10 CFR 50.54(f)

CP&L
A Progress Energy Company

Serial: RNP-RA/02-0072

MAY 17 2002

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

SUBMITTAL OF 60-DAY RESPONSE TO NRC
BULLETIN 2002-01, "REACTOR PRESSURE VESSEL HEAD
DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY"

Ladies and Gentlemen:

Pursuant to 10 CFR 50.54(f), Carolina Power and Light (CP&L) Company hereby submits the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, 60-day response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity." Specifically, Item 3.A of NRC Bulletin 2002-01 (the "Bulletin") requires that the following information related to the remainder of the reactor coolant pressure boundary be submitted within 60 days of the issuance of the Bulletin:

"3.A The basis for concluding that the boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and the Bulletin. If a documented basis does not exist, provide plans, if any, for a review of these programs."

The HBRSEP, Unit No. 2, 15 day response to NRC Bulletin 2002-01, Items 1.A through 1.E, was provided by letter dated April 1, 2002.

Attachment I to this letter provides an affirmation in accordance with 10 CFR 50.54(f).

Attachment II to this letter provides the information required by Item 3.A of the Bulletin. Included within this attachment is the conclusion that the HBRSEP, Unit No. 2, boric acid inspection program associated with the remainder of the reactor coolant pressure boundary is in compliance with the applicable regulatory requirements identified in Generic Letter 88-05 and NRC Bulletin 2002-01.

A095

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3581 West Entrance Road
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Attachment III provides inspection scope examples for boric acid inspection program procedures.

If you have any questions regarding this submittal, please contact Mr. C. T. Baucom.

Sincerely,

B. L. Fletcher III
Manager - Regulatory Affairs

CTB/ctb

Attachments:

I. Affidavit
II. 60-Day Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"
III. Inspection Scope Examples for Boric Acid Inspection Program Procedures

References:

1. HBRSEP, Unit No. 2, Submittal of Information Requested by NRC Bulletin 2002-01, Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity, dated April 1, 2002.
2. CP&L Response to NRC Generic Letter 88-05, dated May 27, 1988.
3. NRC Letter to Mr. E. E. Utley, Subject: "H. B. Robinson Steam Electric Plant, Unit No. 2, and Shearon Harris Nuclear Power Plant, Unit 1 - Response to Generic Letter 88-05 (TAC NOS. 68493, 68922)."

c: Mr. L. A. Reyes, NRC, Region II
Mr. R. Subbaratnam, NRC, NRR
NRC Resident Inspectors

Affidavit

State of South Carolina
County of Darlington

J. W. Moyer, having been first duly sworn, did depose and say that the information contained in letter RNP-RA/02-0072 is true and correct to the best of his information, knowledge, and belief, and the sources of his information are officers, employees, contractors, and agents of Carolina Power and Light Company.

Sworn to and subscribed before me
this 17th day of May, 2002

Notary Public for South Carolina

My commission expires: Oct. 10, 2010

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261
LICENSE NO. DPR-23

ATTACHMENT II TO SERIAL: RNP-RA/02-0072

60-Day Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

60-DAY RESPONSE TO NRC BULLETIN 2002-01, "REACTOR PRESSURE VESSEL DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY"

NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," (the "Bulletin") requires that within 60 days of the issuance of the Bulletin all PWR addressees submit to the NRC the following information related to the remainder of the reactor coolant pressure boundary:

> "The basis for concluding that your boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and this bulletin. If a documented basis does not exist, provide your plans, if any, for a review of your programs."

H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, has and maintains programs and procedures to detect and address borated water leakage that may potentially affect the integrity of the reactor coolant pressure boundary. These programs and procedures encompass:

- the determination of principal locations where leaks that are smaller than the allowable Technical Specifications (TS) limit can cause degradation of the primary pressure boundary by boric acid corrosion
- locating small reactor coolant system (RCS) leaks, i.e., leakage rates less than the TS limits
- methods for conducting examinations and performing engineering evaluations to establish the impact on the reactor coolant pressure boundary when leakage is located
- corrective actions to prevent recurrence of this type of corrosion

These programs and procedures, when taken collectively, provide assurance of the long-term materiel condition, structural integrity, and leak-tightness of the reactor coolant pressure boundary. More specific information regarding these programs and procedures is provided in the following paragraphs.

I. Program Definition and Responsibility

In response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," dated March 17, 1988, HBRSEP, Unit No. 2, implemented a systematic program to monitor locations where boric acid leakage could occur and implement measures to prevent the degradation of the RCS pressure boundary by borated water corrosion. This program is documented and maintained within the HBRSEP, Unit No. 2, Plant Operating Manual as Plant Program Procedure (PLP) - 040, "Program for Prevention of Boric Acid Corrosion of RCS Carbon Steel Bolting (Generic Letter 88-05)." The intent of this procedure is to detail the program for identification, evaluation, repair, and prevention of boric acid corrosion of carbon steel components forming the reactor coolant primary pressure boundary.

