Progress Energy

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

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
PROPOSED REVISION TO TECHNICAL SPECIFICATION 3.6.2.2.a,
SURVEILLANCE REQUIREMENT 4.6.2.2.d AND ASSOCIATED TS BASES
TO INCORPORATE AN EXPANDED RANGE OF EDUCTOR FLOW RATES

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.90, "Application for Amendment of License or Construction Permit," Carolina Power & Light Company (CP&L) doing business as Progress Energy Carolinas, Inc. (PEC), requests an amendment to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-63 for Shearon Harris Nuclear Power Plant, Unit No. 1 (HNP). The proposed amendment will modify Technical Specification 3.6.2.2.a to incorporate the results of a new analysis.

Although the containment spray system is currently operable, an interim operator manual action is in place. Based on this, HNP requests approval of the proposed License Amendment by May 01, 2010, with implementation to occur within 30 days of approval.

This document contains no new Regulatory Commitment.

In accordance with 10 CFR 50.91(b), HNP is providing the State of North Carolina with a copy of the proposed license amendment.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on JAN 27 2010

Sincerely,

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CLB/kms

Enclosures:
1. Evaluation of the Proposed Change
2. Numerical Applications, Inc. Report Number NAI-1478-001, Rev. 0, "HNP CSAT Volume, Flow and NaOH Concentration Range Revisions"

cc:
Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
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SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
EVALUATION OF PROPOSED CHANGES

Subject: *Request for License Amendment to revise Technical Specification 3.6.2.2.a, Surveillance Requirement 4.6.2.2.d and associated TS Bases to incorporate an expanded range of eductor flow rates.*

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REQUEST FOR LICENSE AMENDMENT
EVALUATION OF PROPOSED CHANGES

1. SUMMARY DESCRIPTION

This evaluation supports a request from Carolina Power & Light Company (CP&L), doing business as Progress Energy Carolinas, Inc. (PEC), to amend Renewed Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit No. 1 (HNP).

The proposed change will revise Appendix A, Technical Specifications (TS) Limiting Condition for Operation (LCO) Section 3.6.2.2.a, Surveillance Requirement (SR) 4.6.2.2.d and associated TS Bases 3/4.1.2, 3/4.5.4 and 3/4.6.2.2 to incorporate an expanded range of eductor flow rates resulting from the use of a new chemical model and new boric acid equilibrium data, revised sump pH limits, and changes to the Containment Spray Additive Tank (CSAT) concentration and volume limits.

2. DETAILED DESCRIPTION

Technical Specifications (TS) Limiting Condition for Operation (LCO) Section 3.6.2.2, Containment Spray Additive System, provides the operability requirements, allowed conditions, required actions, completion times and surveillance requirements associated with HNP's Containment Spray System. Per LCO 3.6.2.2, the Spray Additive System (SAS) is considered operable when the CSAT contains the proper mixture and amount of NaOH and the two spray additive eductors each are capable of adding NaOH solution from the chemical additive tank to a Containment Spray System pump flow in Modes 1, 2, 3, and 4.

Surveillance Requirement (SR) 4.6.2.2 contains the associated testing which must be performed to demonstrate operability of the SAS. In accordance with SR 4.6.2.2.d, the flow rate of each eductor is currently verified to be between 19.5 and 20.5 gpm, using the RWST as the test source, at least once per 5 years. HNP has had difficulty maintaining repeatable test results within this flow band. Specifically, when the eductor surveillance test is performed, the as-found flow rate is found to have drifted from the previous as-left flow rate and is outside of the allowable 4.6.2.2.d limits despite no manipulation of the associated throttle valve in between tests.

Multiple factors have been involved in these previous surveillance test performances, including throttle valve design, system operating alignment, test instrumentation and test procedures, all of which have been investigated and addressed by HNP. HNP has concluded that the remaining variation is inherent to the design of the system. A revision to TS 4.6.2.2.d will provide sufficient operating margin to envelope the expected long-term variations in surveillance test flows for the containment spray eductors.

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The HNP post-accident pH calculation has been revised to evaluate and justify an expanded range of eductor flow rates using a new chemical model and new boric acid equilibrium data, revised sump pH limits, and changes to CSAT concentration and volume limits. The calculation estimating post-accident chemical precipitate formation has also been revised based on output from the post-accident pH calculation to show that the new spray pH histories do not affect the input assumptions used during recirculation sump screen testing.

As a result of the updated analysis, the proposed change to HNP's TS includes revisions to the weight percent NaOH, the contained volume, the indicated level of the CSAT and the eductor flow limits, as follows:

- The allowable concentration of sodium hydroxide (NaOH) in the Containment Spray Additive Tank (CSAT) in LCO 3.6.2.2.a is changed from 28–30% to 27–29%.

- The upper CSAT volume limit in 3.6.2.2.a is changed from 3,964 GAL to 3,768 GAL. The lower limit of 3,268 GAL remains unchanged.

- The indicated percent-level range for the CSAT in 3.6.2.2.a will be removed from HNP's TS in favor of the volume limits alone. This is done to avoid confusion between the two sets of numbers. The volume and percent level values do not correspond directly with each other due to the inclusion of instrument uncertainty into the percent level limits. Showing only the volume limits is consistent with several other plants, such as St. Lucie, that have similar TS. Additionally, the percent level values are also now changed from 92–96% to 90.7–93.9%.

- The eductor flow limits in 4.6.2.2.d are changed from 19.5–20.5 GPM to 17.2–22.2 GPM as measured using the Refueling Water Storage Tank (RWST) as the test source.

All of the above limits were found through iterations to the pH analysis and the containment sump precipitate analysis performed by Numerical Applications Inc. (NAI) under their Appendix B QA program. Many different combinations of CSAT level, concentration, and throttle valve position were required to arrive at the final solution. Restraints on the solution included a 4.6.2.2.d flow range of at least 3 GPM, a CSAT concentration range at least as wide as the existing 2% range, and post-accident chemical precipitate quantities equal to or less than the amounts previously used as input for sump screen head loss testing.

