 00702778-04, General Atomic Stack Rad Monitor Channel Cal, 11/15/06  
 WO 01019051-04, General Atomic Stack Radiation monitor Channel Calibration, 5/5/09  
 WO 01509680-01, Main Stack Effluent Flow Rate Monitoring System Functional Test, 1/7/10  
 WO 01460395-01, Main Stack Effluent Flow Rate Monitoring System Functional Test, 10/22/09  
 WO 00862433, U1 Reactor Building Roof Vent Radiation Monitor Channel Calibration, 5/29/06  
 WO 01007787-02, U1 Reactor Building Roof Vent Radiation Monitor Channel Cal., 9/20/08  
 WO 00762088-01, U2 Post-accident Drywell High Range Radiation Monitor Calibration, 4/1/07  
 WO 01126339-01, U2 Post-accident Drywell High Range Radiation Monitor Calibration, 4/12/09  
 WO 00554814-01, Radwaste Liquid Effluent Radiation Monitor Calibration, 2/24/06  
 WO 00854961-01, Radwaste Liquid Effluent Radiation Monitor Calibration, 2/6/08  
 WO 00520194-01, 1B Core Spray ARM Calibration, 7/31/06  
 WO 01291455-01, 1B Core Spray ARM Calibration, 8/4/09  
 WO 01095481-02, Control Room ARM and U1 Feedwater Heater Bay ARM Calibration, 7/6/09  
 WO 00738456-02, Control Room ARM and U1 Feedwater Heater Bay ARM Cal., 7/19/07,  
 WO 00968013-01, U1 Spent Fuel Pool Cooling ARM Calibration, 7/23/08  
 WO 00329829-01, U1 Spent Fuel Pool Cooling ARM Calibration, 6/17/04  
 WO 00347197-01, 2B RHR HX Pump Room and U2 Rx Building Airlock, 5/5/05 and 5/4/05  
 WO 00985728-01, 2B RHR HX Pump Room and U2 Rx Building Airlock, 6/4/08  
 Whole Body Counter Calibration Record, 9/1/09  
 GEM-5 Serial No. 0808-142, Calibration Records, 10/9/08 and 9/19/09  
 ARGOS Serial No. 0808-071, Calibration Records, 10/5/08 and 9/11/09  
 SAM Serial No. 3, Calibration Records, 6/30/08 and 6/1/09  
 SAM Serial No. 106, Calibration Records, 3/8/08 and 2/21/09  
 Model 878-10 High Range Calibrator, Serial No. 116, Certificate of Compliance, 1/14/05  
 Countroom QA/QC Daily Check Records, 1<sup>st</sup> Quarter 2009 and Year-to-Date 2010  
 High-purity Germanium Detector No. 1 Efficiency Calibration Records, 10/21/06 and 9/4/09  
 High-purity Germanium Detector No. 2 Efficiency Calibration Records, 8/21/08 and 8/31/09  
 10 CFR Part 61 Analysis, Dry Active Waste, 9/17/08

### Corrective Action Program Documents

B-RP-09-01, Assessment of Radiation Protection  
 NCR 00375969, Augmented Off-gas Air Monitor does not currently have any calibration

procedures  
 NCR 00380821, ARGOS #4 failed daily source check  
 NCR 00320743, U2 reactor building effluent flow totalizer failed and was replaced  
 NCR 00363887, System 7015 goal monitoring for drywell high range ARM not met

