



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

July 22, 2005

Carolina Power and Light Company  
ATTN: Mr. C. J. Gannon  
Vice President  
Brunswick Steam Electric Plant  
P. O. Box 10429  
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - INSPECTION REPORT  
05000325/2005008 AND 05000324/2005008

Dear Mr. Gannon:

On June 24, 2005, the NRC completed an inspection regarding the application for license renewal for your Brunswick facility. The enclosed report documents the inspection results, which were discussed on June 24, 2005, with members of your staff in an exit meeting open for public observation at the Progress Energy Media Center, 8520 River Road SE, Southport, NC 28461.

The purpose of this inspection was an examination of activities that support the application for a renewed license for the Brunswick facility. The inspection consisted of a selected examination of procedures and representative records, and interviews with personnel regarding implementation of your aging management programs to support license renewal. For a sample of plant systems, inspectors performed visual examination of accessible portions of the systems to observe any effects of equipment aging.

The inspection concluded that your license renewal activities were generally conducted as described in your License Renewal Application. The inspection also concluded that existing programs to be credited as aging management programs (AMPs) for license renewal are generally functioning well and that an implementation plan had been established in the plant Action Request system to track the committed future actions for license renewal to ensure completion. In walking down plant systems and examining plant equipment the inspectors found no significant adverse conditions and it appears plant equipment was being maintained adequately.

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

Should you have any questions concerning this meeting, please contact Caudle A. Julian at (404) 562-4603.

Sincerely,

*/RA/*

Victor M. McCree, Director  
Division of Reactor Safety

Docket Nos.: 50-325, 50-324  
License Nos.: DPR-71, DPR-62

Enclosure: Inspection Report 05000325/2005008 and 05000324/2005008  
W/Attachment: Supplemental Information

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(cc w/encl cont'd - See next page)

cc w/encl cont'd

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-325, 50-324

License Nos.: DPR-71, DPR-62

Report Nos.: 05000325/2005008 and 05000324/2005008

Licensee: Carolina Power and Light Company

Facility: Brunswick Steam Electric Plant

Location: 8520 River Road SE  
Southport, NC 28461

Dates: June 6 - 24, 2005

Inspectors: C. Julian, Team Leader  
R. Moore, Senior Reactor Inspector  
T. Nazario, Reactor Inspector  
M. Scott, Senior Reactor Inspector  
K. VanDoorn, Senior Reactor Inspector

Approved by: Victor M. McCree, Director  
Division of Reactor Safety

Enclosure

## **INSPECTION SUMMARY**

IR 05000325/2005-008,05000324/2005-008; 6/6-24/2005; Brunswick Steam Electric Plant; License Renewal Inspection Program, Aging Management Programs.

This inspection of License Renewal (LR) activities was performed by five regional office engineering inspectors. The inspection program followed was NRC Manual Chapter 2516 and NRC Inspection Procedure 71002. This inspection did not identify any "findings" as defined in NRC Manual Chapter 0612.

The inspection concluded that LR activities were conducted as described in the License Renewal Application (LRA). The inspection also concluded that existing programs to be credited as aging management programs (AMPs) for license renewal are generally functioning well.

The applicant had established an implementation plan in the plant Action Request system to track the committed future actions for license renewal to ensure they are completed. The inspectors found a few examples where actions committed in AMP description documents were not yet included in the implementation plan. The applicant made the needed correction along with including several enhancements pointed out by the inspectors.

In walking down plant systems and examining plant equipment the inspectors found no significant adverse conditions and it appears plant equipment was being maintained adequately.

Attachment 1 to this report contains a partial list of persons contacted and a list of documents reviewed. The Aging Management Programs selected for review during this inspection are listed in Attachment 2 to this report. Attachment 3 is a list of acronyms used in this report.

## Report Details

### I. Inspection Scope

This inspection was conducted by NRC Region II inspectors to interview applicant personnel and to examine a sample of documentation which supports the license renewal application (LRA). This inspection reviewed the implementation of the applicant's Aging Management Programs (AMPs). The inspectors reviewed supporting documentation to confirm the accuracy of the LRA conclusions. For a sample of plant systems, inspectors performed visual examination of accessible portions of the systems to observe any effects of equipment aging. Attachment 1 of this report lists the applicant personnel contacted and the documents reviewed. The Aging Management Programs selected for review during this inspection are listed in Attachment 2 to this report. A list of acronyms used in this report is provided in Attachment 3.

### II. Findings

#### A. Visual Observation of Plant Equipment

During this inspection, the inspectors performed walkdown inspections of portions of plant systems, structures, and components (SSCs) to determine their current condition and to observe any effects of equipment aging. Overall the material condition at Brunswick was good and no significant aging management issues were identified. The following SSCs were observed:

- High Pressure Coolant Injection
- Reactor Core Isolation Cooling
- Core Spray
- Reactor Building Closed Cooling Water
- Diesel Generators and buildings
- Various Cranes in the scope of LR
- Spent Fuel Pool
- Torus area
- Fire pumps
- Reactor Building and drywell
- Service Water Intake Structure
- RHR service water
- Electrical Transformer Area
- Switchyard

Additionally, as part of the NRC's normal inspection program of the applicant's inservice inspection activities during outages NRC inspectors examined the interior of the unit 2 drywell for signs of aging. The inspectors noted two conditions of aging; RBCCW piping with extensive external rust and drywell liner bulging near a personnel airlock penetration caused, in part, by corrosion on the inner surface of the plate. The applicant had previously identified these issues during earlier outages and entered these issues into the corrective action program as Action Requests (ARs) 155239 for RBCCW and 153060 for the penetration problem and was appropriately inspecting and trending the

conditions. The inspectors reviewed the applicant's inspection results for each of these aging issues and concluded that the applicant was appropriately managing the aging.

The inspectors reviewed the applicant's screening and scoping analysis for the following non-safety related systems located in proximity to safety related systems to assess the implementation of 10 CFR 54.4(a)(2):

Heat Tracing System  
Moisture Separator Reheater Drain System & Reheat Steam System  
Heater Drains & Miscellaneous Vents and Drains

The review included the applicant's calculation that assessed the system and component applicability to 10 CFR 54.4(a)(2), applicable plant drawings, and visual examination of the in-plant configuration. The inspectors concluded that the applicant had appropriately implemented the criteria of 10 CFR 54.4(a)(2) in identifying these systems as being in-scope for license renewal due to their proximity to other safety related systems.

B. Review of Mechanical Aging Management Programs

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (ISI) Program [Including Stress Corrosion Cracking (SCC) Program]

The Inservice Inspection (ISI) Program which includes the Stress Corrosion Cracking (SCC) Program is an existing program, subject to regular NRC inspections. In order to address industry issues, the Boiling Water Reactor (BWR) owners group established the Vessel and Internals Project (VIP) to provide a generic response to various issues. A number of VIP documents have been issued covering various subsets of the ISI program including VIP-75, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules. These VIP documents have served to provide for additional inspections and/or modifications of ASME ISI requirements. Initial requirements for SCC inspections were contained in Generic Letter 88-01, including Supplement 1, NRC Position on Intergranular Stress Corrosion Cracking in BWR Austenitic Stainless Steel Piping. Category A SCC-susceptible welds had been subsumed into the Risk-Informed ISI Program and other SCC-susceptible welds were appropriately scheduled. The applicant has maintained the Units 1 and 2 ISI program up to date for the latest Code, NRC, and VIP requirements.

The inspectors reviewed the LR program description documentation, the program implementation plans, site procedures, the ISI plan, and SCC inspection results from the last Unit 2 outage and discussed the program with applicant personnel. The inspectors concluded that the ISI Program was in place, was working effectively, and included elements described in the LRA.

The applicant had specifically identified ISI procedures to be credited for LR and had established a tracking mechanism for assurance of completion of LR required future actions. For each of the LR required AMPs, the applicant had established



implementation plans within AR 100627 to ensure that all LR future actions are tracked and completed.

## 2. Reactor Head Closure Studs Program

The applicant has maintained an ongoing periodically updated existing program for inspection of reactor vessel studs as part of the ISI program. The applicant has previously inspected the studs on both Units and has appropriately scheduled reinspection. In addition, the applicant has implemented controls to assure use of approved lubricants via maintenance procedures.