As previously noted, the revised pH analysis incorporates a new chemistry model that more accurately predicts the equilibrium pH of the containment sump and spray. The revised methodology is a significant reason for the wider range of allowable flows.

The current HNP licensing basis requires that the post-accident containment sump reach a pH of at least 8.5 at the completion of NaOH addition. This limit will be eliminated and the existing requirement for sump pH to meet or exceed 7.0 at the onset of ECCS recirculation will be retained. Since post-accident sump pH and eductor flow are directly related, a wider pH band (7.0 to 11.0 versus 8.5 to 11.0) will allow for a wider range of NaOH/RWST flow.

Although the minimum allowable CSAT volume remains unchanged at 3,268 GAL, the LO level alarm set point on the CSAT will be reduced from 48.00 IABT (inches above the bottom of the tank) to 47.10 IABT. This was done by eliminating some of the margin conservatively added to the level set points in the uncertainty calculations.

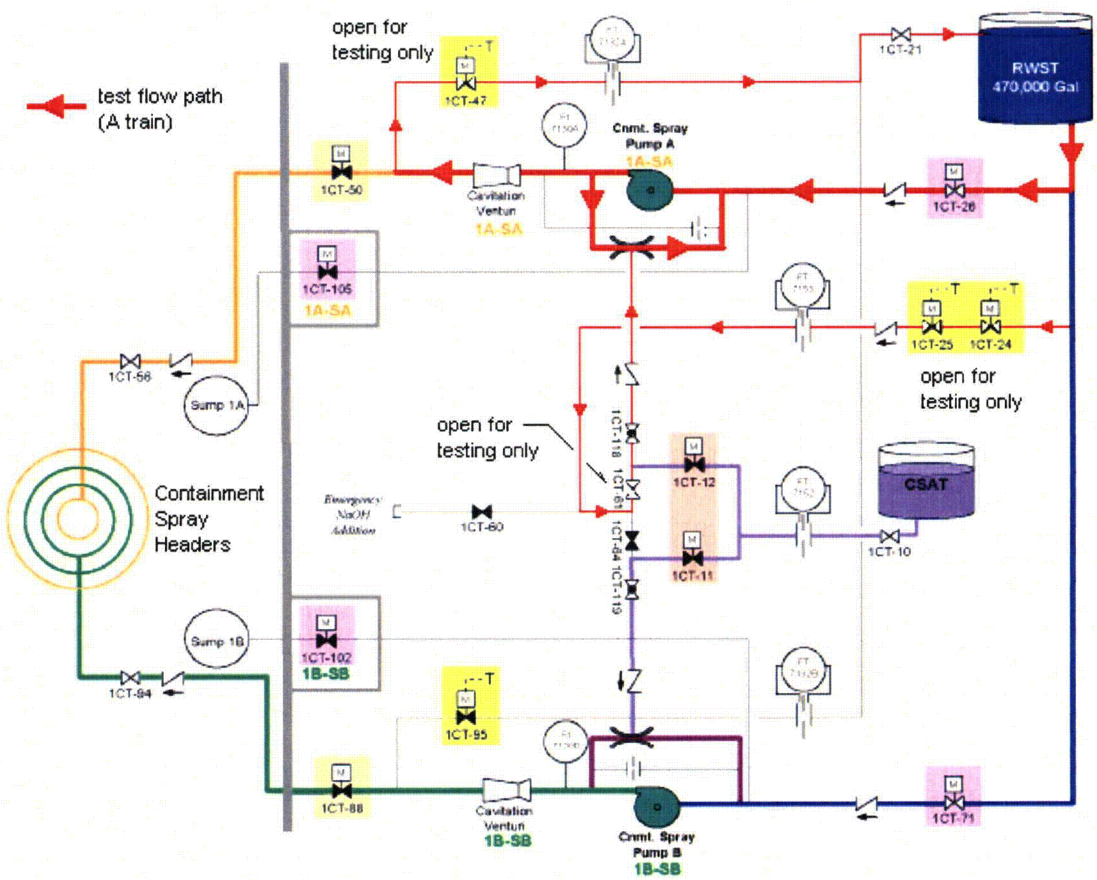
The results of the incorporation of the above changes into the post-accident pH calculation and the post-accident chemical precipitate calculation indicate that containment sump and spray pH values, as well as the predicted masses of chemical precipitates, will remain within analyzed limits.

3. TECHNICAL EVALUATION

3.1 System Description

The purpose of the Containment Spray System (CSS) at HNP is to remove heat and fission products (primarily iodine) from a post-accident containment atmosphere by spraying borated sodium hydroxide (NaOH) solution into containment. The CSS consists of two independent and redundant loops each containing a spray pump, piping, valves, spray headers, and spray valves. The operation of the CSS is automatically initiated by the Containment Spray Actuation Signal (CSAS), which occurs when a containment pressure HI-3 signal is reached. Upon receipt of a CSAS, the containment spray pumps start operation and the containment spray isolation valves open.

Each redundant train of the CSS contains a pump which draws borated water from the Refueling Water Storage Tank (RWST). A small recirculation line across each pump passes water through an eductor. Under accident conditions, NaOH drawn from the Containment Spray Additive Tank (CSAT) by the eductor is then blended into the spray stream that is pumped to the spray headers at the top of the containment dome. Under test conditions, the eductor draws water from the RWST and the pump recirculates back to the RWST, as shown by the red flow paths in the figure below (the A train is shown in service for illustration):



The test and post-accident eductor flow paths are different. The CSAT supplies NaOH under accident conditions while borated water from the RWST is substituted for NaOH during surveillance testing. The test flow path and the post-accident flow path for each train share a common throttle valve: 1CT-118 is the common "A" train throttle valve and 1CT-119 is the common "B" train throttle valve. The throttle valves are set during surveillance testing to maintain flow within Tech Spec 4.6.2.2.d limits.