PLP-040 outlines specific activities and inspection boundaries, and supplements the requirements of other surveillances for the inspection and disposition of borated system leakage and any resultant corrosion of primary pressure boundary "targets," including other safety-related components. These surveillances include:

- Operations Surveillance Test (OST) - 053, "Inspection for Reactor Coolant System Leakage (Prior To and Following Cooldown) (Refueling Interval)"

- Engineering Surveillance Test (EST) - 083, "Inservice Inspection Pressure Testing of Reactor Coolant System (Refueling Shutdown Interval)"

- OST-052, "RCS Leakage Test and Examination Prior to Startup Following an Opening of the Primary System (Refueling and/or Startup Interval)"

Additional pertinent details of PLP-040 are summarized as follows:

- Visual examinations may be conducted without removal of insulation. However, for leakage examinations of components with external insulation surfaces and joints not accessible for direct visual examination, the surrounding area (including the floor, equipment surfaces underneath the inaccessible component, and other areas where leakage may be channeled) shall be examined for evidence of component leakage.

- Discoloration, staining, boric acid residue, and other evidence of leakage on insulation surfaces and the surrounding area shall be given particular consideration as evidence of component leakage. If evidence of leakage is found, the exact source is determined.

- When leakage is discovered, the leak/spray path shall be investigated, removing insulation as necessary, to determine the extent of any component degradation.

- Borated system leakage from the sources of any other borated system in the vicinity of the primary pressure boundary "targets" which could leak/spray on these "targets" is not acceptable. These leaks must be repaired or evaluated (and documented) to assure continued reactor coolant pressure boundary integrity.

- Boric acid corrosion of the "targets" shall be evaluated in accordance with the provisions of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, IWA-5000 and IWB-3000, with regard to structural integrity.

PLP-040, Section 7.7, "Corrective Measures," prescribes the actions to be taken in response to the identification of boric acid leakage or residue on carbon steel components associated with the RCS pressure boundary. Paragraph 7.7.3 of this section states, "If carbon and low-alloy steel components are exposed to boric acid, the component shall be cleaned of all boric acid and corrosion product and visually inspected (VT-3). For severe damage, ultrasonic and dye penetrant inspections of the affected components may be necessary."

II. Inspection Scope and Frequency

As noted above, PLP-040 outlines specific activities and inspection boundaries, and supplements the requirements of other surveillances for the inspection and disposition of borated system leakage and any resultant corrosion of primary pressure boundary "targets," including other safety-related components. The inspection scope and frequency of these implementing surveillances is described in more detail below.

OST-053

Each refueling interval, prior to plant cooldown for refueling, an inspection is performed to identify areas of leakage and boric acid corrosion of the RCS using OST-053, "Inspection for Reactor Coolant System Leakage (Prior To and Following Cooldown) (Refueling Interval)."

The visual examination of the RCS for leakage is performed with the reactor subcritical and RCS pressure greater than 2000 psig. Inspection scope examples associated with

OST-053 are detailed within Attachment III, but generally include the RCS, reactor vessel head, pressurizer, and connected systems. Procedural instructions for accomplishing this visual examination are summarized as follows:

- Without removal of insulation, inspect the exposed surfaces of and joints in component insulation to locate evidence of reactor coolant leakage, and floor areas directly underneath components for evidence of accumulated leakage.

- Inspect the lowest terminal ends of insulation joints along vertical surfaces of vessel walls and piping for leakage indication.

- Inspect insulation joints along horizontal surfaces of components where accessible for leakage indication. Where areas are inaccessible, inspect adjacent areas where potential leakage from the inaccessible area would be channeled.

- At locations where reactor coolant leakages are normally expected, inspect to verify that leakage collection systems are operative.

- During inspections focus particular attention to insulated areas of pressure boundary components constructed of ferritic steels to detect evidence of boric acid residues.

- Inspect safety-related components in the vicinity of identified leaks for boric acid corrosion.

OST-053 also provides that, after RCS cooldown and the reactor vessel head has been removed, an inspection (boric acid inspection) for leakage and corrosion will be performed on the RCS and on the control rod drive mechanism (CRDM) housings.

EST-083

Inservice pressure testing of code class pressure retaining components of the RCS is performed on a refueling interval frequency in accordance with plant procedure EST-083, "Inservice Inspection Pressure Testing of Reactor Coolant System (Refueling Shutdown Interval)," which satisfies ASME Code requirements. This surveillance test is performed at the conclusion of each refueling outage and includes two examinations:

1. While the RCS is less than 200 degrees F, with insulation removed as directed by the Inservice Inspection (ISI) Specialist, an examination is performed for evidence of leakage at the pressure retaining boundary bolted connections identified by EST-083.

2. With the RCS pressurized and in a normal alignment, an examination for leakage is performed within the boundaries established by EST-083.

Inspection scope examples associated with EST-083 are detailed within Attachment III, but generally include the RCS, reactor vessel head, pressurizer, and connected systems. The examination criteria for performance of these inspections are summarized as follows:

Non-Insulated Components

- Conduct VT-2 visual examinations by examining accessible external exposed surfaces of pressure retaining components for evidence of leakage.

- For components whose external surfaces are inaccessible for direct VT-2 visual examination, examine the surrounding area (including floor areas or equipment surfaces located underneath components) for evidence of leakage.

- When examining bolted connections, the VT-2 examiner shall accurately identify any leakage and shall produce a detailed sketch documenting the exact location of any affected bolting and attach this record to the surveillance test procedure.