The inspectors reviewed the LR program description documentation, the program implementation plan, site procedures, and previous inspection results and discussed the program with applicant personnel. The inspectors concluded that the Reactor Head Closure Studs Program was in place, was working effectively, and included elements described in the LRA. The applicant had specifically identified procedures to be credited for LR and had established a tracking mechanism for assurance of completion of required actions.

## 3. Reactor Vessel and Internals Structural Integrity Program

The Reactor Vessel and Internals Structural Integrity Program is an existing program conducted in accordance with ASME Section XI, NRC guidance, and various VIPs. The applicant has also credited the chemistry program for preventing aging of these components. The inspectors confirmed that selected components were included in the program and inspections were scheduled in accordance with applicable guidance. These included the Top Guides (VIP-26), Rim Hold Down Bolts (VIP-25 and plant specific evaluation), Core Shroud Repair Brackets (VIP-76), Jet Pump thermal sleeve welds (VIP-41), Core Spray thermal sleeve welds (VIP-18), and Feedwater thermal sleeve welds (NUREG 0619). The inspectors also reviewed recent inspection results for the above components except for the Top Guides. The inspectors noted that three RS-1 welds (Jet Pump Riser Elbow to Thermal Sleeve Weld) for Unit 1 had crack indications. The inspectors confirmed that the previous two outages had shown these to essentially be the same length indicating these were not growing in length. The inspectors also confirmed these had been evaluated in accordance with accepted guidance.

The inspectors reviewed the LR program description documentation, the program implementation plan, the ISI plan, site procedures, and previous inspection results and discussed the program with applicant personnel. The inspectors concluded that the Reactor Vessel and Internals Structural Integrity Program was in place, was working effectively, and included elements described in the LRA. The applicant had specifically identified procedures to be credited for LR and had established a tracking mechanism for assurance of completion of required actions.

## 4. Flow Accelerated Corrosion (FAC) Program

The FAC program is an existing program credited for management of flow accelerated corrosion which the applicant plans to enhance with updated susceptibility analyses.

The applicant has included attributes described in industry guidance (NSAC-202L-R2, Recommendations for an Effective Flow-Accelerated Corrosion Program). The applicant's program consists of periodic inspections and evaluation of the data to detect wall thinning and compare data to current requirements and historical data values to predict when and if minimum wall thickness will occur. Piping replacements are planned prior to wall thickness reaching minimum requirements. Inspection points and inspection periodicity are adjusted dependant on inspection data, plant operations history, and industry information.

The inspectors reviewed the LR program description documentation, the program implementation plan, site procedures, and selected FAC inspection information and discussed the program with applicant personnel. The inspectors concluded that the FAC Program was in place, was working effectively, and included elements described in the LRA. The applicant had specifically identified procedures to be credited for LR and had established a tracking mechanism for assurance of completion of required actions.

#### 5. Reactor Vessel Surveillance Program

The Reactor Vessel (RV) Surveillance Program is an existing program credited in the LRA as a program for managing RV irradiation embrittlement. The applicant's program consists of participation in the generic industry program for periodic testing of RV surveillance capsules and updating calculations for fracture toughness. The applicant has maintained the program in accordance with the BWR VIP process and is participating in the BWR Integrated Surveillance Program via VIP-116 which is currently under NRC review.

The inspectors reviewed the LR program description documentation, the program implementation plan, site procedures, engineering calculations, and the generic VIP-116 response to NRC and discussed the program with applicant personnel. The inspectors concluded that the Reactor Vessel Surveillance Program was in place, was working effectively, and included elements described in the LRA. The applicant had specifically identified procedures to be credited for LR and had established a tracking mechanism for assurance of completion of required actions.

#### 6. Reactor Coolant Pressure Boundary Fatigue Monitoring Program

The applicant has maintained an ongoing program for fatigue analysis and is in the process of expanding the scope of the program in accordance with NUREG/CR-6260; Application of NUREG/CR-5999, Interim Fatigue Curves to Selected Nuclear Power Plant Components. In addition, the applicant plans to enhance the program to address preventive actions if an analyzed component is determined to be approaching the design limit, to reassess limiting locations, and to address corrective action options.

The inspectors reviewed the LR program description documentation, the program implementation plan, site procedures, engineering calculations, and selected plant data and discussed the program with applicant personnel. Based on discussions with NRC, the applicant initiated an additional procedure enhancement to clarify the transient descriptions and specify the transient data to be compiled, along with data sources and methods for retrieval. The inspectors concluded that the Reactor Coolant Pressure

Boundary Fatigue Monitoring Program was in place, with appropriate enhancements planned, and included elements described in the LRA. The applicant had specifically identified procedures to be credited for LR and had established a tracking mechanism for assurance of completion of required actions.

#### 7. One Time Inspection Program

This is a new program that uses one-time inspections to verify the effectiveness of an aging management program and/or confirm the absence of an aging effect for the period of extended operations on SSCs identified in the aging management review. There is a large scope of SSCs identified for the one-time inspection program in Section 3, Aging Management Review Results, of the LRA. The program inspections will include a combination of Non Destructive Examinations (NDE) by qualified personnel following procedures consistent with ASME Code and 10 CFR 50, Appendix B. The required program elements and general statement of scope are identified in LRA, section B.2.15, One-Time Inspection Program. The program scope and methodology are described in calculation BNP-LR- 632, License Renewal Aging Management Program Description of the One -Time Inspection Program, Rev. 1. A representative sample of these SSCs will receive one time inspections. The applicant stated the sample will be developed and the program completed prior to the period of extended operation. The program implementation plan is documented in AR 100627 Implementation Plan 40, One Time Inspection Program Implementation Plan. The inspectors reviewed the program description, the implementation plan in the LRA, the scope identification in the LRA, and discussed the program development and implementation with the responsible station staff.

The inspectors concluded that the applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. When implemented, there is reasonable assurance that the intended function of the SSCs within the scope of this program will be maintained through the period of extended operation.

#### 8. Selective Leaching of Materials Program

This new program will use a one-time visual inspection and qualitative mechanical examination of a sample of components that may be susceptible to selective leaching. Components susceptible to selective leaching include cast iron, brass, bronze, or aluminum bronze and may be exposed to raw water, treated water, or ground water environment. The required program elements and general statement of scope are identified in the LRA, section B.2.16, Selective Leaching of Materials Program. A sample population will be selected, a procedure will be developed to define one-time examination methodology, acceptance criteria, and examinations to be completed prior to the period of extended operation. The inspectors reviewed the program description, BNP-LR-633, License Renewal Aging Management Program Description of the Selective Leaching of Materials Program and the Selective Leaching Implementation Plan, AR 100627-34 , and discussed the program development and implementation with the responsible station staff. The inspectors noted the implementation plan did not include a provision for training the plant staff responsible for performing the visual and qualitative examinations for selective leaching. Following the discussion with the

applicant on this issue, the implementation plan was revised to include this training provision.

The inspectors concluded that the applicant conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. When implemented, there is reasonable assurance that the intended function of the SSCs within the scope of this program will be maintained throughout the period of extended operations.

#### 9. Buried Piping and Tanks Inspection Program

This is a new program that will manage the aging effects of loss of material on external surfaces of carbon steel, stainless steel, and cast iron piping components buried in soil or sand. There are no buried tanks included in the scope of this program. The aging effects will be managed by protective coatings and inspections. There is no periodic inspection requirement; buried components will be inspected for evidence of coating damage or degradation when they are excavated for any reason. The program requires at least one inspection be performed every ten years. The inspectors reviewed the description of the program in the LRA section B.2.17 and calculation BNP-LR-634 which stated the criteria and methodology for the program activities. Additionally the inspectors reviewed the program implementation plan documented in AR-100627-35 and discussed the program with the assigned responsible staff. The inspectors noted the implementation plan did not include a provision for the performance of at least one buried pipe inspection in a ten year period, although this requirement was stated in the program description. Following discussion, the applicant added this provision to the implementation plan.

The inspectors concluded that the applicant conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. When implemented, there is reasonable assurance that the intended function of the SSCs within the scope of this program will be maintained throughout the period of extended operations.