The CSS has two principal modes of operation:

a. The initial injection mode, during which time the system sprays borated water which is taken from the Refueling Water Storage Tank (RWST).

b. The recirculation mode, which is initiated when low-low level is reached in the RWST. Pump suction is transferred from the RWST to the containment sump by opening the recirculation line valves and closing the valves at the outlet of the refueling water storage tank. This switch over is accomplished automatically.

Upon receipt of the CSAS, the containment spray pumps are started and borated water from the RWST is discharged into the Containment through the containment spray headers. The CSAS starts the two containment spray pumps and opens the motor operated containment spray isolation valves. Upon reaching full speed of the containment spray pumps, water will reach the nozzles and start spraying within approximately 33 seconds.

The spray headers are located to maximize heat removal. Each train of the CSS has two headers which conform to the shape of the Containment and contain a total of 106 spray nozzles per train. A flow element is installed in each containment spray pump's discharge line to monitor the system operation.

The spray nozzles, which are of open throat design, break the flow into small droplets, increasing the cooling effectiveness on the containment atmosphere. As these droplets fall through the containment atmosphere, they absorb heat until they reach the temperature of the containment air-steam mixture.

The motor operated NaOH solution isolation valves will be opened automatically by the HI-3 signal. After the opening of the NaOH isolation valve, the kinetic energy in the spray additive eductor will create a negative pressure to draw the NaOH from the containment spray additive tank. The NaOH solution, which is injected into the CSS lines just upstream of the CS pump suction, enhances absorption and retention of iodine through chemical reaction. Maintaining the pH value within the specified range during the long-term recirculation period minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components. Turbulence in the fluid passing through the pump is sufficient to assure complete and uniform mixing of the fluid. The fission product iodine removed from the containment atmosphere remains mixed in the spray solution and will not evolve back into the containment atmosphere.

The NaOH isolation valves will automatically close when the containment spray additive tank is empty. Additional NaOH can be added to the tank or through an emergency NaOH addition line outside the Tank Building. If necessary, the operator may reopen these NaOH isolation valves at any later time.

The containment spray pumps initially take suction from the RWST. The minimum operating capacity of the RWST is more than adequate to supply enough water for the injection mode of operation. When low-low level tank water level is reached in the RWST, pump suction is transferred to containment recirculating sump automatically by opening the recirculation line valves and closing the valves at the outlet of the RWST. The CSS can provide one year of post accident operation if required.

3.2 Applicable FSAR text

Sodium hydroxide (NaOH) is used to assure that the containment spray solution will not fall outside the range of 8.2 to 11.0 (HNP's FSAR Section 6.1.1.2).

Per FSAR Section 6.5.2.3.3, CSS is designed to deliver spray during injection and initial recirculation phases with a pH of approximately 8.2 to enhance iodine absorption. To assure long-term retention of iodine, a minimum pH of 7.0 in the sump at the onset of recirculation and a minimum spray pH of 8.5 at the completion of NaOH addition from the CSAT is maintained. A maximum pH of 11.0 is also required.

CSS will provide adequate capability for scrubbing of the containment atmosphere to ensure that 10CFR50.67 dose limits are not exceeded while assuming Regulatory Guide 1.183 (alternate source term) release characteristics (FSAR Section 6.5.2.1.1).

FSAR Section 6.5.2.1.2 states that a pH of 8.2 to 11.0 is maintained during the recirculation period to enhance absorption and retention of iodine by chemical reaction. The iodine removed from the containment atmosphere remains mixed in the spray solution.

3.3 Numerical Applications, Inc. Report Number NAI-1478-001, Rev. 0

NAI-1478-001, Rev. 0, "HNP CSAT Volume, Flow and NaOH Concentration Range Revisions," the Numerical Applications, Inc. technical report with this submittal, documents the inputs, analyses and results associated with revisions to HNP's CSAT maximum volume, eductor test flow range and sodium hydroxide concentration range.

The current TS SR 4.6.2.2.d for the Containment Spray Additive System require that the eductor flow rate using the RWST as a test source be between 19.5 gpm and 20.5 gpm. This test range, which is very restrictive when uncertainties are considered, is based in part on an historical requirement that the containment spray and sump pH both be greater than or equal 8.5 at the end of NaOH addition. Based on more recent data and regulatory documents, this historical pH requirement of 8.5 for the containment spray and sump is no longer applicable.

Additionally, the original pH analyses for HNP were performed utilizing boric acid equilibria data from a paper presented by R.E. Mesmer in 1971. To properly consider ionic strength dependence, the boric acid equilibria data of D.A. Palmer et al. are utilized for the analyses supporting the proposed changes.

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EVALUATION OF PROPOSED CHANGES

The currently applicable pH requirements for HNP are based on prevention of iodine re-evolution, corrosion considerations and precipitate formation. These requirements specify that the equilibrium containment sump pH be greater than 7.0 at the onset of the spray recirculation mode and that the maximum containment spray and sump pH profiles do not cause an increase in the mass of precipitates previously evaluated for HNP. The proposed eductor flow rate range (with the RWST as a test source), along with the other proposed changes, assure these requirements are met.

The key pH results, as documented in Table 1, Figure 1, Figure 2 and Figure 3 of NAI-1478-001, Rev. 0, indicate that a CSAT concentration range of 27 wt.% to 29 wt.% NaOH with a CSAT volume range of 3268 gallons to 3768 gallons produces acceptable pH results. Acceptable pH results are defined as the containment sump minimum pH exceeding 7.0 by the time of recirculation to prevent iodine re-evolution and the containment sump and spray maximum pH profiles resulting in acceptable levels of precipitates.

3.4 Eductor Flow Limit Changes

The eductor flow limit changes result from the incorporation of the following changes to HNP's containment sump/spray pH calculation:

- Expanded limits for sump pH at the end of NaOH addition. Prior to this revision, the analysis was limited to a sump pH of ≥ 8.5 once the entire contents of the additive tank had been injected. Now, the analysis is limited to a pH of ≥ 7.0. This expanded pH range allows for an expanded flow range.