Insulated Components

- For systems borated for the purpose of controlling reactivity, remove insulation from pressure-retaining bolted connections and perform a visual examination.

- When examining bolted connections, the VT-2 examiner shall accurately identify any leakage and shall produce a detailed sketch documenting the exact location of any affected bolting and attach this record to the surveillance test procedure.

- For other components, conduct a VT-2 visual examination without removal of insulation by examining accessible and exposed vertical surfaces of insulation. Essentially vertical surfaces need only be examined at the lowest elevation where leakage may be detectable. Essentially horizontal surfaces on insulation shall be examined at each insulation joint.

- Examine the surrounding area of all accessible and inaccessible system components (including floor areas or equipment surfaces located underneath components) for evidence of leakage, or other areas to which such leakage may be channeled.

- Inspect for discoloration, staining, or residue on surfaces to detect evidence of boric acid accumulation from borated reactor coolant leakage.

Components With Leakage Collection Systems

- Verify by VT-2 visual examination that leakage collection systems are operative where leakage from components are normally expected and collected (such as valve stems, pump seals, or vessel flange gaskets).

OST-052

After refueling or normal opening of the primary system, OST-052, "RCS Leakage Test and Examination Prior to Startup Following an Opening of the Primary System (Refueling and/or Startup Interval)," is performed to provide for a system leakage test of the reactor coolant pressure boundary in accordance with Section XI of the ASME Code. This OST is also intended to provide an inspection for borated system leakage and corrosion as part of the overall program described by PLP-040. OST-052 is generally performed at or above the normal operating pressure of the RCS.

If EST-083 is being performed in conjunction with this OST, the boric acid inspection results will be documented by EST-083, and the corresponding portions of OST-052 will be marked "not applicable." Examples of the inspection scope associated with OST-052 are described in Attachment III, but generally include the RCS, reactor vessel head, pressurizer, and connected systems. The examination criteria for performance of boric acid inspections performed under OST-052 are summarized as follows:

- Visual examination may be conducted without the removal of insulation. Accessible joints and exposed surfaces of the insulation and floor areas directly underneath components shall be examined for evidence of reactor coolant leakage.

- Inspect the lowest terminal ends of insulation joints along vertical surfaces of vessel walls and piping for leakage indication.

- Inspect insulation joints along horizontal surfaces of components where accessible for leakage indication. Where areas are inaccessible, inspect adjacent areas where potential leakage of the inaccessible area would be channeled.

- At locations where reactor coolant leakage is expected, inspect to verify that leakage collection systems are operative.

- Inspect with particular focus on insulated areas of components constructed of ferritic steels to detect evidence of boric acid residues which might have accumulated during the service period preceding the inspection (these components are identified as "targets" within PLP-040).

Other Monitoring Procedures

In addition to the boric acid program inspection procedures described above, HBRSEP, Unit No. 2, has and maintains procedures for the routine monitoring of RCS operational and pressure boundary leakage. These procedures are associated with leakage monitoring activities such as those described within NRC Information Notice 2002-13, "Possible Indicators of Ongoing Reactor Pressure Vessel Head Degradation." For example, routine operational leakage monitoring is performed in accordance with TS Surveillance Requirement (SR) 3.4.13.1 by plant procedure OST-051, "Reactor Coolant System Leakage Evaluation (Every 72 Hours During Steady State Operation and Within 12 Hours After Reaching Steady State Operation)." Also, both normal and abnormal operating procedures are provided for response to containment area radiation monitor alarms or malfunctions. The potential for containment air cooler fouling is addressed by plant maintenance procedures that provide instructions for inspection and cleaning of safety-related heat exchangers.

III. Training

Training and qualification of personnel who perform surveillances in support of the boric acid inspection program are generally designated by the implementing surveillance procedure.

Operations Surveillance Tests (OSTs) are the responsibility of the Operations organization and are conducted by personnel who have been trained and qualified by the accredited operations training program. With respect to OST-051, OST-052, and OST-053, local or in-plant actions, such as leakage examinations or valve operations, are performed by personnel qualified at or above the Auxiliary Operator (non-licensed operator) level. Control Room activities, such as system monitoring, data collection, or plant maneuvering, are performed or overseen by licensed Operations personnel. Upon completion of surveillance test procedures, results are reviewed for acceptability by the Operations Shift Technical Advisor, and are approved by the Superintendent Shift Operations (the Senior Reactor Operator in charge of the shift).

Qualified Quality Control (QC) Inspectors are designated to perform certain specific inspections associated with the boric acid inspection program. OST-053 requires that qualified QC personnel perform the visual inspection of the reactor vessel head, including the CRDM housings, after it has been removed to its storage area. EST-083 is performed by personnel qualified to perform VT-2 visual examinations and requires that examiners use an approved VT-2 Examination Procedure in conjunction with this surveillance. Upon completion of this surveillance test procedure, results are reviewed for acceptability by ISI personnel, and approved by the Supervisor - Programs within the Engineering organization.