#### 10. Water Chemistry Program

This is an existing program to minimize loss of material, cracking and flow blockage by monitoring and controlling water chemistry based on the Boiling Water Reactor (BWR) Chemistry Guidelines. This includes periodic monitoring, control, and mitigation of known detrimental contaminants below levels known to result in loss of material, cracking, or flow blockage. The program is described in Section B.2.2 of the LRA and calculation BNP-LR-600. The implementation plan is described in AR 100627-25. The inspectors reviewed the program documentation, discussed the program with responsible station staff, and reviewed existing procedures which implemented the scope and actions of this program. Additionally, the inspectors reviewed trending of critical chemistry parameters and reviewed the identification and resolution of identified conditions in which parameter limits were exceeded.

The inspectors concluded that the applicant had conducted adequate historic reviews of plant specific and industry experience to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. As implemented, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

#### 11. Fuel Oil Chemistry Program

This is an existing program with enhancements, to manage the aging effects of loss of material to fuel oil tanks and piping by minimizing exposure to fuel oil contaminants such as water and microbiological organisms. This is accomplished by verifying the quality of new oil before introduction into the storage tanks and periodic sampling to assure that the tanks are free of water and particulate. Enhancements include a one-time internal visual inspection of the main fuel oil storage tank, one-time wall thickness inspections of all in-scope tanks, and a requirement to trend sample data for water and particulate. The in-scope tanks include the main fuel oil storage tank, the 4-day storage tanks, the diesel generator day tanks, and the diesel driven fire pump fuel oil tank. The program is described in Section B.2.13 of the LRA and calculation BNP-LR-631. The implementation plan is described in AR 100627-46. The inspectors reviewed the program documentation, discussed the program with responsible station personnel and reviewed existing procedures which implemented the scope and activities of this program. The procedure enhancement for trending of water and particulate data was completed. The one-time inspections for in-scope tanks were included in the scope of the one-time inspection program.

The inspectors concluded that the applicant had conducted adequate historic reviews of plant specific and industry experience to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. As implemented and enhanced, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

#### 12. Protective Coating Monitoring and Maintenance

This existing program with enhancements is a condition monitoring program for Service Level 1 coatings applied inside the primary containments and performs periodic visual and in-process inspections for coating repairs and refurbishment to assure coatings are qualified. Coating parameters measured include blistering, cracking, flaking, rusting and other distress. Program enhancements to establish general and focused periodic containment visual inspections as a requirement, establish qualification requirements for inspectors, and document the inspection results have been completed. The program is described in Section B.2.24 of the application and calculation BNP-LR-639. The implementation plan is described in AR 100627-39. The inspectors reviewed the program documentation, discussed the program with responsible applicant personnel, and reviewed existing procedures which implemented the scope and actions of this program. Additionally, the inspectors reviewed the applicant's response to GL-98-04, Potential for Degradation of the ECCS and Containment Spray System after LOCA Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment, dated 11/11/98 and the Units 1 & 2 Coatings Exempt Logs.

The inspectors concluded that the applicant had conducted adequate historic reviews of plant specific and industry experience to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. As implemented, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

13. Above Ground Carbon Steel Tanks Program

This is a new monitoring program that will manage the aging effects of loss of material for external surfaces and inaccessible locations of the Main Fuel Oil Storage Tanks, Condensate Storage Tanks (CST), and Fire Protection Water Storage Tanks (FPWST). The program will include one-time inspections of CST and FPWST interior surfaces, and thickness measurements of tank bottoms and periodic exterior surface monitoring accomplished by the System Monitoring Program. The inspectors reviewed the program documentation which included the program description in calculation BNP-LR-630 and section B.2.12 of the LRA, and the implementation plan described in AR 100627-33.

The inspectors concluded that the applicant had conducted adequate historic reviews of plant specific and industry experience to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. When implemented, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

14. Open Cycle Cooling Water System Program (OCCW)

This OCCW or Service Water program described in LRA section B.2.7 is an existing program that will be enhanced under LR. The inspectors reviewed the AMP description BNP-LR-602, Open Cycle Cooling Water System Aging Management Program. The existing program has been in effect for a number of years as the implementation of the NRC Generic Letter 89-13 recommendations. On a sampling basis, the inspector checked that elements of the recommended program were in place. Review of corrective action documents described in the AMP indicated that the carbon steel piping and its welds had experienced through wall leaks, which is typical for salt water or brackish water systems. Additionally, erosion of copper-nickel piping was discussed. The AR 100627-42 Action Plan contained some significant actions to be completed under LR such as: delineation of eddy current criteria for the residual heat removal (RHR) heat exchangers (HX); thermal performance testing of the RHR and Jacket Water HX; delineation of inspection criteria for copper-nickel piping; procedure for the replacement of the RHR seal cooler every two years; initiate periodic preventive maintenance for the inspection of the service water pump casings; and inspection of the expansion joints on the emergency diesel service water piping. On a sampling basis, the inspectors reviewed the corrective action documents on the system against the applicant's OE review. The inspectors walked down the system, discussed the service water intake channel dredging scheme and procedure with the staff and observed emergent work on the intake structure. As implemented and as planned to be enhanced, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

#### 15. Systems Monitoring Program

This is an existing system condition monitoring program described in LRA section B2.29 with pending enhancements to be completed. The program includes periodic visual inspections, performed by System Engineers, on surfaces of systems and components to identify degraded conditions prior to the loss of intended function. Corrective maintenance or corrective action documents are initiated to ensure identified deficiencies are tracked, trended, and corrected. The inspectors reviewed the program AMP description BNP-LR-640 and existing documentation that provided the requirement for system monitoring via system engineer field walk downs and the attributes to be included in these periodic visual inspections. The inspectors reviewed nuclear assessment reports (particularly B-ES-04-01, AR 136693), discussed the program with several system engineers, and walked down plant systems as indicated elsewhere in this report. The administrative control procedure, OENP-648 will be enhanced/ revised to more fully bound the scope of license renewal with the additions of items such as fire protection systems (inclusive of the Carbon Dioxide portions) and adding the inspections for the aging effects shown in Attachment 1 of BNP-LR-640 described in the AR 100627-36, Action Plan.

The inspectors concluded that the applicant had conducted adequate historic reviews of plant specific and industry experience to determine aging effects. The applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. As implemented, there is reasonable assurance that the intended function of the SSCs will be maintained through the period of extended operation.

#### 16. Closed Cycle Cooling Water Program (CCCW)

This program described in LRA section B.2.8 is an existing program that will be enhanced under LR. The OCCW service water cools the CCCW. The cooled water side of the subject systems is chemically treated. The CCCW AMP included the non-safety-related reactor building closed cooling water system (RBCCW) that penetrates the drywell and therefore has some containment integrity importance, the control bay chillers, and the Jacket Water (JW) system that cools the emergency diesels. The inspectors reviewed the AMP description BNP-LR-627, Aging Management Program Description Closed Cycle Cooling Water System. The existing program has been in effect for a number of years having been based on an Electrical Power Research Institute document TR-107396, "Closed Cycle Cooling Water Chemistry Guideline." The exterior of CCCW are monitored by the system monitoring program. On a sampling basis, the inspectors checked that elements of the recommended program were in place in site program documents. Review of the applicant's corrective action documents found in the AMP indicated that few problems were found in these systems. The inspectors checked that the minor enhancements to the AMP were being tracked with the appropriate tracking program. The inspectors cross-checked the corrective action searches against the compiled OE, reviewed chemistry data, and performed a walk down on available RBCCW, chiller, and JW piping. Industry operating experience has demonstrated that monitoring and maintenance of corrosion inhibitors is effective in mitigating loss of material, cracks, and supports heat transfer. Implementation of the CCCW program provides reasonable assurance that the aging effects will be managed such that the equipment will continue to perform its intended function.

17. Inspection of Overhead Heavy Load and Light Load Handling Systems Program

This program is described in LRA section B.2.9 and is an existing program that will be enhanced. The inspectors reviewed AMP description BNP-LR-628, Inspection of Overhead Heavy Load and Light Load Handling Systems and walked down three of the four types of cranes, finding them in relatively good condition. The inspectors observed the disassembly and inspection of the Service Water intake crane, finding the disassembled trolley in good mechanical condition. Review of corrective action documents issues on crane problems showed very limited findings. Program instructions follow industry guidance (NUREG-0612 and ASME B30.2) and have incorporated industry operational history. The AR 100627-22 Action Plan has items for future completion that will more fully bring the crane program under LR by listing several items for incorporation such as corrosion inspections. The inspectors noted little corrosion during the plant tours, most of which had been addressed by maintenance personnel. For license renewal, the primary crane components of interest are the structural components that make up the bridge, trolley, and rails. Implementation of the crane program provides reasonable assurance that the aging effects will be managed such that the equipment will continue to perform its intended function.

