Progress Energy

James Scarola
Vice President
Harris Nuclear Plant
Progress Energy Carolinas, Inc.

JUN 2 0 2005

Serial: HNP-05-062
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
TECHNICAL SPECIFICATIONS (TS) 3/4.4.7 TEMPERATURE LIMIT FOR REACTOR COOLANT SYSTEM (RCS) DISSOLVED OXYGEN

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.90, Carolina Power and Light Company (CP&L) doing business as Progress Energy Carolinas, Inc., requests a license amendment for the Harris Nuclear Plant (HNP) to Technical Specifications (TS) 3/4.4.7, "Reactor Coolant System Chemistry." Specifically, the proposed amendment would revise the footnotes in Tables 3.4-2 and 4.4-3 of the TS to increase the temperature limit from 180°F to 250°F above which reactor coolant sampling and analysis for dissolved oxygen is required and dissolved oxygen limits apply. This amendment will enhance operational flexibility when returning the plant to service from cold shutdown conditions.

Attachment 1 provides the description, background, and technical analysis for the proposed amendment to the Technical Specifications.

Attachment 2 details, in accordance with 10 CFR 50.91(a), the basis for HNP's determination that the proposed amendment to the Technical Specifications does not involve a significant hazards consideration.

Attachment 3 provides the proposed Technical Specification changes.

Attachment 4 provides the revised Technical Specification pages.

With respect to this proposed amendment, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. The proposed amendment to the TS meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental assessment or environmental impact statement is required for approval of this application.

P.O. Box 165
New Hill, NC 27562

T > 919.362.2502
F > 919.362.2095

A001

In accordance with 10 CFR 50.91(b), HNP is providing the State of North Carolina with a copy of the proposed license amendment. HNP requests that the proposed amendment be issued prior to January 12, 2006 to support HNP Refueling Outage (RFO)-13, which is scheduled for April 8, 2006.

This document contains no new Regulatory Commitment.

Please refer any question regarding this submittal to Mr. Dave Corlett at (919) 362-3137.

I declare, under penalty of perjury, that the attached information is true and correct (Executed on JUN 2 0 2005).

Sincerely,

James Scarola

JS/jpy

Attachments:

1. Description, Background, and Technical Analysis
2. 10 CFR 50.92 Evaluation
3. Proposed Technical Specification Changes
4. Revised Technical Specification Pages

c:
Mr. R. A. Musser, NRC Senior Resident Inspector
Ms. B. O. Hall, N.C. DENR Section Chief
Mr. C. P. Patel, NRC Project Manager
Dr. W. D. Travers, NRC Regional Administrator

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DESCRIPTION, BACKGROUND, AND TECHNICAL ANALYSIS

Description

In accordance with the Code of Federal Regulations, Title 10, Part 50.90, Carolina Power and Light Company (CP&L) doing business as Progress Energy Carolinas, Inc., requests a license amendment for the Harris Nuclear Plant (HNP) to Technical Specifications (TS) 3/4.4.7, "Reactor Coolant System [RCS] Chemistry." Specifically, the proposed amendment would revise the footnotes in Tables 3.4-2 and 4.4-3 of the TS to increase the temperature limit from 180°F to 250°F for (1) when limits for dissolved oxygen limits apply and (2) above which reactor coolant sampling and analysis for dissolved oxygen is required. As described within the Technical Analysis section of this letter, HNP considers that the proposed amendment is acceptable because (1) the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components, and (2) the reaction rate of hydrazine with oxygen is greatly enhanced at higher temperatures. This amendment will enhance operational flexibility when returning the plant to service from cold shutdown.

Proposed Change

HNP proposes to revise the footnotes in Table 3.4.-2, "Reactor Coolant System Chemistry Limits," and Table 4.4-3, "Reactor Coolant System Chemistry Limits Surveillance Requirements," of TS 3/4.4.7, "Reactor Coolant System Chemistry."

TS Limiting Condition of Operation (LCO) 3.4.7 states, "The Reactor Coolant System chemistry shall be maintained within the limits specified in Table 3.4-2." This LCO is applicable "At all times." However, the footnote in Table 3.4.-2 of TS LCO 3.4.7 states that the dissolved oxygen limits do not apply below a certain temperature.

Specifically, the footnote in Table 3.4.-2 of TS LCO 3.4.7 states for the dissolved oxygen parameter, "Limit not applicable with T_{avg} less than or equal to 180°F." The proposed revision would increase the temperature requirement from 180°F to 250°F.