Training and qualification requirements for the boric acid inspection program are supplemented by the use of pre-job briefings and application of industry operating experience. As noted within EST-083, such a pre-job briefing is performed to brief test personnel on their responsibilities for performing this procedure. Operations procedures identify that normally a pre-job briefing is conducted for tests having an interval of greater than one week, e.g., OSTs - 052 and 053. These pre-job briefings create the opportunity to provide clear guidance concerning required actions to properly establish the conditions for the test or evolution. As noted within the HBRSEP, Unit No. 2, response to NRC Bulletin 2001-01, dated September 4, 2001, such briefings provided the opportunity to familiarize VT-2 qualified inspectors on the issue of vessel head penetration (VHP) nozzle leakage at Oconee Nuclear Station prior to the performance of similar inspections on the HBRSEP, Unit No. 2, reactor vessel head.

IV. Response to Leakage

OST-053

Inspections performed to identify areas of leakage and boric acid corrosion in the RCS using OST-053 include specific Acceptance Criteria that is used to determine whether the test may be considered satisfactory or acceptable. A summary of these Acceptance Criteria is provided as follows:

- Leakage at locations where leakage collection systems do not exist is unacceptable and must be repaired, or a written evaluation justifying leakage must be prepared.

- Carbon steel pressure boundary components corroded by boric acid residue shall be evaluated in accordance with the provisions of IWB-3000 with regard to structural integrity. Components constructed of or containing carbon steel pressure boundary parts are identified as "targets" in PLP-040.

- Other safety-related components corroded by boric acid residue shall be evaluated per applicable codes and standards with regard to structural integrity.

OST-053 provides for a visual examination of the RCS with the reactor subcritical and RCS pressure greater than 2000 psig. In the event that leakage of the reactor coolant is detected during this visual examination, the source of leakage must be located, and the results and comments associated with the inspection be listed and defined. The procedure further instructs that Maintenance personnel remove insulation as necessary. Corrective actions are initiated for any leakage detected and corrosion caused by boric acid residues.

OST-053 also provides for an inspection (boric acid inspection) for leakage and corrosion for the RCS and CRDM housings after RCS cooldown and the reactor vessel head has been removed. If leaks or significant corrosion are evident, the Manager - Operations is notified.

EST-083

EST-083 is performed to satisfy ASME Code requirements for inservice pressure testing of the code class pressure retaining components of the RCS. The Acceptance Criteria for performance of this test are summarized as follows:

- All observed leakage identified during performance of the test must be documented and categorized.

- All test exceptions must be reviewed by the test engineer and evaluated in accordance with PLP-040.

- No through-wall leakage exists on any piping system examined during the performance of the test. Or, if through-wall leakage has been detected, the through-wall leakage has been addressed by a corrective maintenance work order, an engineering evaluation, or both.

As noted above, for non-insulated components, when examining bolted connections, the VT-2 examiner shall accurately identify any leakage and shall produce a detailed sketch documenting the exact location of any affected bolting and attach this record to the surveillance test procedure.

In addition, EST-083 prescribes corrective measures to be taken in the event that leakage is identified. These corrective measures are summarized as follows:

- Locate and evaluate the source of leakages detected during the system pressure test:

  - Initiate a work order to perform corrective measures.
  - For leakage occurring at a bolted connection, perform a VT-1 visual examination for corrosion, and evaluate in accordance with Relief Request-10.
  - If boric acid residue is detected, locate the leakage source and areas of general corrosion. Evaluate any component with local areas of general corrosion that reduce wall thickness by more than 10 percent to determine whether the component may be acceptable for continued service, or whether repair or replacement is required (Reference PLP-040).

- Document as "test exceptions" leakage or evidence of leakage identified by the examiner from component mechanical connections (flanges, bolted and threaded connections, etc.), and valve and pump packing glands without leakage collection systems. Include documentation of boric acid corrosion of carbon steel pressure boundary components or other safety-related components.

- Document as "test deficiencies" flow impairments and leakage, or evidence of leakage, except as described above and identified by the examiner. Include the test deficiency location (component identification and name) and details of exact nature of the deficiency (weld leak, type of flow obstruction, etc.).

- The test engineer shall review all "test exceptions." Depending on the location and amount of leakage and fluid normally contained in the system, recommend repairs as considered necessary.

OST-052

OST-052 is performed in accordance with Section XI of the ASME Code for a system leakage test of the reactor coolant pressure boundary. Key acceptance criteria associated with this test are summarized as follows:

- Leakage other than at locations where leak-off collection systems exist is unacceptable. Technical Specification 3.4.13 details leakage rates which require additional action.

- Any carbon steel pressure boundary component corroded by boric acid residue shall be evaluated by engineering personnel in accordance with the ASME Code, Section XI, IWB-3000, with regard to structural integrity. The components constructed of or containing carbon steel pressure boundary parts are identified as "targets" in PLP-040.

- Any other safety related component corroded by boric acid shall be evaluated by the engineering personnel in accordance with applicable codes and standards.

- Initiate corrective action for leaks at locations not provided with leak-off collection systems for leaks resulting from through-wall flaws in pressure retaining membranes of components, and for corrosion caused by boric acid residues, as required.

As described above, specific and comprehensive actions are delineated within surveillance test procedures to respond to evidence of reactor coolant leakage identified as part of the boric acid inspection program.