18. Preventive Maintenance

This program is described in LRA section B.2.30 and is an existing program that will be enhanced by the applicant. The existing program performs periodic maintenance on the system and components in the plants. The inspectors reviewed existing program documents and processes, reviewed the LR program documents, reviewed the planned enhancements, and compared the program enhancement and program against past corrective action evaluations. The inspectors reviewed among other items the existing procedure ADM-NGGC-0203, Preventive Maintenance and Surveillance Testing; BNP-LR-642, AMP Description of the Preventive Maintenance Program ; and the AR 100627-44 Action Plan. Attachment 1 to the AMP lists the items to be added to the program and those additions appeared to be appropriate. During the AR plan review the inspector found only one minor omission based on comparison with the existing program document. The applicant added the omission, inspection of the demineralized water tank, to the AR plan. Implementation of the AMP provides reasonable assurance with the planned enhancements that the aging effects will be managed such that the equipment will continue to perform its intended function.

19. Bolting Integrity

This program is described in LRA section B.2.6 and is an existing program that will be enhanced by the applicant. The existing program provided bolting instructions for bolting on safety-related components and pressure retaining components. The inspectors primarily reviewed the AMP description BNP-LR-625, Bolting Integrity Program, the existing implementing document, OMMM-017, Maintenance Methods and Guidelines for Torquing, and the future action tracking plan, AR 100627-41. The NUREG-1801 (Gall program description element) exception under this program was that the structural bolting would not be handled under this program but would be handled by other instructions such as the ASME Code, Section XI, IWF, requirements. The existing program and minor enhancements were compared to existing industry guidance on



bolting. Implementation of the AMP provides reasonable assurance with the planned enhancements that the aging effects will be managed such that the equipment will continue to perform its intended function.

## 20. Fire Protection Program

The Fire Protection Program is an existing aging management program that applies to penetration seals, fire barrier walls, ceiling, floors, fire doors, gaseous (Halon/CO<sub>2</sub>) fire suppression systems, the diesel-driven fire pump fuel oil supply line, and the fire pump diesel engine heat exchanger. The Program is implemented through various plant procedures. The Fire Protection Program is described in the LRA as being consistent with NUREG-1801, Section XI.M26 as modified by NRC ISG-04 with the following exceptions.

- a. The initial periodic inspection penetration seal sample size utilized is less than the recommended size of 10%.
- b. The BSEP Fire Protection Program does not require visual inspection of each type of penetration seal but rather a statistical sample of penetration seals in each affected building or group of buildings.
- c. The ISG-modified program element recommends system functional testing at least once every six months. The subject systems are verified as being properly charged every six months, but functional testing is performed less frequently. The halon system is functionally tested annually, and the CO<sub>2</sub> system is functionally tested every 18 months.
- d. General visual inspections are performed for the subject components rather than a VT-1 or equivalent inspection.

The inspectors examined the records of a sample of various fire protection equipment periodic surveillance tests. The records were retrievable and reflect that equipment passed the tests or corrective actions were taken and a successful retest performed. The inspectors concluded that the fire protection program is functioning as intended.

## 21. Fire Water System Program

The Fire Water System Program includes system pressure monitoring, inspections, and periodic testing in accordance with applicable National Fire Protection Association commitments. The Fire Water System Program is an existing program that the LRA states, following enhancement, will be consistent in its entirety with the criteria of NUREG-1801, Section XI.M27 as amended by NRC ISG-04. The following enhancements will be implemented prior to the period of extended operation. The Fire Protection Program administrative control documents will be updated to incorporate a requirement to perform non-intrusive baseline pipe thickness measurements at various locations prior to the expiration of the current license, to repeat tests at periodic intervals and trend the results to detect degradation prior to the loss of the intended function.

A majority of the sprinkler heads have been replaced within the last ten years and the LRA states that the remainder (located in the Diesel Generator Building and RHR rooms) will be replaced prior to 50 years of service. This will assure that all the sprinkler heads will have less than 50 years service throughout the extended period of operation.

The inspectors examined the records of a sample of various fire water system periodic surveillance tests. The records were retrievable and reflect that equipment passed the tests or corrective actions were taken and a successful retest performed. The inspectors concluded that the fire water system program is functioning as intended.

C. Review of Electrical Aging Management Programs

The Brunswick LRA concluded that the only electrical components that require an aging management program are electrical cables and connectors and electrical busses. Electrical equipment, including cables, that are already subject to the 10 CFR 50.49 environmental qualification (EQ) program are age managed by that program. The applicant considers the EQ program subject to a Time Limited Aging Analysis (TLAA) to demonstrate that EQ components' qualified life can be extended an additional 20 years or to ensure that they will be replaced at the appropriate time.

The AMPs proposed by the applicant are as follows:

1. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The inspectors reviewed document BNP-LR-664 which provides a description of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. This program is credited for aging management of cables and connections not included in the BSEP EQ Program. Accessible electrical cables and connections installed in adverse localized environments will be visually inspected at least once every 10 years for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, swelling, or surface contamination, which are precursor indications of conductor insulation aging degradation from heat, radiation or moisture. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service condition for the electrical cable or connections. The aging effects of concern are reduced insulation resistance leading to electrical failure. The technical basis for selecting the sample of cables and connections to be inspected is defined in the implementing BSEP program document. The sample locations will consider the location of cables and connections inside and outside primary containment as well as any other known adverse localized environments.

This is a new program yet to be developed and thus there is no performance history. However, the commitments are identical to ones described in NUREG-1801 which the NRC has found acceptable.

2. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program

The inspectors reviewed document BNP-LR-665 which provides a description of the Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program. This program is credited for the aging management of radiation monitoring and neutron flux monitoring instrumentation cables not included in the BSEP EQ Program. Exposure of electrical cables to adverse localized environments caused by heat or radiation can result in reduced insulation resistance (IR). A reduction in IR is a concern for circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies. For radiation monitoring instrumentation circuits, the results of routine calibration tests will be used to identify the potential existence of cable aging degradation. For neutron flux instrumentation circuits, field cables will be tested at least once every 10 years. Testing may include IR tests, time domain reflectometry tests, current versus voltage testing, or other testing judged to be effective in determining cable insulation condition. This is a new program yet to be developed but the description is consistent with NUREG-1801, Section XI.E2, with exception that direct cable testing will be performed as an alternative to instrument loop calibrations for neutron flux monitoring instrumentation circuits. The acceptance criteria will be determined based on the type of test selected for these cables.

3. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The inspectors reviewed document BNP-LR-666 which provides a description of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. This program is credited for aging management of cables not included in the BSEP EQ Program. In-scope, medium-voltage cables exposed to significant moisture and significant voltage will be tested at least once every 10 years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. This is a new program yet to be developed and its description is consistent with NUREG-1801, Section XI.E3.

The inspectors asked if periodic actions are being taken such as inspection for and removal of water collected in cable manholes and conduits containing normally energized safety related cables. The inspectors were told that 52 manholes are periodically inspected as a preventive maintenance task. Only 3 of those manholes contain cables that are in the scope of license renewal. The inspectors participated with the applicant in examining one of the inscope manholes. The manhole contained a small amount of water and the installed sump pump was operable. The cables and supports were satisfactory. The inspector examined records of a sample of the past manhole inspections and found them satisfactory.

#### 4. Phase Bus Program

The inspectors reviewed document BNP-LR-668 which provides a description of the Phase Bus Aging Management Program. This program is credited for aging management of inscope iso-phase and non-segregated phase bus at BSEP. The Program involves several activities conducted at least once every 10 years to identify the potential existence of aging degradation. Activities include visual examination of accessible bolted connections for signs of loosening, visual inspections of the bus for signs of cracks, corrosion, or discoloration which may indicate overheating, and visual inspections of the bus enclosure for signs of corrosion, foreign debris, excessive dust buildup and evidence of water intrusion. The Program applies to the iso-phase bus as well as nonsegregated 4.16KV and 480V phase bus within the scope of License Renewal. Bolted connections covered with heat shrink tape, sleeving, insulating boots, etc., are considered inaccessible and are not covered by this activity. This is a new aging management program yet to be developed. The commitment is that following issuance of a renewed operating license for BSEP, this program will be completed before the end of the initial 40-year license term.