- A new chemical model. The calculation of the equilibrium pH of the sump prior to this revision was overly conservative for both the minimum and maximum pH cases. A newer and more accurate method for determining pH which allows for an expanded range of flows has been incorporated.

3.5 Elimination of pH=8.5 Requirement at End of NaOH Injection

Part of the basis for the revision to the above TS limits is an elimination of the limitation that requires sump pH to be at or above 8.5 at the end of NaOH injection. The current HNP licensing basis requires that the pH of the fluid recirculated throughout containment after a loss-of-coolant accident (LOCA) be at least 8.5 upon completion of sodium hydroxide (NaOH) addition from the CSAT. By eliminating this limit, the range of allowable NaOH flows and related RWST test flows can be expanded.

The following items were reviewed for potential impacts in HNP's evaluation for retaining sump pH at or above 7.0 at the onset of ECCS recirculation:

- Regulatory Review
  - Standard Review Plan (NUREG-0800)
- Radiological Effects
  - LOCA Dose Analysis
- Chemical Effects
  - Stress Corrosion Cracking
  - GSI-191 Chemical-Precipitate Analysis
  - Hydrogen Generation
- Equipment Qualification

3.5.1 Standard Review Plan (NUREG-0800)

Numerical Applications Inc. (NAI) performed a review of the HNP licensing history associated with containment sump and containment spray pH limits. The results of this review determined that the Standard Review Plan (SRP) Section 6.5.2, Revisions 0 and 1, required a pH of 8.5 in the containment sump at the onset of recirculation mode to ensure adequate fission product removal.

However, in all later revisions of Section 6.5.2, a pH of 7.0 or greater is considered acceptable for iodine retention. Section 6.5.2.III.4, Revision 2, indicates that elemental iodine removal during the injection phase is largely independent of spray pH and, during injection, fresh spray having no dissolved iodine and a pH as low as 5 is effective in removing elemental iodine from the containment atmosphere. Since the sump solution contains some dissolved iodine during the recirculation phase, Section 6.5.2.III.4 states that re-evolution of this iodine need not be considered for pH values above 7.0. The most recent NRC SRP requirements for containment sump and containment spray chemistry consistently require that pH only be at or above 7.0 at the onset of circulation.

The NAI report also references the NRC approved Safety Evaluation for the St. Lucie Plant (Reference 1) as an example of an accepted alternative source-term (AST) submittal in which the containment sump pH was required to equal 7.0 or greater at the onset of recirculation in order to prevent iodine re-evolution.

3.5.2 LOCA Dose Analysis

The containment spray radioactivity removal rate and the retention of radioactivity in the containment sump are inputs to the offsite dose analysis. The spray removal coefficients for elemental iodine and particulate iodine are presented in FSAR Section 6.5.2.3.2. No credit is taken for spray removal/retention of organic iodine compounds.

The removal coefficients (separate coefficients are defined for each chemical form) are determined by such parameters as spray flow rate, droplet diameter, fall height, absorption rate at the droplet surface and sprayed volume of containment. The absorption rate at the surface of a droplet is based on data that is dependent on droplet size and pressure and largely independent of spray pH (reference SRP 6.5.2, Section III.4.C.i). The removal coefficients are arbitrarily capped to meet NRC regulatory positions. The dose calculations are dependent on the spray not becoming a source of airborne radioactivity once recirculation begins. This is met by having a sump and spray pH greater than 7.0 after spray recirculation begins.

Per NUREG/CR-5950, referenced in the alternative source term summary report, retention of iodine in the recirculation pool is dependent on pool pH. The tendency for retained iodine to convert back to elemental (gaseous) iodine becomes extremely small for pH values above 6.0.

Based on the above, the post-LOCA dose calculations do not require the minimum pH analysis to demonstrate a sump pH any higher than 7.0 at any point beyond the onset of recirculation.

3.5.3 Chemical Effects

3.5.3a Stress Corrosion Cracking

Section 6.1.1 and Branch Technical Position MTEB 6-1, NUREG-0800, require a minimum pH of 7.0 for containment spray and post-accident emergency cooling water to reduce the probability of stress-corrosion cracking in austenitic stainless steel. Since the new minimum pH limit for containment sump water is consistent with the existing NUREG-0800 guidance, there are no new material corrosion concerns associated with the elimination of the requirement that the sump pH be at or above 8.5 at the end of NaOH injection.

3.5.3b GSI-191 (GL 2004-02) Chemical-Precipitate Analysis

The guidance provided in Generic Safety Issue (GSI)-191 and Generic Letter (GL) 2004-02 ensures that post-accident debris will not impede or prevent the operation of the Emergency Core Cooling System (ECCS) and CSS in recirculation mode at pressurized water reactors (PWRs) during LOCAs or other accidents for which sump recirculation is required. Of particular concern is the blockage of the containment recirculation sump screens by debris and chemical precipitates. Materials present in containment may dissolve or corrode when exposed to the reactor coolant and spray solutions. These products/precipitates may collect on the surface of the screens and hinder post-accident recirculation flow.

The amount of chemical precipitates that form inside containment following an accident is a function of fluid pH and temperature. WCAP-16530-NP (Reference 3) developed a model of precipitate formation in containment sump fluids based on experimental results. According to Section 6.5.2 of the WCAP, *total* precipitate formation generally tends to *increase* with higher pH, particularly above a pH of 8.5. However, this trend is dependent upon the type and amount of source materials, such as aluminum and various types of insulation.

The analysis HNP performed for the Engineering Change (EC) that provided a method of "opening up" the throttle valves to allow better control of the eductor test flow demonstrated that a lower pH will result in reduced precipitates based on the types and amounts of materials found in the HNP containment building. That prior analysis considered precipitate-generating cases involving Fiberglass, Microtherm and Min-K, the three types of insulation found in the HNP containment.

The mass of precipitates for each case were greater for the higher pH history, even though the time to reach peak pH was shorter. Based on the conclusion that lower pH is a benefit for HNP to precipitate production, retaining the pH limit of 7.0, by itself, has no adverse impact on the GSI-191 chemical precipitate analysis at HNP. The revised pH will be incorporated into HNP's GL 2004-02 review.