V. Review of Program Effectiveness

The HBRSEP, Unit No. 2, procedure for implementation of Generic Letter 88-05, PLP-040, was implemented in December 1988. Since that time, the procedure has been improved and refined through review of both internal and external operating experience, and to reflect NRC guidance and communications in the area of boric acid corrosion and

pressure boundary degradation. It is expected that this program procedure will continue to evolve based on industry experience and future NRC communications, such as those associated with the Davis-Besse event.

The general health and effectiveness of the boric acid inspection program have been evaluated by review of surveillance tests performed during recent refueling outages. Specifically, the results of OST-053, EST-083, and OST-052 have been reviewed for Refueling Outages (RO) - 18, 19, and 20, which were conducted in 1998, 1999, and 2001, respectively. This review found that the subject surveillance tests were effective in identifying, documenting, and dispositioning evidence of reactor coolant leakage and boric acid deposition. Minor leaks, such as fitting and packing leaks, have typically been addressed as minor maintenance items that involved cleaning and leak testing. More substantive problems have typically been addressed by the corrective maintenance program, or through the involvement of the engineering organization (e.g., evidence of boric acid residue on the reactor vessel head and CRDM housings that resulted from a canopy seal weld leak). This review concluded that the boric acid inspection program surveillance tests, and the associated program controls provided by PLP-040, have been effective in the identification and resolution of reactor coolant leakage and boric acid deposition.

The effective and efficient use of operating experience information to improve safety and reliability at HBRSEP, Unit No. 2, is guided by Nuclear Generation Group (NGG) procedure CAP-NGGC-0202, "Operating Experience Program." The primary objectives of this program are to ensure lessons learned are captured from industry events, and that internal events with lessons learned are shared with the nuclear industry. The benefits of this program include preventing events that are similar to occurrences in the industry, and to increase plant personnel's awareness of industry events and issues. The operating experience program delineated within CAP-NGGC-0202 is applicable to the HBRSEP, Unit No. 2, boric acid inspection program, and will be used to foster continued program improvements that result from both internal and external operating experience.

Based on the information provided above regarding implementation of the Generic Letter 88-05 program, combined with the extensive inspection guidance contained within the boric acid inspection program procedures (e.g., OST-053, EST-083, and OST-052), and considering the discussion of Applicable Regulatory Requirements provided below, the HBRSEP, Unit No. 2, boric acid inspection program is effectively implemented.

VI. Applicable Regulatory Requirements

NRC Bulletin 2002-01, Item 3.A, requires that a basis be provided for concluding that the HBRSEP, Unit No. 2, boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and the Bulletin. These applicable regulatory requirements are identified as follows:

- 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants," including the following:

  Criteria 14, "Reactor Coolant Pressure Boundary"
  Criteria 30, "Quality of Reactor Coolant Pressure Boundary"
  Criteria 31, "Fracture Prevention of Reactor Coolant Pressure Boundary"
  Criteria 32, "Inspection of Reactor Pressure Coolant Pressure Boundary"

- 10 CFR 50.55a, "Codes and Standards"

- 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criteria V, IX, and XVI"

- Technical Specifications

General Design Criteria

The General Design Criteria (GDC) in existence at the time HBRSEP, Unit No. 2, was licensed for operation (July 1970) were contained in the proposed Appendix A to 10 CFR 50, "General Design Criteria for Nuclear Power Plants," published in the Federal Register on July 11, 1967. HBRSEP, Unit No. 2, conformance with these Proposed GDC is described within Updated Final Safety Analysis Report (UFSAR) Section 3.1, "Conformance With General Design Criteria." Applicability of these Proposed GDCs to the HBRSEP, Unit No. 2, boric acid inspection program is discussed in the following paragraphs.

Proposed GDC 9 provides the HBRSEP, Unit No. 2, design criteria that is comparable to the current GDC 14 and certain portions of the current GDC 30. The Proposed GDC 9 states the following:

> "The reactor coolant pressure boundary (RCPB) shall be designed, fabricated, and constructed so as to have an exceedingly low probability of gross rupture or significant uncontrolled leakage throughout its design lifetime."

A discussion of HBRSEP, Unit No. 2, compliance with Proposed GDC 9 is provided within UFSAR Section 3.1.2.9. Previous visual examinations of the HBRSEP, Unit No. 2, reactor coolant pressure boundary have not identified pressure boundary leakage or degradation. Based on the above and industry experience regarding the low levels of primary system leakage resulting from reactor coolant pressure boundary leakage, HBRSEP, Unit No. 2, remains in compliance with the reactor coolant pressure boundary design criteria as set forth within Proposed GDC 9.

Proposed GDC 16 provides the HBRSEP, Unit No. 2, design criteria that is comparable to the portions of GDC 30 that are not encompassed by the Proposed GDC 9. Proposed GDC 16 states the following:

> "Means shall be provided to detect significant uncontrolled leakage from the reactor coolant pressure boundary."