Similarly, the footnote in Table 4.4-3 of TS Surveillance Requirement (SR) 4.4.7 states that sample and analysis for dissolved oxygen is not required below a certain temperature. Specifically, the footnote in Table 4.4.-3 of TS SR 4.4.7 states for the dissolved oxygen parameter, "Not required with T_{avg} less than or equal to 180°F." The proposed revision would increase the temperature requirement from 180°F to 250°F.

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Background

Dissolved oxygen contributes to stress corrosion cracking of reactor coolant system components. These effects are reduced to a point of little concern at temperatures less than 250°F and operating controls need not be implemented until the coolant exceeds this temperature. Dissolved oxygen is controlled during plant heatup by the use of mechanical degas (i.e., venting) followed by the use of chemical degas (i.e., hydrazine) for residual oxygen scavenging.

TS Bases 3/4.4.7, "Chemistry," states:

> "The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady-State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant System over the life of the plant. The associated effects exceeding the oxygen, chloride, and fluoride limits are time and temperature dependent. Corrosions studies show that operation may be continued with contaminant concentration levels in excess of the Steady-State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady-State limits.
>
> The Surveillance Requirements provide adequate assurance that concentrations in excess of the limits will de detected in sufficient time to take corrective action."

HNP Final Safety Analysis Report (FSAR) Section 5.2.3.2.1, "Chemistry of reactor coolant," states:

> "The RCS water chemistry is controlled to minimize corrosion . . . The Chemical and Volume Control System provides a means for adding to the RCS the chemicals which . . . scavenge oxygen from the coolant during heatup . . . During reactor startup from the cold condition, hydrazine is employed as an oxygen scavenging agent."

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Technical Analysis

Currently, Table 3.4.-2 of TS LCO 3.4.7 specifies a dissolved oxygen limit and Table 4.4-3 of TS SR 4.4.7 requires sampling and analysis of reactor coolant for dissolved oxygen whenever T_{avg} is greater than 180°F. The proposed revision to the footnotes in Tables 3.4-2 and 4.4-3 would increase the temperature limit from 180°F to 250°F for (1) when limits for dissolved oxygen limits apply and (2) above which reactor coolant sampling and analysis for dissolved oxygen is required. HNP considers that the proposed amendment is acceptable because (1) the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components, and (2) the reaction rate of hydrazine with oxygen is greatly enhanced at higher temperatures. This amendment is consistent with current industry guidelines and practices for control of reactor coolant dissolved oxygen and will enhance operational flexibility when returning the plant to service from cold shutdown.

As discussed in HNP FSAR Section 5.2.3.2.1, the purpose of the temperature limit for RCS oxygen control is to minimize corrosion [at high temperatures] on RCS components. At elevated temperatures, dissolved oxygen can lead to stress corrosion cracking and general corrosion of RCS components. Industry guidance and practice indicate that these mechanisms do not prevail at temperatures below 250°F. These effects are reduced to a point of little concern at temperatures less than 250°F and operating controls need not be implemented until the coolant exceeds this temperature.

The practice at HNP during plant heatup is to perform mechanical degas (i.e., by venting) of the RCS and then to perform chemical degas (i.e., by introducing hydrazine) of the RCS to scavenge oxygen from the coolant when the RCS temperature is less than or equal to 180°F to comply with the requirements of TS 3/4.4.7. However, because of the slow reaction rate of hydrazine with oxygen at or below 180°F and because hydrazine simultaneously is decomposing rapidly, the effective removal rate of oxygen is slow. Therefore, it is necessary to suspend heatup above 180°F until the dissolved oxygen is lowered to within the limit specified in Table 3.4-2.

The reaction rate of hydrazine with dissolved oxygen increases rapidly with increasing temperature. Therefore, as temperature increases, the rate of oxygen scavenging relative to the hydrazine decomposition rate becomes greater and the removal of dissolved oxygen by hydrazine becomes more effective. The concentration of dissolved oxygen in the coolant could be brought into compliance with the specified limit faster if heatup could proceed above 180°F. HNP's proposed

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Technical Analysis (continued)

amendment to increase the temperature limit for applicability to 250°F would decrease the time needed to achieve compliance with the dissolved oxygen limit and decrease the overall time to restart the plant from cold shutdown.

The proposed amendment is consistent with the Electric Power Research Institute's (EPRI's) guidelines for Pressurized Water Reactor (PWR) Primary Water Chemistry.