The WCAP-16530-NP spreadsheet/model, as contained in HNP's Chemical Model Benchmarking calculation, was evaluated in support of the technical specification and pH changes associated with this LAR, using the new maximum pH-versus-time curve from the most current revision of HNP's Sump and Containment Spray pH Transient Calculation. This was performed to document that the aggregate of all changes (including a lower pH limit) would not result in precipitate production beyond analyzed amounts. The results show that maximum total precipitate production will continue to remain below the values used for sump screen head loss testing.

3.5.3c Hydrogen Generation

Per HNP FSAR Section 1.8, HNP is committed to Regulatory Guide (RG) 1.7, which requires plants to be able to limit and control the quantity of post-accident hydrogen gas in containment. According to RG 1.7, the corrosion rate of aluminum is dependent upon fluid pH, among other factors (particularly temperature). Because accurate corrosion rates are difficult to determine given the various post-accident influences, Table 1 of RG 1.7 provides a conservative aluminum corrosion rate for use in determining hydrogen generation. This value is to be adjusted for increased temperature but is not required to be adjusted for variable pH. This results in the inference that the value provided by RG 1.7 accounts for the effects of variable pH. RG 1.7 does not specifically address zinc corrosion rates.

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In the HNP hydrogen generation calculation, hydrogen generation rates are adjusted for temperature but not for pH. Therefore, it is concluded that the calculated amount of hydrogen generated by aluminum and zinc corrosion is unaffected by retaining the existing sump pH limit of 7.0, as supported by the following:

NUREG/CR-2812 (January 1984) applied statistical methods to new experimental data to study the relative importance of temperature, pH, and boric acid concentration on rates of hydrogen production from galvanized steel (zinc) corrosion. The report indicates that temperature is by far the single most important variable in the production of hydrogen gas, but that the interactions between these three factors make the situation somewhat complex (which is echoed in RG 1.7). As shown in the report, the impact of decreased pH is a decreased rate of hydrogen production (i.e., a smaller rate constant).

Additional general discussion, not specifically concerning a post-LOCA containment environment, about the influence of pH on aluminum corrosion is taken from "The Nalco Guide to Cooling Water System Failure Analysis" (Herro and Port, 1993):

> **Certain alloys frequently used in cooling water environments, notably aluminum and zinc, can be attacked vigorously at high pH. These metals are also significantly corroded at low pH and thus are said to be *amphoteric*. A plot of the corrosion behavior of aluminum as a function of pH when exposed to various compounds is shown in Fig. 8.1. The influence of various ions is often more important than solution pH in determining corrosion on aluminum.**

According to "The Corrosion Resistance of Zinc and Zinc Alloys" (Porter, 1994), zinc corrosion also increases in more alkaline solutions:

> **Zinc**
>
> **Zinc is attacked at high pH. However, in weakly alkaline solutions near room temperature, corrosion is actually very slight, being less than 1 mil/y (0.0254 mm/y) at a pH of 12. The corrosion rate increases rapidly at higher pH, approaching 70 mil/y (1.8 mm/y) at a pH near 14. Just as in aluminum corrosion, protection is due primarily to a stable oxide film that forms spontaneously on exposure to water. High alkalinity dissolves the oxide film, leading to rapid attack.**

From the above information, it is concluded that retaining the existing sump pH limit of 7.0 will have no adverse impact on hydrogen production due to aluminum or zinc corrosion.

3.5.4 Equipment Qualification

Changing the lower pH limit to 7.0 (neutral) will have no adverse effect on equipment qualification. Per discussion with HNP Lab Services, non-metallics are generally sensitive to acidic solutions below a pH of around 4.0 and to very alkaline solutions with a pH exceeding 11 to 12.

More specifically, a review of equipment qualification data packages (EQDPs) associated with the qualification of EQ equipment located inside containment indicates that, during qualification testing, the equipment performed successfully after exposure to a chemical spray within the pH range of 8.5 to 11. It should also be noted that the equipment was initially exposed to pure steam condensation (essentially pure water) at significantly elevated pressures (>56.5 PSIA) and also continued to perform the required safety function(s). It is reasonable to believe that the steam condensation was very near a pH of 7.0. The containment pressure reaches its peak at approximately 43.3 seconds into the worst-case accident that is postulated. At this time into the accident, the condensation of the steam will have the greatest potential for migration into or onto non-metallic materials (cable and equipment subcomponents).

Based on the fact that the equipment inside containment is fully qualified to this pure water (pH 7.0) condition and also to the chemical spray condition (pH range of 8.5-11), it is reasonable to conclude that changing the pH range to 7.0-11.0 will have no negative impact on the ability of the equipment to perform its intended safety function(s). Therefore, the subject EQDP's currently envelop qualification of equipment when exposed to water within a pH range of 7.0 to 11.0. The equipment, as currently tested and evaluated in the subject EQDPs, is considered fully qualified to the revised pH condition.

3.6 Changes to Containment Spray Additive Tank (CSAT) Maximum Level and Sodium Hydroxide Concentration

The maximum pH case in the revised analysis was found, through much iteration, to be optimized by decreases in CSAT maximum volume and concentration. Therefore, TS 3.6.2.2.a is being revised to provide a new 3,768 GAL upper limit on CSAT volume (the existing limit is 3,964 GAL) and a new sodium hydroxide concentration range of 27-29% (the existing range is 28-30%). The new percent level limits used to verify the new volume limits are 90.7-93.9% (the existing limits are 92-96%). Note that level limits are being removed from TS.