A discussion of HBRSEP, Unit No. 2, compliance with Proposed GDC 16 is provided within UFSAR Section 3.1.2.16. Positive indications are provided in the Control Room for the detection of leakage from the RCS to the containment. This includes the capability for continuous monitoring of containment air activity and the needed indications for monitoring of liquid inventory in process systems and the containment sump. Additionally, containment humidity and runoff from the condensate collecting pans under the cooling coils of the containment air recirculation units are displayed at the Waste Disposal Panel. As noted previously within this submittal, routine operational leakage monitoring is performed in accordance with TS SR 3.4.13.1, which requires verification that RCS operational leakage is within limits (1 gpm unidentified leakage and 10 gpm identified leakage) once within 12 hours after reaching steady state operating conditions and every 72 hours thereafter during steady state operation. Therefore, HBRSEP, Unit No. 2, remains in compliance with the reactor coolant pressure boundary leakage detection requirements as set forth within Proposed GDC 16.

Proposed GDC 34 provides the HBRSEP, Unit No. 2, design criteria that is comparable to the current GDC 31. This Proposed GDC states the following:

> "The RCPB shall be designed and operated to reduce to an acceptable level the probability of rapidly propagating type failure. Consideration is given:
>
> a) To the provisions for control over service temperature and irradiation effects which may require operational restrictions.
>
> b) To the design and construction of the reactor pressure vessel (RPV) in accordance with applicable codes, including those which establish requirements for absorption of energy within the elastic strain energy range, and for absorption of energy by plastic deformation.
>
> c) To the design and construction of RCPB piping and equipment in accordance with applicable codes."

A discussion of HBRSEP, Unit No. 2, compliance with Proposed GDC 34 is provided within UFSAR Section 3.1.2.34. As noted above, previous visual examinations of the HBRSEP, Unit No. 2, reactor coolant pressure boundary have not identified reactor coolant pressure boundary leakage or degradation. Based on the above information and

industry experience to-date regarding flaw development and propagation, HBRSEP, Unit No. 2, remains in compliance with Proposed GDC 34 regarding rapidly propagating type failures of the reactor coolant pressure boundary.

Proposed GDC 36 provides the HBRSEP, Unit No. 2, design criteria that is comparable to the current GDC 32. This Proposed GDC states the following:

> "RCPB components shall have provisions for inspection, testing, and surveillance of criteria areas by appropriate means to assess the structural and leak-tight integrity of the boundary components during their service lifetime. For the reactor vessel, a material surveillance program conforming with the current applicable codes shall be provided."

A discussion of HBRSEP, Unit No. 2, compliance with Proposed GDC 36 is provided within UFSAR Section 3.1.2.36. This UFSAR section states that the design of the reactor vessel and its arrangement in the system permits access to the entire internal surfaces of the vessel and to the following external zones of the vessel:

- the flange seal surface
- the flange outside diameter down to the cavity seal ring
- the closure head except around the drive mechanism adaptors, and
- the nozzle to reactor coolant piping welds

This UFSAR section further states that the reactor arrangement within the containment provides sufficient space for inspection of the external surfaces of the reactor coolant piping, except for the area of pipe within the primary shielding concrete. In addition to this license condition, Technical Specifications and ASME Code requirements prohibit RCS pressure boundary leakage. The inspection programs and surveillance tests described previously within this submittal are considered sufficient and appropriate for the detection and correction of reactor coolant pressure boundary leakage and any associated boric acid deposition. Therefore, HBRSEP, Unit No. 2, remains in compliance with Proposed GDC 36 regarding the capability for RCPB inspection and surveillance.

10 CFR 50.55a, Codes and Standards

10 CFR 50.55a, "Codes and Standards," requires that inservice inspection and testing be performed in accordance with the requirements of the ASME B&PV Code, Section XI, "Inservice Inspection of Nuclear Plant Components." Section XI contains applicable rules for examination, evaluation, and repair of code class components, including the reactor coolant pressure boundary.

The HBRSEP, Unit No. 2, Third Ten-Year Inservice Inspection (ISI) Interval, which commenced on February 19, 1992, was implemented in accordance with the ASME B&PV Code, 1986 Edition with no Addenda. The Fourth Ten-Year ISI Interval for HBRSEP, Unit No. 2, commenced on February 19, 2002, and has been developed in accordance with the ASME B&PV Code, 1995 Edition with 1996 Addenda.

As described previously within this submittal, ASME Code requirements for the code class pressure boundary are implemented through the performance of surveillance tests EST-083 and OST-052. These procedures prescribe corrective measures that satisfy Code requirements for the resolution of reactor coolant pressure boundary leakage and boric acid deposition.

The Acceptance Standards provided within both the 1986 and 1995 Editions of the ASME Code for the referenced VT-2 visual examinations is identified as IWB-3522, which requires correction of pressure boundary leakage prior to continued service. Additionally, both the 1986 and 1995 Editions of the ASME B&PV Code contain within IWB-3140 Acceptance Standards for visual examinations required by IWB-2500. Specifically, IWB-3142 prescribes Acceptance Standards regarding the acceptability for continued service of components whose visual examination detects relevant conditions.

As described above, HBRSEP, Unit No. 2, has and maintains procedures and programs to implement ASME Code requirements relative to the reactor coolant pressure boundary. The acceptance criterion for these procedures is that no through-wall leakage exists. Therefore, HBRSEP, Unit No. 2, remains in compliance with 10 CFR 50.55a regarding ASME Code requirements.