#### D. Review of Structural Aging Management Programs

##### 1. Structures Monitoring, Masonry Wall, and Fuel Pool Girder Tendons Programs

The Structures Monitoring Program (SMP) is an existing program which the applicant plans to enhance for LR to identify the complete list of systems and structures that credit the SMP for aging management and define the inspection boundaries between the system and associated structures. The applicant's existing program consists of periodic inspections and monitoring of accessible areas of structures. The SMP, specifically procedure 0SPP-PIX503, will also be enhanced to notify the Responsible Engineer when below grade concrete is exposed, so an inspection can be performed prior to backfill. The Responsible Engineer will be required, as part of the enhancements, to review the groundwater monitoring results against applicable parameters for determination of an aggressive environment.

The inspectors reviewed AMP description documents for the SMP, selected plant inspection data, engineering documents, site procedures, drawings, corrective action documents, inspection reports and EGR-NGGC-0351, "Condition Monitoring of Structures," which provides the guidance and periodicity required to manage the effects of aging. The inspectors also discussed the applicable programs with responsible personnel.

The inspectors conducted general walkdowns of the site, including reactor buildings, switchyards, service water intake structure (SWIS), diesel generator buildings, and any applicable structures, systems or components related to the SMP. The inspectors verified that areas where signs of degradation such as spalling, cracking, leakage through concrete walls, corrosion of steel members, deterioration of structural materials and other aging effects had been previously identified and addressed adequately by the SMP and/or the Corrective Action Program (CAP). The applicant maintains comprehensive inspection reports containing photographic and written documentation of

areas inspected thus facilitating adequate monitoring of structural commodities and components.

During the walkdown of the SWIS, the inspectors identified some visible corrosion of the sheet piling on the coffer dams which encase structural fill. This issue has been addressed by action request (AR) 00096712 and work order (WO) 00589254-01 which propose preventative maintenance of the sheet piling and non destructive examination of the areas deemed necessary by engineering personnel. BSEP is exposed to an aggressive saltwater environment; however, their existing 10 CFR 50.65 Maintenance Rule programs, which include inspections of submerged areas by divers, identify areas of concern and consequently disposition them accordingly through the CAP. The applicant will revise EGR-NGGC-0351 to establish the inspection frequency for "Intake and Pumphouse structures" and "Dams, Embankments and Canals" to not exceed 5 years. A final enhancement will be made to revise system engineer training materials to include the procedure regarding condition monitoring of structures as a procedure requiring in-depth knowledge.

The Fuel Pool Girder Tendon (FPGT) Inspection Program is an existing plant-specific program used to manage loss of prestress in the fuel pool girder tendons of each Reactor Building. The inspectors reviewed the 20<sup>th</sup> and 25<sup>th</sup> year surveillance records for the FPGT, as well as applicable procedures and assessments. The grease cans have been replaced to minimize water intrusion. The inspectors also walked down both the interior and exterior of the reactor buildings and observed the conditions of the post-tensioning system to be acceptable with no signs of active leakage. The fuel pool girder tendons are not associated with the containment pressure boundary and are not within the scope of the IWL Program; however, the FPGT Inspection Program performs visual and physical testing on a frequency commensurate with guidance from the ASME Section XI, Subsection IWL Program. The Program visually inspects and physically tests a representative sample of tendons. The applicant plans to make several enhancements to the program including trending the loss of prestress for each inspection period and graphing data against the projected values through the period of extended operation. Inspection results are used to project an estimated loss of prestress through the next inspection period to ensure the tendon prestressing values do not fall below the minimum design requirements. In addition, the applicant plans to require any tested tendons found outside of the acceptance criteria to be entered into the corrective action program. Implementation of the existing program was in accordance with current guidance and appropriate enhancements are planned.

The Masonry Wall Program is implemented through the Maintenance Rule structures monitoring procedure EGR-NGGC-0351, "Condition Monitoring of Structures." The inspectors reviewed masonry walls procedures, inspection reports and discussed these with responsible personnel. The applicant plans to continue to address masonry wall considerations consistent with NRC IE Bulletin (IEB) 80-11, "Masonry Wall Design" and NRC Information Notice (IN) 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11." The program is implemented as part of the five-year SMP periodic inspections, with increased frequencies in some areas based on operational experience, and appeared to be functioning adequately to address masonry wall considerations. The inspectors concluded that there is reasonable assurance that the SMP and the Masonry Wall Program will adequately monitor the

condition of structures and structural components through the period of extended operation.

2. ASME Section XI, Subsection IWE/IWF/IWL Inservice Inspection Program

The BSEP ASME Section XI, Subsection IWE, Containment Inservice Inspection (ISI) Program was developed considering the requirements of 10 CFR 50.55a and the ASME Code. The program is an existing program which includes visual examinations of steel containment (MC) shells and their integral attachments; containment hatches and airlocks; seals, gaskets, and moisture barriers; and pressure-retaining bolting. The inspectors reviewed AMP evaluation documents for ASME Section XI programs, selected plant inspection data, site procedures, drawings and discussed the program with responsible personnel. In response to NRC Generic Letter (GL) 97-05, "Request for Additional Information Assessment of Licensee Measures to Mitigate and/or Identify Potential Degradation of Mark I Drywells," the applicant also performed a detailed examination of the material condition and enhancement of the moisture barrier. This existing program has been in place and functioning for the life of the plant.

The ASME Section XI, Subsection IWF is an existing program and is part of the overall ISI programs for BSEP. An enhancement to include torus vent system supports within the scope of the ASME, Section XI, Subsection IWF program is planned prior to the period of extended operation. The ASME Section XI, Subsection IWL manages accessible and inaccessible pressure retaining, primary containment concrete. This program is also part of the overall ISI programs for BSEP and is an existing program. The inspectors reviewed several self-assessments and found no significant degradation issues. Those identified by the applicant had been addressed through the CAP.

The inspectors concluded that the ASME Section XI, Subsections IWE/IWF/IWL Inservice Inspection Programs were in place, had been implemented, and included the elements identified in the LRA. When implemented as described, there is reasonable assurance that adequate inspections required by ASME will be performed through the period of extended operation.

3. 10 CFR Part 50, Appendix J Program

This program is described in LRA Section B.2.21 and is an existing program not requiring enhancements. The inspectors reviewed BNP-LR-615, 10 CFR Appendix J Containment Leak Rate Test (LRT) Program, Rev 0. This existing program monitors leakage rates through the containment shells, containment liners, associated welds, penetrations, fittings and other access openings, in order to detect degradation of the containment pressure boundary. Acceptance criteria for leakage rates are defined in plant technical specifications. The inspectors also reviewed and discussed with plant personnel the previous outage reports, leak rate test results and applicable procedures. This program follows guidance established in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," September 1995 and Nuclear Energy Institute (NEI) Guidelines 94-01, "Industry Guideline for Implementing Performance Based Option of 10 CFR Part 50, Appendix J," Revision 0. In addition, the applicant's performance based Appendix J program monitors and trends its test results to provide predictability of the extent of degradation and ensure timely corrective action. ASME Section XI IWE and

IWL programs address SSC where aging degradation is detected as a result of leak rate testing. Implementation of the Appendix J Program provides reasonable assurance that the aging effects will be managed such that components and commodities associated with the containment pressure boundary will continue to perform their intended functions during the period of extended operation.

### III. Conclusions

The inspection concluded that LR activities were conducted as described in the License Renewal Application. The inspection also concluded that existing aging management programs are generally functioning well.