The evaluation of a decrease in CSAT maximum level from 3,964 GAL to 3,768 GAL and a change in sodium hydroxide (NaOH) concentration from 28-30% to 27-29% addressed the following potential impacts:

- Instrumentation Effects
    - CSAT Level Alarm Set Points
- Mechanical/Hydraulic Effects
    - Post-LOCA Containment Water Level
    - Seismic Impact

3.6.1 CSAT Level Alarm Set Points

HNP CSAT level is measured by two instruments: LT-01CT-7150SA and LT-01CT-7166SB. These Rosemount Model 1153DB4 differential-pressure transmitter loops have the following features:

- Have an upper range limit of 150 INWC (inches of water column).
- Are currently scaled for a range of 1.75-51.75 IABT (inches above bottom of tank). This is a 50 IN range of NaOH solution equivalent to 65.73 INWC when corrected for an average NaOH solution density of 29% (NaOH is heavier than pure water).
- Have a LO-LO (empty) level setpoint of 2%, or 2.75 IABT.
- Have a LO level setpoint of 92.5%, or 48.00 IABT (based on TS volume of 3,268 GAL with uncertainty included).
- Have a HI level "setpoint" of 96%, or 49.75 IABT (based on TS volume of 3,964 GAL with uncertainty included).

The LO-LO (empty) and LO tank levels are alarmed on the main control board while the HI tank level is not. Although HI tank level is calculated in terms of percent level, it is used only in operating procedures for tank volume monitoring and adjustments.

HNP's uncertainty calculation, which adjusts the levels for instrument uncertainty as part of the determination of the final set points, in addition to scaling calculations have been revised to accommodate the new 3,768 GAL upper volume limit.

Although the minimum allowable CSAT volume remains unchanged at 3,268 GAL, the associated LO level alarm set point will be reduced from 48.00 IABT (inches above the bottom of the tank) to 47.10 IABT in order to provide as much separation between LO and HI level limits as possible. This is done through the removal of existing conservative margin in the set point uncertainty calculation.

The CSAT level instrumentation effects are summarized as follows:

- The new calibrated range remains 1.75-51.75 IABT (50 inches of solution) but the upper calibrated range expressed in inches of water column is now 65.40 INWC (down from 65.73 INWC). The INWC value has decreased slightly due to the drop in average NaOH density (now calculated at 28% NaOH vs. 29% NaOH).

- The LO-LO (empty) level set point will remain 2% of range (2.75 IABT) with re-set at 3% (3.25 IABT). No changes are required to the LO-LO set point.

- The indicated level and low-level alarm set point associated with the LO volume of 3,268 GAL is now 90.7% or 47.10 IABT (down from 92% and 47.75 IABT). This value includes loop and calibration uncertainties.

    - The set point has changed even though the minimum analytical volume remains the same in order to increase the separation between the LO and HI level set points. This was accomplished by removing some conservative margin present in the original uncertainty calculation.

    - Re-set will be at 91.2%, or 47.35 IABT (+0.5% above the set point).

- The HI level "setpoint" will become 93.9% of range, or 48.70 IABT, which includes loop uncertainty and provides a 3.2% operating range for tank level between the upper limit and the low alarm setpoint. Based on a review of the Surveillance Test results over a one-year period indicates that once the tank is filled, the tank level does not vary significantly over time (approximately ±0.1% from Oct.'08 to Aug.'09). Therefore, 3.2% is an acceptable range.

In addition to the above, computer points LCT7150 and LCT7166 will be revised. The computer limit alarms will be set to the TS limits of 90.7% and 93.9% with warning alarms set ±0.5% above/below these values.

3.6.2 Mechanical/Hydraulic Effects

3.6.2a Post-LOCA Containment Water Level

Minimum post-LOCA containment water level is a critical value for assuring adequate net positive suction head (NPSH) to the Residual Heat Removal (RHR) and Containment Spray (CT) Pumps. It is also a factor in the determination of debris transport to the recirculation sump screens and the potential for vortex formation above the screens.

The HNP calculation for minimum post-LOCA containment water level considers a contribution of fluid from the CSAT to the volume of post-LOCA water on the containment floor. Because this calculation is concerned with minimum volume, it considers only the volume of fluid drawn from the CSAT in the time that it takes the containment atmosphere to reach peak temperature. The flow rate used in this calculation is 8 GPM, which is much less than the minimum flow rates of approximately 11 to 14 GPM used in the HNP pH Transient in the Sump and Containment Spray calculation. Therefore, the increase in CSAT maximum level has no effect on the calculated minimum post-LOCA containment water level.

In the *maximum* post-LOCA containment water level calculation, the full volume of the CSAT (currently 3,964 GAL or 530 FT^3) is used to calculate a maximum level of 228.6 FT. Clearly, a reduction in the maximum tank volume adds margin to the analysis. Therefore, the change in CSAT volume does not impact the calculated containment water level.

3.6.2b Seismic Impact

EPRI NP-5228-SL, Volume 4, Section 3 (Page 3-4) states that for small horizontal tanks, only a small portion of the liquid content in the tank would be involved in an amplified response during a seismic event. Therefore, it is conservative to assume that the entire weight of the contents responds with the tank and, consequently, that the tank is completely full. Since the HNP seismic qualification report for the CSAT used the weight of the full capacity of the tank in the qualification analysis, there is no impact to the tank's seismic qualification as a result of the change to the operating level limits.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The purpose of the Containment Spray System (CSS) is to remove heat and fission products (primarily iodine) from a post-accident containment atmosphere by spraying borated sodium hydroxide (NaOH) solution into containment, as required by 10 CFR 50, Appendix A, General Design Criteria 38, "Containment Heat Removal."

NRC regulations in 10 CFR 50.46 require that the Emergency Core Cooling System (ECCS) have the capability to provide long-term cooling of the reactor core following a LOCA. The ECCS must be able to remove decay heat so that the core temperature is maintained at an acceptably low value for the extended period of time required by the long-lived radioactivity remaining in the core. HNP credits, in part, a Containment Spray System with performing safety functions to satisfy the above requirements. Additionally, the CSS is also credited by HNP for reducing the accident source term to meet the limits of 10 CFR Part 100 or 10 CFR 50.67.

Under the proposed changes, the CSS will continue to provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. In the event of a Design Basis Accident (DBA), the reduction of containment pressure and the iodine removal capability of the spray both maintain the release of fission product radioactivity from containment to the environment within specified limits.