10 CFR 50, Appendix B

NRC Bulletin 2002-01 identified the following Criteria of 10 CFR 50, Appendix B, as being applicable to reactor coolant pressure boundary degradation and leakage:

- Criterion V, "Instructions, Procedures, and Drawings"
- Criterion IX, "Control of Special Processes"
- Criterion XVI, "Corrective Action"

HBRSEP, Unit No. 2, has and maintains the required instructions, procedures, and drawings for special processes and activities affecting quality to satisfy the requirements of 10 CFR 50, Appendix B, Criterion V and IX. As described previously within this submittal, the requirements of NRC Generic Letter 88-05 and the ASME Code are prescribed within HBRSEP, Unit No. 2, instructions and procedures.

10 CFR 50, Appendix B, Criterion XVI, requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected. Additionally,

significant conditions adverse to quality will have the cause determined and corrective actions taken to preclude repetition. HBRSEP, Unit No. 2, has and maintains programs and procedures to satisfy the requirements of Criterion XVI.

Based on the above, there is reasonable assurance that HBRSEP, Unit No. 2, has met and will continue to meet the regulatory requirements provided within 10 CFR 50, Appendix B, Criterion V, IX, and XVI.

Technical Specifications

10 CFR 50.36, "Technical Specifications," provides requirements for Technical Specifications (TS) for licenses associated with production and utilization facilities. 10 CFR 50.36(c)(2) provides requirements specific to "Limiting Conditions for Operation," and 10 CFR 50.36(c)(3) provides requirements relative to "Surveillance Requirements." The HBRSEP, Unit No. 2, Operating Licensing and TS were developed and approved in accordance with these requirements and provide Limiting Conditions for Operation (LCO), Action Statements, and Surveillance Requirements (SR) regarding the reactor coolant pressure boundary.

HBRSEP, Unit No. 2, TS 3.4.13, "RCS Operational Leakage," provides criteria and limits regarding primary system leakage, including LCO 3.4.13, which prohibits RCS pressure boundary leakage. Should pressure boundary leakage exist, Condition B would be entered which requires the unit to enter MODE 3 in six hours and MODE 5 in 36 hours. Verification that RCS operational leakage is within limits by performance of an RCS water inventory balance is performed every 72 hours during steady-state operation in accordance with SR 3.4.13.1.

As noted above under the General Design Criteria discussion, and as indicated within the HBRSEP, Unit No. 2, TS Bases for LCO 3.4.13, the RCS leakage detection systems provide the means to detect RCS leakage to the extent practical. Industry experience from reactor coolant pressure boundary leakage has shown that the associated primary system leakage can be well below TS limits and the sensitivity of on-line leakage detection systems. An RCS leak of sufficient magnitude to be detected by on-line leak detection systems would be evaluated in accordance with TS requirements and the appropriate actions taken. The current HBRSEP, Unit No. 2, TS requirements, e.g., LCOs and SRs, are consistent with the requirements of 10 CFR 50.36 and specify actions to maintain plant operations within analysis and design limits.

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261
LICENSE NO. DPR-23

ATTACHMENT III TO SERIAL: RNP-RA/02-0072

Inspection Scope Examples for Boric Acid Inspection Program Procedures

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

INSPECTION SCOPE EXAMPLES FOR
BORIC ACID INSPECTION PROGRAM PROCEDURES

OST-053 Inspection Scope Examples		
• Loop "A" Hot Leg • Loop "A" Chemical and Volume Control System (CVCS) Charging Line • Loop "A" Cold Leg & Flow Transmitter • Loop "A" Drain Line • Loop "A" Reactor Coolant Pump (RCP) Seal Injection • Loop "A" High & Low Head Safety Injection (Cold Leg) • Loop "A" Letdown Line	• Loop "B" Hot Leg and Primary Sample Line • Loop "B" Reactor Vessel Level Indicating System (RVLIS) • Loop "B" Cold Leg & Flow Transmitter Piping • Loop "B" High-Head Safety Injection (Hot Leg) • Residual Heat Removal Suction ("B" Hot Leg) • Loop "B" Excess Letdown • Loop "B" Charging Line (CVCS) • Loop "B" RCP Seal Injection • Loop "B" Low-Head/High-Head Safety Injection (Cold Leg) • Loop "B" Pressurizer Spray • Loop "B" Drain	• Loop "C" Hot Leg & Primary Sample Line • Loop "C" Pressurizer Surge Line • Loop "C" Reactor Vessel Level Indicating System • Loop "C" High-Head Safety Injection (Hot Leg) • Loop "C" Cold Leg & Flow Transmitter Piping • Loop "C" Low-Head/High-Head Safety Injection (Cold Leg) • Loop "C" Pressurizer Spray • Loop "C" Drain • Loop "C" RCP Seal Injection
• RVLIS (From Vessel Head) • Reactor Vessel Vent • Control Rod Drive Housing Area • Reactor Vessel Stud Area	• Pressurizer and Associated Piping • Pressurizer Safety Lines • Pressurizer - Power Operated Relief Valve	• Sub-Vessel Area - Including Incore Detectors Tubing; Including Seal Table