#### Exit Meeting Summary

The results of this inspection were discussed on June 24, 2005, with members of the applicant staff in an exit meeting open for public observation at the Progress Energy Media Center, 8520 River Road SE, Southport, NC. The applicant acknowledged the results presented and presented no dissenting comments. The inspectors asked if any of the applicant materials reviewed were proprietary and were told certain documents were proprietary. Those documents were returned to the applicant and no proprietary information is included in this report.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

L. Beller, Supervisor Licensing, Progress Energy  
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M. Guthrie, Engineer, Progress Energy  
M. Heath, Supervisor License Renewal, Progress Energy  
K. Karcher, Engineer, Progress Energy  
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G. Miller, Manager License Renewal, Progress Energy  
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#### **NRC personnel**

K. Clark, Public Affairs Officer, RII  
G. DiPaolo, Senior Resident Inspector, RII  
V. McCree, Director Division of Reactor Safety, RII  
S. Mitra, Senior Project Manager, NRR

### **LIST OF DOCUMENTS REVIEWED**

#### **Licensing Documents**

Brunswick Steam Electric Plant License Renewal Application dated October 18, 2004 and related Requests for Additional Information  
Brunswick Updated Final Safety Analysis Report

#### **License Renewal Aging Management Program Descriptions**

BNP-LR-606; ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program, Rev. 1  
BNP-LR-654, BWR Stress Corrosion Cracking Program, Rev. 1  
BNP-LR-619, Reactor Head Closure Studs Program, Rev. 0  
BNP-LR-656, Reactor Vessel and Internals Structural Integrity Program, Rev. 2  
BNP-LR-603, Flow-Accelerated Corrosion Program, Rev. 1  
BNP-LR-613, Reactor Vessel Surveillance Program, Rev. 1  
BNP-LR-502, Thermal Fatigue Time-Limited Aging Analysis Evaluation, Rev. 0  
BNP-LR-605, Reactor Coolant Pressure Boundary Fatigue Monitoring Program, Rev. 1  
BNP-LR-630, Above Ground Carbon Steel Tanks Program, Rev. 1  
BNP-LR-632, One-Time Inspection Program, Rev. 1



BNP-LR-633, Selective Leaching of Materials Program, Rev. 2  
 BNP-LR-634, Buried Piping and Tanks Program, Rev. 1  
 BNP-LR-600, Water Chemistry Program, Rev. 2  
 BNP-LR-631, Fuel Oil Chemistry Program, Rev. 3  
 BNP-LR-639, Protective Coating Monitoring and Maintenance Program, Rev. 0  
 BNP-LR-602, Open Cycle Cooling Water System Program, Rev. 2  
 BNP-LR-640, Systems Monitoring Program, Rev. 0  
 BNP-LR-642, Preventive Maintenance Program, Rev. 2  
 BNP-LR-625, Bolting Integrity Program, Rev. 2  
 BNP-LR-627, Closed Cycle Cooling Water Program, Rev. 1  
 BNP-LR-628, Overhead Heavy Load and Light Load Handling Systems, Rev. 0  
 BNP-LR-608, Structures Monitoring Program, Rev 2  
 BNP-LR-615, 10 CFR Appendix J Containment Leak Rate Test (LRT) Program, Rev 0  
 BNP-LR-616, ASME Section XI, Subsection IWE, Rev 1  
 BNP-LR-617, ASME Section XI, Subsection IWL, Rev 1  
 BNP-LR-618, ASME Section XI, Subsection IWF, Rev 0  
 BNP-LR-645, Fuel Pool Girder Tendon Inspection Program, Rev 1  
 BNP-LR-662, Masonry Wall Program, Rev 0  
 BNP-LR-664, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, Rev 1  
 BNP-LR-665, Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program, Rev 2  
 BNP-LR-666, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, Rev 2  
 BNP-LR-668, Phase Bus Program, Rev 1  
 BNP-LR-611, Fire Water System Program, Rev 1  
 BNP-LR-612, Fire Protection Program, Rev 1

### **Existing Procedures, Plans, Reports, and Programs**

BSEP Third Inspection Interval ISI Program Plan for Class 1,2 and 3 Components and Their Supports, Rev. 12  
 OBNP-TR-001, Inservice Inspection Technical Report, Rev. 6  
 OENP-15, Reactor Vessel & Internals Structural Integrity Program, Rev. 0  
 OENP-16, Procedure for Administrative Control of Inservice Inspection Activities, Rev. 43  
 OENP-16.2, Administrative Control of ASME Section XI Non-Destructive Examination Program, Rev. 16  
 OENP-16.9, Administrative Control of the ASME Section XI Pressure Testing Program, Rev. 13  
 OENP-44, Reactor Pressure Vessel Component Fatigue Monitoring Program, Rev. 7  
 OPLP-08, Repair/Replacement Program, Rev. 23  
 OPT-80.1, Reactor Pressure Vessel ASME Section XI Pressure Test, Rev. 47  
 OPT-90.1, Vessel Internal Component Remote Examinations, Rev. 29  
 OSMP-RPV502, Reactor Vessel Reassembly, Rev. 1  
 EGR-NGCC-0202, Flow Accelerated Corrosion Monitoring Program, Rev. 8  
 OAI-81, Operations Administrative Procedure, Water Chemistry Guidelines, Rev. 38  
 OE&RC-1000, Environmental and Radiations Control Procedure, Sampling and Analysis for Technical ODCM and TRM Specifications Chemistry, Rev. 49  
 OE&RC-1010, Fuel Oil Sampling, Rev. 25

OE&RC-1141, Water and Sediment in Fuel Oil, Rev. 25  
OE&RC-1142, Particulate Contamination in Fuel Oil, Rev. 3  
OPT-20.5.5, Periodic Test, Safety Related Service Level 1 Coatings Condition Assessment, Rev.1  
ADM-NGGC-0203, Preventive Maintenance and Surveillance Testing, Rev. 6  
OMMM-017, Maintenance Methods and Guidelines for Torquing, Rev. 25  
OENP-648, System Monitoring and Walkdowns, Rev. 0  
0AI-81, Water Chemistry Guidelines, Rev. 38  
OE&RC-1001, Sampling and Analysis for Non-Regulatory Specification Chemistry, Rev. 34  
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OMMM-015, Operation and Inspection of Cranes and material Handling Equipment, Rev. 39  
OPM-CRN501, PM for the Fixed Gantry and Track Cranes, Rev. 2  
OENP-2704, Administrative Control of the NRC Generic Letter 89-13 Requirements, Rev. 8  
OPM-STU500, Service Water Intake Structure Inspection and Cleaning, Rev. 12  
OE&RC-3295, Intake Canal Monitoring, Rev. 13  
EGR-NGGC-0351, Condition of Monitoring of Structures, Rev. 12  
EGR-NGGC-0015, Containment Inspection Program, Rev 3  
0PM-STU500, SWIS Inspection and Cleaning, Rev 12  
0E&RC-3250, Groundwater Monitoring Program, Rev 22  
0SPP-PIX503, Excavation and Backfill, Rev 1  
ESP Training Guide TG-SE02, System Engineering Generic Self Study Guide, Rev 0  
ESP Training Guide TG-SE01, System Engineering Generic Self Study Guide, Rev 0  
ESP Training Guide ESG0019B, Discipline Specific Training Guide-Civil Engineer, Rev 1  
0BNP-TR-009, Maintenance Rule Structural Walkdown Technical Report, Rev 0  
BSEP Specification No. 008-001, Excavation, Backfill and Compaction Work General Plant Area, Rev 3  
0RXB-0024, BNP Masonry Block Wall HCLPF Determination for the IPEEE (GL88-20 Supplement 4), Rev 0  
0SP-93-032, In-Service Inspection Tendon Surveillance Program, Rev 2  
0RXB-0016, Fuel Pool Girder ISI, Rev 0  
OPT-20.3, Local Leak Rate Testing, Rev 59  
OPT-20.3a.1, B21-F022A and B21-F028A Leak Test, Rev 12  
OPT-20.3B, Local Leak Rate testing of the Personnel Airlock, Rev 10  
OPT-20.3C, Personnel Airlock Interior and Exterior Doors Leak Rate Test, Rev 8  
0BNP-TR-002, First Containment Inspection Interval Containment Inspection Program, Rev 6  
TG-ES8123B, Local Leak Rate Testing of Appendix J and Inservice Testing (IST), Rev 2  
TG-ESG0001B, Containment Inspection Program, Rev 0  
TG-ESG0002B IWE/IWL Responsible Engineer, Rev 0  
TG-ESG0014B IWL Concrete Examiner, Rev 0  
0PLP-08, Repair/Replacement Program, Rev 23  
NDEP-0613, VT-3 Visual Examination of Nuclear Power Plant Components, Rev 18  
NGGM-PM-0011, NDEP-A, Nuclear NDE Program and Personnel Process, Rev 10  
0ENP-16, Procedure for Administrative Control of Inservice Inspection Activities, Rev 43  
0ENP-16.2, Administrative Control of ASME Section XI Non-Destructive Examination Program, Rev 16  
0ENP-16.15 Administrative Procedure for Components Support and Snubber Program, Rev 14  
OPT-20.5.1, Primary Containment Inspection, Rev 13  
Third Inspection Interval ISI Program Plan for Class 1, 2 & 3 Components and their supports, Rev 10