## **Section 2RS6: Radioactive Gases and Liquid Effluent Treatment**

### Procedures, Guidance Documents, and Manuals

Regulatory Procedure – Nuclear Generating Group Corporate (REG-NGGC)-0010, 10 CFR 50.59 and Selected Regulatory Reviews, Rev. 12  
 Brunswick Steam Electric Plant Off-Site Dose Calculation Manual (ODCM), Rev. 33  
 Brunswick Steam Electric Plant Update Final Safety Assessment Report, Chapters 2.2-2.5, 11, and 12  
 Brunswick Nuclear Plant (BNP) Health Physics Programs Technical Report, Radiological Analysis, Radioactive Material in Locations Outside the Power Block, Rev. 1  
 BNP Process Control Program (PCP), Rev. 5  
 Liquid Waste Inventory Reduction Plan, 9/8/2009  
 Unit 0, Administrative Instruction (0AI) – 132, Oil and Liquid Waste Management Program, Revision (Rev.) 10  
 Unit 0, Environmental and Radiation Control Procedure (0E&RC) – 0293, Storage of Radioactive Materials at BNP, Rev. 2  
 0E&RC-1091, Waste Water Processing, Rev. 0  
 0E&RC-1230, Tritium Analysis of Liquids, Rev. 12  
 0E&RC-1231, Sampling and Analysis for Tritiated Water in Airborne Effluents, Rev. 24  
 0E&RC-1240, Analysis for Gross Alpha Activity, Rev. 7  
 0E&RC-1705, Verification of Analytical Performance for Nuclear Counting Instrumentation, Rev. 2  
 0E&RC-1706, Sampling Of the Once Through Ventilation System, Rev. 8  
 0E&RC-1091, Waste Water Processing, Rev. 0  
 0E&RC-2002, Sampling Of Radioactive Airborne Effluent Releases, Rev. 40  
 0E&RC-2003, Reporting Of Radioactive Airborne Effluent Releases, Rev. 29  
 0E&RC-2009, Radioactive Liquid Effluent Releases and Reports, Rev. 23  
 0E&RC-2011, Service Water Release Sampling and Analysis, Rev. 10  
 0E&RC-2020, Set-point Determinations for Gaseous Radiation Monitors, Rev. 25  
 0E&RC-2021, Service Water Effluent Radiation Monitor Setpoints Determination, Rev. 16  
 BSEP 08-0059, Radioactive Effluent Release Report for 2007, 4/29/2008  
 BSEP 09-0045, Radioactive Effluent Release Report for 2008, 4/27/2009  
 Offsite Dose Calculation Manual, Rev. 32  
 1OP-37.3, Turbine Building Heating and Ventilation System Operating Procedure, Rev. 41  
 2OP-37.3, Turbine Building Heating and Ventilation System Operating Procedure, Rev. 68

### Records and Data Reviewed

Brunswick Steam Electric Plant Off-Site Dose Calculation Manual (ODCM), Rev. 32  
 Stand By Gas Treatment Test Results since 1/1/2007. Performed 1/31/07, 2/21/07, 4/23/07, 12/12/07, 1/2/08, 2/5/08, 12/18/08, 1/14/09

UFSAR Change Request LDCR 08FSAR-012, Correcting terms and descriptions in the description of the site with regard to hydrology and geology to reflect recent hydro-geological

studies (NCR 268357), 7/20/2009  
 BSEP 07-0068, Voluntary Report of tritium in onsite water samples, 7/12/2007  
 BSEP 08-0043, Voluntary Report of tritium in onsite water samples, 4/3/2008  
 Consultant Groundwater Investigation Report for Storm Drain Stabilization Pond, 3/10/2008  
 Consultant Site-wide Groundwater Assessment Report, 5/2009  
 Consultant Groundwater Assessment Report for Protected Area, 10/2009  
 Laboratory Analytical Crosscheck Program Results for 2007, 2008 and 2009.  
 Liquid and Gaseous radiation monitor out-of-service data for calendar years 2007, 2008 and 2009  
 Screening Document No. 00355490, New 0E&RC-1091, September 2009  
 Work Request 419459, AOG HEPA filter Dp, 2/15/10

#### CAP Documents

Various condition reports documented per 10 CFR50.75 (g)  
 Audit B-EC-07-01, BNP Environmental & Chemistry Assessment  
 Audit B-EC-09-01, Assessment of Environmental and Chemistry, Rev. 1  
 NCR 00342593, Management and disposal of liquid wastes  
 CR 292216, Representativeness of radioactive particulate sampling by the sampling skids used to monitor gaseous effluent releases

#### **Section 2RS7: Radiological Environmental Monitoring Program (REMP)**

##### Procedures and Guidance Documents

Offsite Dose Calculation Manual, Rev. 33  
 Unit 0, Environmental & Radiation Control Procedure (0E&RC) - 1301, Radiological Environmental Monitoring Program, Rev. 29  
 0E&RC - 1307, Calibration and Use of Environmental Air Samplers, Rev. 7  
 Plant Operating Manual Preventative Maintenance (OPM)-MET001, Meteorology Tower Equipment Calibration and Functional Test, Rev. 2