The proposed amendment is also consistent with the Standard Technical Specifications (STS) for Westinghouse Pressurized Water Reactors (NUREG-0452, Revision 4 dated November 2, 1981) with regard to the temperature limit of 250°F for applicability of the requirements for sampling, analysis, and dissolved oxygen limit. In addition, the proposed amendment is consistent with other Westinghouse plants of similar size and vintage. These plants include: Millstone Station Unit 3 (NPF-49), Wolf Creek (NPF-62), Callaway (NPF-30), Vogtle Unit 1 (NPF-68) and Unit 2 (NPF-81), Diablo Canyon Unit 1 (DPR-80) and Unit 2 (DPR-82), Virgil C. Summer (NPF-16), Byron Unit 1 (NPF-37) and Unit 2 (NPF-66), and McGuire Unit 1 (NPF-9) and Unit 2 (NPF-17). A similar TS amendment was approved for Seabrook Nuclear Plant.[1]

HNP considers that the proposed amendment is acceptable because (1) the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components, and (2) the reaction rate of hydrazine with oxygen is greatly enhanced at higher temperatures. In addition, this amendment is consistent with current industry guidelines and practices for control of reactor coolant dissolved oxygen and will enhance operational flexibility when returning the plant to service from cold shutdown.

Conclusion

HNP has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

[1] Letter from A. W. De Agazio (NRC) to T. C. Feigenbaum (NAESC), dated November 29, 1995, TAC No. M92524.

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10 CFR 50.92 NO SIGNIFICANT HAZARDS EVALUATION

A written evaluation of the significant hazards consideration of a proposed license amendment is required by 10 CFR 50.92. Harris Nuclear Plant (HNP) has evaluated the proposed amendment and determined that it involves no significant hazards consideration. According to 10 CFR 50.92, a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated; or

2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. Involve a significant reduction in a margin of safety

The basis for this determination is presented below.

Proposed Change

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Basis

This amendment does not involve a significant hazards consideration for the following reasons:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   Operation of HNP in accordance with the proposed amendment does not increase the probability or consequences of accidents previously evaluated. The Final Safety Analysis Report (FSAR) documents the analyses of design basis accidents (DBA) at HNP. Any scenario or previously analyzed accident that results in offsite dose were evaluated as part of this analysis. The proposed amendment does not change or affect any accident previously evaluated in the FSAR. The proposed amendment does not modify any plant equipment. In addition, the proposed amendment does not result in a change to a structure, system, or component (SSC), or adversely affect its design function.

   The purpose of the temperature limit for RCS oxygen control is to minimize corrosion at high temperatures on RCS components. Increasing the temperature at which oxygen levels are required to be maintained within specified limits from 180°F to 250°F is supported by industry and vendor data which indicates that the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components. The proposed amendment is consistent with the Electric Power Research Institute's (EPRI's) guidelines for Pressurized Water Reactor (PWR) Primary Water Chemistry. This amendment places HNP in line with standard industry specifications for reactors of similar size and vintage. HNP's proposed amendment to increase the temperature limit for applicability to 250°F would decrease the time needed to achieve compliance with the dissolved oxygen limit and decrease the overall time to restart the plant from cold shutdown. Removing oxygen in a more expeditious fashion enhances RCS chemistry. Based on the above, RCS integrity is maintained by this amendment.

   Therefore, this amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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Basis (Continued)

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   Operation of HNP in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. The FSAR documents the analyses of design basis accidents (DBA) at HNP. Any scenario or previously analyzed accident that results in offsite dose were evaluated as part of this analysis. The proposed amendment does not change or affect any accident previously evaluated in the FSAR, and no new or different scenarios are created by the proposed amendment to the TS. The proposed amendment does not modify any plant equipment. In addition, the proposed amendment does not result in a change to an SSC, or adversely affect its design function.

   The purpose of the temperature limit for RCS oxygen control is to minimize corrosion at high temperatures on RCS components. Increasing the temperature at which oxygen levels are required to be maintained within specified limits from 180°F to 250°F is supported by industry and vendor data which indicates that the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components. The proposed amendment is consistent with EPRI's guidelines for PWR Primary Water Chemistry. This amendment places HNP in line with standard industry specifications for reactors of similar size and vintage. HNP's proposed amendment to increase the temperature limit for applicability to 250°F would decrease the time needed to achieve compliance with the dissolved oxygen limit and decrease the overall time to restart the plant from cold shutdown. Removing oxygen in a more expeditious fashion enhances RCS chemistry. Based on the above, RCS integrity is maintained by this amendment.

   Therefore, this amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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Basis (Continued)

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   Operation of HNP in accordance with the proposed amendment does not involve a significant reduction in a margin of safety. Existing TS operability and surveillance requirements are not reduced by the proposed amendment. The proposed amendment does not modify any plant equipment. In addition, the proposed amendment does not result in a change to a structure, system, or component (SSC), or its design function. The proposed amendment does not adversely affect existing plant safety margins or the reliability of equipment assumed to mitigate accidents in the FSAR.