EST-083 Inspection Scope Examples **Pressure Retaining Bolted Connection Scope [1]**		
• Loop "A" Hot Leg • Loop "A" CVCS Charging Line • Loop "A" Cold Leg & Flow Transmitter • Loop "A" Drain Line • Loop "A" RCP Seal Injection • Loop "A" Seal Water Bypass Line • Loop "A" High & Low Head Safety Injection • Loop "A" Letdown Line	• Loop "B" Hot Leg and Primary Sample Line • Loop "B" RVLIS • Loop "B" Cold Leg & Flow Transmitter Piping • Loop "B" High-Head Safety Injection • Residual Heat Removal Suction ("B" Hot Leg) • Loop "B" Excess Letdown • Loop "B" Charging Line (CVCS) • Loop "B" RCP Seal Injection • Loop "B" Seal Water Bypass Line • Loop "B" Low-Head Safety Injection • Loop "B" Pressurizer Spray • Loop "B" Drain	• Loop "C" Hot Leg & Primary Sample Line • Loop "C" Pressurizer Surge Line • Loop "C" RVLIS • Loop "C" High-Head Safety Injection • Loop "C" Cold Leg & Flow Transmitter Piping • Loop "C" Low-Head Safety Injection • Loop "C" Pressurizer Spray • Loop "C" Drain • Loop "C" RCP Seal Injection • Loop "C" Seal Water Bypass Line
• RVLIS (From Vessel Head) • Reactor Vessel Vent • Control Rod Drive Housing Area • Reactor Vessel Stud Area • Reactor Vessel Level Scale Line	• Pressurizer and Associated Piping • Pressurizer Safety Lines • Pressurizer - Power Operated Relief Valve	• Sub-Vessel Area - Including Incore Detectors Tubing

[1] Inspection scope areas identified within EST-083 also specify components within each area that are to be inspected, and also denote whether these components are considered "targets" in accordance within PLP-040 and Generic Letter 88-05.

EST-083 Inspection Scope Examples **VT-2 Test Scope [1]**		
• Loop "A" Hot Leg • Loop "A" CVCS Charging Line • Loop "A" Cold Leg & Flow Transmitter • Loop "A" Drain Line • Loop "A" RCP Seal Injection • Loop "A" Seal Water Bypass Line • Loop "A" High & Low Head Safety Injection • Loop "A" Letdown	• Loop "B" Hot Leg Line • Loop "B" RVLIS • Loop "B" Cold Leg & Flow Transmitter Piping • Loop "B" High-Head Safety Injection • Residual Heat Removal Suction • Loop "B" Excess Letdown • Loop "B" Charging Line (CVCS) • Loop "B" RCP Seal • Loop "B" Seal Water • Loop "B" Low-Head • Loop "B" Pressurizer • Loop "B" Drain	• Loop "C" Hot Leg & Primary Sample Line • Loop "C" Pressurizer • Loop "C" RVLIS • Loop "C" High-Head • Loop "C" Cold Leg & Flow Transmitter Piping • Loop "C" Low-Head Safety Injection • Loop "C" Pressurizer Spray • Loop "C" Drain • Loop "C" RCP Seal • Loop "C" Seal Water Bypass Line
• RVLIS (From Vessel Head) • Reactor Vessel Vent • Control Rod Drive Housing Area • Reactor Vessel Stud Area • Reactor Vessel Level Scale Line	• Pressurizer and Associated Piping • Pressurizer Safety • Pressurizer Relief Valve	• Sub-Vessel Area Including Incore Detectors Tubing

[1] Inspection scope areas identified within EST-083 also specify components within each area that are to be inspected.

OST-052 Inspection Scope Examples **RCS Walkdown**		
• Loop "A" Hot Leg • Loop "A" CVCS Charging Line • Loop "A" Cold Leg & Flow Transmitter • Loop "A" Drain Line • Loop "A" RCP Seal Injection • Loop "A" High & Low Head Safety Injection • Loop "A" Letdown Line	• Loop "B" Hot Leg and Primary Sample Line • Loop "B" RVLIS • Loop "B" Cold Leg & Flow Transmitter Piping • Loop "B" High-Head Safety Injection (Hot Leg) • Loop "B" Excess Letdown • "B" Hot Leg Residual Heat Removal Suction • Loop "B" Charging Line (CVCS) • Loop "B" RCP Seal Injection • Loop "B" Low-Head/High Head Safety Injection (Cold Leg) • Loop "B" Pressurizer Spray • Loop "B" Drain	• Loop "C" Hot Leg & Primary Sample Line • Loop "C" Pressurizer Surge Line • Loop "C" RVLIS • Loop "C" High-Head Safety Injection (Hot Leg) • Loop "C" Cold Leg & Flow Transmitter Piping • Loop "C" Low-Head/High Head Safety Injection (Cold Leg) • Loop "C" Pressurizer Spray • Loop "C" Drain Valves • Loop "C" RCP Seal Injection
• RVLIS (From Vessel Head) • Reactor Vessel Vent • Control Rod Drive Housing Area • Reactor Vessel Stud Area	• Pressurizer and Associated Piping • Pressurizer Safety Lines • Pressurizer Relief Valves	• Sub-Vessel Area Including Incore Detectors Tubing and Seal Table