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 0ENP-16.8, Containment Leakage Tracking, Rev 21  
 0PT-20.5, Integrated Primary Containment Leak Rate Test (ILRT), Rev 45  
 0RIP-1013, Drywell Liner Repair, Rev 8  
 Specification 015-001, Containment Structure Steel Liners, Rev 6  
 1RIP-1225, Repair of Drywell Personnel Hatch Penetration and Vent Line Penetration to the Torus, Rev 2

## Plant Data and Test Results

SE-REA-074/94; Neutron Dosimetry Results for the Surveillance Capsule Removed at the Conclusion of Fuel Cycle 8 dated June, 1994  
 Analysis of the 300 Deg Capsule from Brunswick Unit 2 Reactor Vessel dated November, 1996  
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 25th Year Physical Surveillance Unit 1 and Unit 2 Fuel Pool Girder Tensioning System at the Brunswick Nuclear Plant, Rev 0  
 Self Assessment Report # 51710, IEW/IWL Implementation-BNP, 01/15/02  
 Self Assessment Report # 27642, Snubber/Pipe Support Program, 10/30/02  
 B115R1 Local Leakage Rate Outage Summary Report, 06/07/04  
 B114R1 Local Leakage Rate Outage Summary Report, 05/29/02  
 B113R1 Unit 1 LLRT Outage Summary Report, 05/22/00  
 B112R1 Unit 1 LLRT Outage Summary Report, 06/02/98  
 B111R1 Unit 1 LLRT Outage Summary Report, 11/19/96  
 B217R1 Local Leakage Rate Outage Summary Report, 06/20/05  
 B216R1 Local Leakage Rate Outage Summary Report, 06/07/04  
 B215R1 Unit 2 LLRT Outage Summary Report, 04/03/01  
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 Calculation 0RIP-1013, Drywell Liner Repair, Rev 8  
 Calculation 10RIP-1225, Repair of Drywell Personnel Hatch Penetration and Vent Line Penetration to the Torus, Rev 6  
 EER No. 93-0417, Unit 1 Drywell Liner Corrosion Inspection and Corrective Action, Rev 0  
 ESR # 9400506, Unit 2 Spent Fuel Leak, Rev 0  
 ESR # 9700015, U-2 Spent Fuel Pool Leak Evaluated Leak Condition, Rev 0  
 OPT-34.6.7.7 Fire Barrier Penetration Seals Service Water Intake Structure, Rev 0, 2/14/05  
 OPT-34.6.7.8 Fire Barrier Penetration Seals Control Building Rev. 9, 12/11/01, 8/15/02  
 OPT-34.6.7.10, Fire Barrier Seals Diesel Building, Rev. 10, 4/3/05  
 1PT-34.6.7.5, Fire Barrier Penetration Seals Reactor/Turbine Building, Rev. 10, 4/28/03, 10/21/04  
 2PT-34.6.7.6, Fire Barrier Penetration Seals Reactor/Turbine Building, Rev. 9, 4/25/01, 6/15/04  
 OPT-34.1.1.0 Fire Pump Test (Motor Driven & Engine), Rev. 17, 5/25/05

OPT-34.5.5.0 Engine and Electric Fire Pump Functional Test, Rev. 22, 1/29/03, 7/20/04  
 OMST-DP500R Fire Pump Diesel Engine Annual Inspection, Rev. 5, 5/12/04  
 OPT-34.35.1.5 Halon Fire Extinguishing System Liquid Level and Cylinder Pressure, Rev. 7, 12/9/04  
 OPT-34.4.2.1 Diesel Generator Building Halon System, Rev. 2, 4/18/05  
 OPT-34.4.2.0 Carbon Dioxide Cylinder Weight Verification, Rev 10, 1/28/05  
 1PT-34.5.3.1 HPCI High Pressure CO2 Operability Test, Rev. 16, 1/24/05  
 2PT-34.5.3.2 HPCI High Pressure CO2 Operability Test, Rev. 10, 11/15/04  
 OPT-34.7.1.0 Fire Suppression Water System Flow Test, Rev 10, 3/30/04  
 OPT-34.7.2.1 Hose Station Flow, Rev. 4, 4/20/05

### **Plant Drawings**

D-02040-LR, Units 1&2 Condensate & Demineralized Water Transfer Systems Piping Diagram, sheet 1A, Rev. 2  
 D-2035, Piping Diagram, Moisture Separator Heater Drains System, Rev. 18  
 F-02585-LR, Units 1&2 Service Bldg. Misc. Services Nitrogen and Off Gas Piping Diagram, sheet 1, Rev. 0  
 FP 9527-2627, Units 1&2 Fire Protection Tank General Plan, Rev. 6  
 0-FP-12626, Condensate Storage Tank General Plan, Rev. E  
 0-FP-20203, General Plan, Diesel Fuel Oil Storage Tank, Units 1&2, Rev. C  
 0-FP-20072, Piping Layout, Fuel Oil system, Rev. A  
 UE&C dwg. 9527-LL-2230, BSEP Fuel Oil Storage Tank, Rev. 1

### **Action Requests (AR)**

AR 129397 SACR. Elevated Reactor Vessel Conductivity Due to Resin Intrusion, 6/12/04  
 AR 124341, Unit 1 Startup, Coolant and Condensate Chemistry Parameters in Action Level 1&2, 6/26/04  
 AR 097766, Plant Buried Piping Vulnerability Review, 7/2/03  
 AR 005010, ANI Audit Observations Associated with Monitoring Underground Piping and Above Ground Carbon Steel Tanks, 11/9/95  
 AR 00101738, Intake Canal Sedimentation, 08/12/03  
 AR 00100627, BSEP License Renewal Implementation Change Management Plan, 08/11/03  
 AR 00150153, Masked Concrete Degradation, 02/03/05  
 AR 00150706, Track Structural Operability Reviews Associated with Concrete  
 AR 00121086, 1X2 Personnel Airlock Penetration Sleeve Below Min Wall, 03/11/04  
 AR 00153060, Bulging of the 2 x 2 Personnel Airlock Penetration Sleeve, 03/08/05  
 AR 00096712, Corroded Steel Bulkhead at Intake Structure, 06/19/03  
 AR 00088485, Program Improvement for Appendix J, 03/24/03

### **Aging Management Program Implementation Plans**

AR 100627-28, Section XI: IWB, IWC and IWD Inservice Inspections Implementation Plan  
 AR 100627-25, Water Chemistry Program Implementation Plan  
 AR 100627-32, Reactor Head Closure Studs Program Implementation Plan  
 AR 100627-45, Flow Accelerated Corrosion (FAC) Program Implementation Plan  
 AR 100627-41, Bolting Integrity Program Implementation Plan  
 AR 100627-42, Open Cycle Cooling Water (OCCW) Program Implementation Plan

AR 100627-43, Closed Cycle Cooling Water (CCCW) Program Implementation Plan  
 AR 100627-30, Fire Protection Program Implementation Plan  
 AR 100627-29, Fire Water Program Commitment/Credited Activity Summary  
 AR 100627-37, Reactor Vessel Surveillance Program Implementation Plan  
 AR 100627-47, Fatigue Monitoring Program Implementation Plan  
 AR 100627-26, Reactor Vessel and Internals Structural Integrity Program Implementation Plan  
 AR 100627-36, Systems Monitoring Program Implementation Plan  
 AR 100627-44, Preventive Maintenance Program Implementation Plan  
 AR 100627-33, Above Ground Carbon Steel Tanks Program  
 AR 100627-34, Selective Leaching Program  
 AR 100627-40, One-Time Inspection Program  
 AR 100627-46, Fuel Oil Chemistry Program  
 AR 100627-35, Buried Piping and Tank Program  
 AR 100627-25, Water Chemistry Program  
 AR 100627-39, Protective Coating Monitoring and maintenance Program