   The purpose of the temperature limit for RCS oxygen control is to minimize corrosion at high temperatures on RCS components. Increasing the temperature at which oxygen levels are required to be maintained within specified limits from 180°F to 250°F is supported by industry and vendor data which indicates that the influence of dissolved oxygen at or below 250°F is not significant with regard to stress corrosion cracking and general corrosion of RCS components. The proposed amendment is consistent with EPRI's guidelines for PWR Primary Water Chemistry. This amendment places HNP in line with standard industry specifications for reactors of similar size and vintage. HNP's proposed amendment to increase the temperature limit for applicability to 250°F would decrease the time needed to achieve compliance with the dissolved oxygen limit and decrease the overall time to restart the plant from cold shutdown. Removing oxygen in a more expeditious fashion enhances RCS chemistry. Based on the above, RCS integrity is maintained by this amendment.

   Therefore, this amendment does not involve a significant reduction in a margin of safety.

Based on the above, HNP concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

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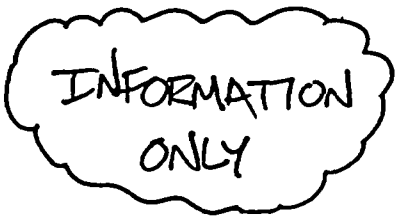
PROPOSED TECHNICAL SPECIFICATION CHANGES



LIMITING CONDITION FOR OPERATION

3.4.7 The Reactor Coolant System chemistry shall be maintained within the limits specified in Table 3.4-2.

APPLICABILITY: At all times.

ACTION:

MODES 1, 2, 3, and 4:

a. With any one or more chemistry parameter in excess of its Steady-State Limit but within its Transient Limit, restore the parameter to within its Steady-State Limit within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and

b. With any one or more chemistry parameter in excess of its Transient Limit, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

At All Other Times:

With the concentration of either chloride or fluoride in the Reactor Coolant System in excess of its Steady-State Limit for more than 24 hours or in excess of its Transient Limit, reduce the pressurizer pressure to less than or equal to 500 psig, if applicable, and perform an engineering evaluation to determine the effects of the out-of-limit condition on the structural integrity of the Reactor Coolant System; determine that the Reactor Coolant System remains acceptable for continued operation prior to increasing the pressurizer pressure above 500 psig or prior to proceeding to MODE 4.

SURVEILLANCE REQUIREMENTS

4.4.7 The Reactor Coolant System chemistry shall be determined to be within the limits by analysis of those parameters at the frequencies specified in Table 4.4-3.

TABLE 3.4-2

REACTOR COOLANT SYSTEM

CHEMISTRY LIMITS

PARAMETER	STEADY-STATE LIMIT	TRANSIENT LIMIT
Dissolved Oxygen*	≤ 0.10 ppm	≤ 1.00 ppm
Chloride	≤ 0.15 ppm	≤ 1.50 ppm
Fluoride	≤ 0.15 ppm	≤ 1.50 ppm

*Limit not applicable with T_{avg} less than or equal to 180°F.

Replace 250°F

Add Amendment No.

TABLE 4.4-3

REACTOR COOLANT SYSTEM

CHEMISTRY LIMITS SURVEILLANCE REQUIREMENTS

PARAMETER	SAMPLE AND ANALYSIS FREQUENCY
Dissolved Oxygen*	At least once per 72 hours
Chloride	At least once per 72 hours
Fluoride	At least once per 72 hours

Replace 250°F

*Not required with T_{avg} less than or equal to 180°F

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REVISED TECHNICAL SPECIFICATION PAGES

TABLE 3.4-2

REACTOR COOLANT SYSTEM

CHEMISTRY LIMITS

PARAMETER	STEADY-STATE LIMIT	TRANSIENT LIMIT
Dissolved Oxygen*	$\leq$ 0.10 ppm	$\leq$ 1.00 ppm
Chloride	$\leq$ 0.15 ppm	$\leq$ 1.50 ppm
Fluoride	$\leq$ 0.15 ppm	$\leq$ 1.50 ppm

*Limit not applicable with T_{avg} less than or equal to 250°F.

TABLE 4.4-3

REACTOR COOLANT SYSTEM

CHEMISTRY LIMITS SURVEILLANCE REQUIREMENTS

PARAMETER	SAMPLE AND ANALYSIS FREQUENCY
Dissolved Oxygen*	At least once per 72 hours
Chloride	At least once per 72 hours
Fluoride	At least once per 72 hours

*Not required with T_{avg} less than or equal to 250°F