4.2 Precedent

To support the analytical justification of a wider TS eductor flow acceptance band, an OE search of more than ten plants with containment spray systems similar to HNP revealed no other cases with an acceptance band as narrow as that currently required by HNP's TS (1 GPM).

Numerical Applications, Inc. (NAI), was contracted to perform the calculation revisions necessary to support the changes to the technical specifications. NAI performed similar work for the Turkey Point Station, which is also lowering their minimum sump pH limit to 7.0, and also for the St. Lucie Station.

4.3 Significant Hazards Consideration

Carolina Power and Light Company (CP&L), doing business as Progress Energy Carolinas, Inc. (PEC), has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below. This evaluation is in conformance with the guidance provided in NRC Regulatory Issue Summary (RIS) 2001-22.

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

Response: No.

The proposed change provides revised requirements for an expanded range of eductor flow rates using a new chemical model and new boric acid equilibrium data, revised sump pH limits, and changes to CSAT concentration and volume limits. This ensures that the Spray Additive System remains operable within the TS requirements or appropriate actions be taken. The proposed changes do not affect the automatic shutdown capability of the reactor protection system and no accident analyses are impacted by the proposed changes.

Expanding the range of acceptable values of eductor flow rate does not increase the probability of occurrence of any accident. Analyzed events are initiated by the failure of plant structures, systems or components. The containment spray additive system is not considered as an initiator of any analyzed accident. The proposed changes ensure that the spray additive system and the associated containment spray system can perform the accident mitigation functions required during a LOCA or MSLB event.

The proposed change does not have a detrimental impact on the integrity of any plant structure, system or component that initiates an analyzed event and will not alter the operation of, or otherwise increase the failure probability of any plant equipment that initiates an analyzed accident. Furthermore, this action does not affect the initiating frequency of a LOCA or MSLB event.

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

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

Response: No.

As described above, the proposed change provides revised requirements for an expanded range of eductor flow rates using a new chemical model and new boric acid equilibrium data, revised sump pH limits, and changes to CSAT concentration and volume limits. These proposed changes ensure that the spray additive system and the associated containment spray system can perform the required accident mitigation functions during a LOCA or MSLB event. There are no other types of accidents that can be postulated that would require the use of the spray additive system or the associated containment spray system for mitigation.

The proposed changes do not introduce any new association between the spray additive system and any radioactive system, including the RCS.

Emergency operation of the spray additive system, or postulated failures of the spray additive system, cannot initiate any type of accident. No new accident initiators are introduced by the proposed requirements and no new failure modes are created that would cause a new or different kind of accident from any accident previously evaluated.

Therefore, the proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

Response: No.

The Bases of TS 3.6.2.2 state that the operability of the Spray Additive System ensures that sufficient NaOH is added to the containment spray in the event of a LOCA. The limits on NaOH volume and concentration ensure a pH value of between 7.0 and 11.0 for the solution that is recirculated within containment after a LOCA. The spray additive system adds NaOH to the containment spray water being supplied from the refueling water storage tank (RWST) to adjust the pH of the containment spray and containment recirculation sump solutions. This pH range minimizes both the evolution of iodine and the effect of chloride and caustic stress corrosion on mechanical systems and components. The proposed range of flow rate from the RWST through each eductor ensures that the original margin of safety is maintained through acceptable pH control following a LOCA or MSLB event. The initial conditions of the accident analyses are preserved and the consequences of previously analyzed accidents are unaffected.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant reduction in the 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.

4.4 Conclusions

Based on the considerations discussed above, (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.

5. ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation," or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," Paragraph (c)(9).

Therefore, pursuant to 10 CFR 51.22, Paragraph (b), an Environmental Impact Statement or Environmental Assessment is not required in connection with the proposed amendment.

6. REFERENCES

1. Letter from Nuclear Regulatory Commission to Mr. J. A. Stall (Florida Power and Light Company), "St. Lucie Plant, Unit 2 – Issuance of Amendment Regarding Alternative Source Term (TAC NO. MD6202)," September 29, 2008, and accompanying Safety Evaluation

2. Harris Nuclear Plant Final Safety Analysis Report (FSAR)

3. Letter from Nuclear Regulatory Commission to Mr. G. Bischoff (Westinghouse Electric Company), "Final Safety Evaluation for Pressurized Water Reactor Owners Group (PWROG) Topical Report (TR) WCAP-16530-NP, 'Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191' (TAC NO. MD1119)," December 21, 2007, and accompanying Safety Evaluation

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
EVALUATION OF PROPOSED CHANGES

ATTACHMENT 1
TECHNICAL SPECIFICATION PAGE MARKUPS
(2 Pages)

SPRAY ADDITIVE SYSTEM

LIMITING CONDITION FOR OPERATION

Insert 1

3.6.2.2 The Spray Additive System shall be OPERABLE with:

a. A Spray Additive Tank containing between 28 and 30 weight % NaOH and a contained volume of between 3268 and 3964 gallons which will be ensured by maintaining an indicated level between 92% and 96%, and (1) add

b. Two spray additive eductors each capable of adding NaOH solution from the chemical additive tank to a Containment Spray System pump flow.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With the Spray Additive System inoperable, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the Spray Additive System to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 The Spray Additive System shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position;

b. At least once per 6 months by:

1. Verifying the contained solution volume in the tank, and
2. Verifying the concentration of the NaOH solution by chemical analysis.

c. At least once per 18 months by verifying that each automatic valve in the flow path actuates to its correct position on a containment spray or containment isolation phase A test signal as applicable; and (1) delete

d. At least once per 5 years by verifying each eductor flow rate is between 19.5 and 20.5 gpm, using the RWST as the test source containing at least 436,000 gallons of water. (1) add

17.2 22.2

Insert 1:

A Spray Additive Tank containing a volume of between 3268 and 3768 gallons of between 27 and 29 weight % NaOH solution, and"

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
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ATTACHMENT 2
RETYPED TECHNICAL SPECIFICATION PAGES
(1 Page)

SPRAY ADDITIVE SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.2 The Spray Additive System shall be OPERABLE with:

a. A Spray Additive Tank containing a volume of between 3268 and 3768 gallons of between 27 and 29 weight % NaOH solution, and

b. Two spray additive eductors each capable of adding NaOH solution from the chemical additive tank to a Containment Spray System pump flow.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With the Spray Additive System inoperable, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the Spray Additive System to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 The Spray Additive System shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position;

b. At least once per 6 months by:

1. Verifying the contained solution volume in the tank, and
2. Verifying the concentration of the NaOH solution by chemical analysis.

c. At least once per 18 months by verifying that each automatic valve in the flow path actuates to its correct position on a containment spray or containment isolation phase A test signal as applicable; and

d. At least once per 5 years by verifying each eductor flow rate is between 17.2 and 22.2 gpm, using the RWST as the test source containing at least 436,000 gallons of water.