### **Work Orders**

Work Order (WO) 00582039-01, 20' Turbine Building Performance Walkdown During B217R1 by System Engineering, 04/06/05  
 WO 00582039-02, TB Zone 0-1 CW Discharge Tunnel System Engineering Performance Walkdown, 04/06/05  
 WO 00378427-01, Unit 1 SW and SCW Pump Silt and Bio Cleaning, 09/22/03  
 WO 00388555-01, Unit 2 SW and SCW Pmp Bay Silt and Biosilt Cleaning, 09/08/03  
 WO 00203219-02, Repair the overhead concrete beam in SWB, 09/22/04  
 WO 00579572-06, Torus 2 Elevation 0' 0351 Inspection Walkdown, 03/18/05  
 WO 00584530-02, 5' DW Liner Plate-Engineering Identified Bulged Areas, 03/17/05  
 WO 00393924-01, Drywell Metallic Liner, 03/17/04  
 WO 00589254-01, Perform Ultrasonic Testing of Intake, 06/23/05  
 WO 00334928-01, Fire Pump Diesel Engine annual Inspection, 5/12/04

### **Miscellaneous Documents**

EGR-NGGC-0501 Nuclear Plant License Renewal Program, Rev. 9  
 BWRVIP Response to NRC Requests for Additional Information on BWRVIP-116 dated January 11, 2005  
 BNP-LR-103, Mechanical Component Screening Results, Rev. 6  
 BNP-LR-013, SSCs In Scope for Spatial Interaction, Rev. 2  
 BNP-LR-104, License Renewal Mechanical Screening Calculation for Steam and Power Conversion Systems, System 3030 - Moisture and Reheater Drain System, System 3060 - Heater Drains & Misc. Vents and Drains, Rev. 3  
 BNP-LR-006, Alternative Radiological Source Term LR Scoping Calculation, Rev. 1  
 BNP-LR-349, License Renewal aging Management Review ire Protection CO2 system (6195), Rev. 0  
 BNP-LR-004, Fire Protection (FP) System/Structure Scoping for License Renewal, Rev 5  
 BNP-LR-300, Electrical Integrated Plant Assessment (IPA), Rev. 1  
 BSEP letter, 98-0204, BSEP Response to GL 98-04, dated 11/11/98  
 BSEP Units 1&2 Coatings Exempt Log  
 ESR- 99-00518, Engineering Service Request, Corrosion Effects on Condensate Storage Tanks, Rev. 2

BSEP Annual Chemistry Report, 2004  
Action Request (AR) 156589, Significant Adverse Condition Report (SACR) , Elevated Reactor Conductivity Due to Resin Intrusion, 4/16/05  
BSEP Report B-EC-03-01, Environmental And Chemistry Assessment, 8/5/03  
BSEP Unit 1 Chemistry Data for June, 2003 - June 2005  
BWRVIP-94, BWR Vessel and Internals Project Program Implementation Guide, Final Report, Aug, 2001  
BSEP License Renewal Steering Committee Minutes, 7/05  
BNP Engineering Assessment B-ES-04-01, dated September 24, 2004 (NAS 04-058)  
BNP-LR-335, AMR Closed Cooling Water Systems, Rev. 1  
BNP-LR-11, Operating Experience (OE) Review of Materials and Programs for License Renewal, Rev. 0  
BNP-LR-503, Crane Fatigue Time-Limited Aging Analysis Review, Rev. 0  
BNP-LR-334, License Renewal Aging Management Review Service Water Systems, Rev. 2  
BNP-LR-371, License Renewal Civil Aging Management Review for Structures and Components Outside Containment, Rev 3  
BNP-LR-372, License Renewal Civil Aging Management Review for Primary Containment System, Rev 1  
Licensee Event Report (LER) 1-92-012, Emergency Diesel Generator Building Internal Wall Seismic Support Bolting was Defectively installed during plant construction (Supplement 3), 09/30/93

## **BRUNSWICK STEAM ELECTRIC PLANT**

### **AGING MANAGEMENT PROGRAMS SELECTED FOR INSPECTION**

ASME SECTION XI, INSERVICE INSPECTION, SUBSECTIONS IWB,  
IWC AND IWD PROGRAM  
WATER CHEMISTRY PROGRAM  
REACTOR HEAD CLOSURE STUDS PROGRAM  
BWR STRESS CORROSION CRACKING PROGRAM  
FLOW-ACCELERATED CORROSION PROGRAM  
BOLTING INTEGRITY PROGRAM  
OPEN-CYCLE COOLING WATER SYSTEM PROGRAM  
CLOSED-CYCLE COOLING WATER SYSTEM PROGRAM  
INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD  
HANDLING SYSTEMS PROGRAM  
FIRE PROTECTION PROGRAM  
FIRE WATER SYSTEM PROGRAM  
ABOVEGROUND CARBON STEEL TANKS PROGRAM  
FUEL OIL CHEMISTRY PROGRAM  
REACTOR VESSEL SURVEILLANCE PROGRAM  
ONE-TIME INSPECTION PROGRAM  
SELECTIVE LEACHING OF MATERIALS PROGRAM  
BURIED PIPING AND TANKS INSPECTION PROGRAM  
ASME SECTION XI, SUBSECTION IWE PROGRAM  
ASME SECTION XI, SUBSECTION IWL PROGRAM  
ASME SECTION XI, SUBSECTION IWF PROGRAM  
10 CFR PART 50, APPENDIX J PROGRAM  
MASONRY WALL PROGRAM  
STRUCTURES MONITORING PROGRAM  
PROTECTIVE COATING MONITORING AND MAINTENANCE PROGRAM  
ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR  
50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM  
ELECTRICAL CABLES NOT SUBJECT TO 10 CFR 50.49  
ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN  
INSTRUMENTATION CIRCUITS PROGRAM  
INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10  
CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM  
REACTOR VESSEL AND INTERNALS STRUCTURAL INTEGRITY PROGRAM  
SYSTEMS MONITORING PROGRAM  
PREVENTIVE MAINTENANCE PROGRAM  
PHASE BUS AGING MANAGEMENT PROGRAM  
FUEL POOL GIRDER TENDON INSPECTION PROGRAM

## LIST OF ACRONYMS USED

AMP	Aging Management Program
AR	Action Request
BNP	Brunswick Nuclear Plant
BSEP	Brunswick Steam Electric Plant
BWR	Boiling Water Reactor
CAP	Corrective Action Program
CCCW	Closed Cycle Cooling Water System
CST	Condensate Storage Tank
ECCS	Emergency Core Cooling Systems
EDG	Emergency Diesel Generator
EQ	Environmental Qualification Program
FAC	Flow Assisted Corrosion
FP	Fire Protection
FPGT	Fuel Pool Girder Tendon inspection program
FPWST	Fire Protection Water Storage Tank
GALL	Generic Aging Lessons Learned document - NUREG-1801
GL	Generic Letter
HX	Heat Exchanger
IEB	Inspection & Enforcement Bulletin
IN	Information Notice
IR	Insulation Resistance
ISI	Inservice Inspection
JW	Jacket Water System
LOCA	Loss of Coolant Accident
LR	License Renewal
LRA	License Renewal Application
LRT	Leak Rate Test
NDE	Non Destructive Examination
NRR	NRC Office of Nuclear Reactor Regulation
OCCWS	Open Cycle Cooling Water System
RAI	Request for Additional Information
RBCCW	Reactor Building Closed Cooling Water System
RCS	Reactor Coolant System
RG	Regulatory Guide
RHR	Residual Heat Removal System
RHRSW	Residual Heat Removal Service Water System
RV	Reactor Vessel
RWST	Refueling Water Storage Tank
SBO	Station Blackout Event
SCC	Stress Corrosion Cracking
SFP	Spent Fuel Pool
SMP	Structures Monitoring Program
SR	Safety Related
SSC	Systems, Structures, and Components
SWIS	Service Water Intake Structure
TLAA	Time Limited Aging Analysis
UFSAR	Updated Final Safety Analysis Report
VIP	Vessel and Internals Program
WO	Work Order