##### Records and Data Reviewed

Annual Radiological Environmental Operating Report 2008, 5/13/2009  
 Annual Radiological Environmental Operating Report 2007, 5/13/2008  
 ODCM Changes Rev. 30, Rev. 31, and Rev. 33  
 Annual X/Q Comparison to ODCM Values for the Brunswick Plant, Vendor Letter dated 01/28/2010 to Paul Snead Environmental Coordinator, Progress Energy  
 Meteorological Data Recovery Statistics for the Calendar Year (CY) 2009, 01/15/2010  
 Meteorological Data Recovery Statistics for the Period Ending December 31, 2008, 01/26/2009,  
 Air Sampler Workbook Sheets, and associated Environmental Air Sampler Dry Gas Calibration Forms, January 1, 2008, through and February 8, 2010  
 Meteorological Data Recovery Summary,  
 LDCR O8FSAR-012, Updated Final Safety Analysis Report Change Request, NCR 268357, July 2009  
 Work Order Package (WO) 01481778-01, -02, -03, -04, Perform OPM-MET001 on the Met Tower, Completed 12/17/2009  
 WO 01394276-01, -02, -03, -04, Perform OPM-MET001 on the Met Tower, Completed 06/18/2009  
 WO 01298511-01, -02, -03, -04, Perform OPM-MET001 on the Met Tower, Completed

01/26/2009  
 WO 01115664-01, -02, -03, -04, Perform OPM-MET001 on the Met Tower, Completed  
 07/28/2008  
 WO 0132055-01, -02, -03, -04, Perform OPM-MET001 on the Met Tower, Completed  
 02/11/2008  
 Harris Energy & Environmental Center (HE&EC) Cross Check Program Results: Calendar Year  
 2009, 1<sup>st</sup> through 3<sup>rd</sup> quarter data  
 HE&EC Cross Check Program Results: Calendar Year 2008, 1<sup>st</sup> through 4<sup>th</sup> quarter data

#### CAP Documents

B-EC-07-01, Brunswick Nuclear Plant (BNP) Environmental and Chemistry Assessment,  
 07/12/2007  
 B-EC-09-01, Assessment of environmental and Chemistry, BNP, 11/18/2009  
 N-PR-09-02, Corporate Nuclear Oversight (NOS) – 2009-018, H&EC Labs Assessment,  
 7/16/2009  
 NCR 303063, Environmental water sample radionuclide concentration accuracy  
 NCR 319178, Environmental vegetation sample location BL-803 sampled on 2/2/09 indicated  
 Cobalt 60 (Co-60) results, re-sample did not indicate any detectable Co-60  
 NCR 335566, Emergency Response Facility Information System computers could not connect  
 to the MET tower Zeno device  
 NCR 341246. Review Harris Energy and Environmental Center laboratory procedures against  
 industry best practices and company standards

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

##### Procedures

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

##### Audits and Corrective Action Documents

Audit B-EC-07-01, BNP Environmental & Chemistry Assessment  
 Audit B-EC-09-01, Assessment of Environmental and Chemistry, Rev. 1  
 NCR 00342593, Management and disposal of liquid wastes  
 34 DRD Alarm Evaluations  
 NCR 00323732 Worker Received a Dose Rate Alarm in the U2 SJAE Room  
 NCR 00323877 Workers did not Check in with HP Control Point.  
 NCR 00324977 Individuals went from one work area to another and did not change RWPs and  
 both received dose rate alarms.  
 NCR 00330249 Worker entered an area posted as a high radiation area on an RWP that did  
 not allow entry into a high radiation area  
 NCR 00323769 Individual received dose alarm

#### **Section 40A3: Event Followup**

1EOP-01-RSP, Reactor Scram Procedure  
 1OP-29, Circulating Water System Operating Procedure  
 1OP-32, Condensate and Feedwater System Operating Procedure  
 0GP-05, Unit Shutdown Procedure  
 Offsite Dose Calculation Manual, Ver. 33

Unit 0, Administrative Procedure (OAP)-040, Site Groundwater Protection Program, Rev. 1  
Unit 0 Regulatory Compliance Instruction (ORCI)-06.1, Reportable Event Evaluation Criteria and  
Processing, Rev. 25  
OE&RC-3250, Groundwater Monitoring Program, Rev. 31  
OE&RC-3291, Storm Drain Stabilization Pond, Rev. 16