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ATTACHMENT 3
PROPOSED TECHNICAL SPECIFICATION (TS) BASES CHANGES
(FOR INFORMATION ONLY)
(3 Pages)

BORATION SYSTEMS (Continued)

condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single boron injection flow path becomes inoperable.

The limitation for a maximum of one charging/safety injection pump (CSIP) to be OPERABLE and the Surveillance Requirement to verify all CSIPs except the required OPERABLE pump to be inoperable below 325°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

The boron capability required below 200°F is sufficient to provide the required SHUTDOWN MARGIN as defined by Specification 3/4.1.1.2 after xenon decay and cooldown from 200°F to 140°F. This condition requires either 7150 gallons of 7000 ppm borated water be maintained in the boric acid storage tanks or 106,000 gallons of 2400-2600 ppm borated water be maintained in the RWST.

The gallons given above are the amounts that need to be maintained in the tank in the various circumstances. To get the specified indicated levels used for surveillance testing, each value had added to it an allowance for the unusable volume of water in the tank, allowances for other identified needs, and an allowance for possible instrument error. In addition, for human factors purposes, the percent indicated levels were then raised to either the next whole percent or the next even percent and the gallon figures rounded off. This makes the LCO values conservative to the analyzed values.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 7.0 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

The BAT minimum temperature of 65°F ensures that boron solubility is maintained for concentrations of at least the 7750 ppm limit. The RWST minimum temperature is consistent with the STS value and is based upon other considerations since solubility is not an issue at the specified concentration levels. The RWST high temperature was selected to be consistent with analytical assumptions for containment heat load.

The OPERABILITY of one Boron Injection System during REFUELING ensures that this system is available for reactivity control while in MODE 6.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that: (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of rod misalignment on associated accident analyses are limited. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

ECCS SUBSYSTEMS (Continued)

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance Requirements for throttle valve position and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

3/4.5.4 REFUELING WATER STORAGE TANK

The OPERABILITY of the refueling water storage tank (RWST) as part of the ECCS ensures that a sufficient supply of borated water is available for injection into the core by the ECCS. This borated water is used as cooling water for the core in the event of a LOCA and provides sufficient negative reactivity to adequately counteract any positive increase in reactivity caused by RCS cooldown. RCS cooldown can be caused by inadvertant depressurization, a LOCA, or a steam line rupture.

The limits on RWST minimum volume and boron concentration assure that: (1) sufficient water is available within containment to permit recirculation cooling flow to the core and (2) the reactor will remain subcritical in the cold condition following mixing of the RWST and the RCS water volumes with all shutdown and control rods inserted except for the most reactive control assembly. These limits are consistent with the assumption of the LOCA and steam line break analyses.

The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 7.0 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

An RWST allowed outage time of 12 hours is permitted during performance of Technical Specification surveillance 4.4.6.2.2 with a dedicated attendant stationed at valve 1CT-22 in communication with the Control Room. The dedicated attendant is to remain within the RWST compartment whenever valve 1CT-22 is open during the surveillance. The dedicated attendant can manually close valve 1CT-22 within 30 minutes in case of a line break caused by a seismic event. Due to the piping configuration, a break in the non-seismic portion of piping during this surveillance could result in draining the RWST below the minimum analyzed volume.

CONTAINMENT VENTILATION SYSTEM (Continued)

gross leakage failures could develop. The 0.60 L_a leakage limit of Specification 3.6.1.2b. shall not be exceeded when the leakage rates determined by the leakage integrity tests of these valves are added to the previously determined total for all valves and penetrations subject to Type B and C tests.

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SYSTEM

The OPERABILITY of the Containment Spray System ensures that containment depressurization and cooling capability will be available in the event of a LOCA or steam line break. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the safety analyses.

The Containment Spray System and the Containment Fan Coolers are redundant to each other in providing post-accident cooling of the containment atmosphere. However, the Containment Spray System also provides a mechanism for removing iodine from the containment atmosphere and therefore the time requirements for restoring an inoperable spray system to OPERABLE status have been maintained consistent with that assigned other inoperable ESF equipment.

3/4.6.2.2 SPRAY ADDITIVE SYSTEM

The OPERABILITY of the Spray Additive System ensures that sufficient NaOH is added to the containment spray in the event of a LOCA. The limits on NaOH volume and concentration ensure a pH value of between 7.0 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components. The contained solution volume limit includes an allowance for solution not usable because of tank discharge line location or other physical characteristics. These assumptions are consistent with the iodine removal efficiency assumed in the safety analyses.

The maximum and minimum volumes for the Spray Additive Tank are based on the analytical limits. The specified indicated levels used for surveillance include instrument uncertainties and unusable tank volume.

3/4.6.2.3 CONTAINMENT COOLING SYSTEM

The OPERABILITY of the Containment Fan Coolers ensures that adequate heat removal capacity is available when operated in conjunction with the Containment Spray Systems during post-LOCA conditions.

ESW flowrate to the Containment Fan Coolers will vary based on reservoir level. Acceptable ESW flowrate is dependent on the number of heat exchanger tubes in service. Surveillance test acceptance criteria should be adjusted for these factors.