Entergy Nuclear Northeast
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249
Tel 914 254 6700

John A Ventosa
Site Vice President

NL-12-090

August 14, 2012

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Proposed License Amendment Regarding Connection of Non Seismic Purification Line to Refuel Water Storage Tank
Indian Point Unit Number 3
Docket No. 50-286
License No. DPR-64

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc, (Entergy) hereby requests a License Amendment to Operating License DPR-64, Docket No. 50-286 for Indian Point Nuclear Generating Unit No. 3 (IP3). The proposed TS change contained herein would revise 3.5.4, "Refueling Water Storage Tank" such that the non-seismically qualified piping of the Spent Fuel Pool (SFP) purification system may be connected to the Refueling Water Storage Tanks (RWST) seismic piping by manual operation of a RWST seismically qualified boundary valve under administrative controls for a limited period of time (i.e., 14 days per fuel cycle for filtration for removal of suspended solids from the RWST water). This change will only be applicable until Refueling Outage R18 (Spring 2015) ends.

Entergy has evaluated the proposed change in accordance with 10 CFR 50.91(a)(1) using the criteria of 10 CFR 50.92(c) and Entergy has determined that this proposed change involves no significant hazards, as described in Attachment 1. The marked up page showing the proposed changes are provided in Attachment 2. The associated Bases changes are provided in Attachment 3 for information. A copy of this application and the associated attachments are being submitted to the designated New York State official in accordance with 10 CFR 50.91.

Entergy requests approval of the proposed amendment by January 15, 2013 and an allowance of 30 days for implementation. There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Manager, Licensing at (914) 254-6710.

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 14, 2012.

Sincerely,

D. M. May
for JV

JAV/sp

Attachments:
1. Analysis of Proposed Technical Specification Changes Regarding Connection of Non Seismic Purification Line to Refuel Water Storage Tank
2. Marked Up Technical Specifications Pages for Proposed Changes Regarding Connection of Non Seismic Purification Line to Refuel Water Storage Tank
3. Marked Up Technical Specification Bases Changes Associated with the Proposed Changes Regarding Connection of Non Seismic Purification Line to Refuel Water Storage Tank

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William Dean, Regional Administrator, NRC Region 1
NRC Resident Inspectors
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-12-090

ANALYSIS OF PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING CONNECTION OF NON SEISMIC PURIFICATION LINE TO REFUEL WATER STORAGE TANK

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

1.0 DESCRIPTION

Entergy Nuclear Operations, Inc (Entergy) is requesting an amendment to Operating License DPR-64, Docket No. 50-286 for Indian Point Nuclear Generating Unit No. 3 (IP3). The proposed Technical Specification (TS) change contained herein would revise 3.5.4, "Refueling Water Storage Tank" such that the non-seismically qualified piping of the Spent Fuel Pool (SFP) purification system may be connected to the Refueling Water Storage Tank's (RWST) seismic piping by manual operation of a RWST seismically qualified boundary valve under administrative controls for a limited period of time (i.e., 14 days per fuel cycle for filtration for removal of suspended solids from the RWST water). This change will only be applicable for the next two fuel cycles and cannot be used after Refueling Outage R18 (Spring 2015).

The specific proposed changes are listed in the following section.

2.0 PROPOSED CHANGES

The proposed TS changes are as follows:

Directly under "Actions" add

..... NOTE 1.....

The RWST isolation valves connected to non-safety related piping may be opened under administrative controls for up to 14 days per fuel cycle for filtration until the end of refuel outage 18.

.....

In addition, the Technical Specification Bases will be revised to clarify administrative controls.

3.0 BACKGROUND

Historically, until February 15, 2012, IP3 was periodically using the Spent Fuel Pool (SFP) Purification Loop to filter the RWST water while in plant conditions and modes for which the RWST was required to be operable. This alignment was utilized for RWST water purification in accordance with the EPRI PWR Primary Water Chemistry Guidelines (Reference 1) which recommends monitoring suspended solids in the refueling water storage tank (RWST) prior to a refueling outage and if possible recirculate the RWST through the spent fuel pool (SFP) demineralizers to ensure optical clarity during refueling. Entergy had established the practice of recirculating the RWST for up to 30 days beginning approximately two months prior to a refueling outage.

It was known that this system alignment could render the RWST inoperable during a seismic event since the SFP Purification Loop consisted of non-seismically qualified piping. To maintain operability, procedure changes were made to direct manual operator action to isolate the RWST from the SFP Purification Loop. After reviewing Information Notice (IN) 2012-01, "Seismic Considerations-Principally Issues Involving Tanks," Entergy concluded that manual actions could not be credited for this purpose without prior NRC approval and subsequently discontinued this

practice. However, the original IP3 design of the RWST system affords no other way to filter the RWST through seismically qualified piping until modifications are made to qualify the piping for this purpose before refuel outage 19.

During plant operations in Modes 1 through 4, the RWST is required to be operable to maintain a borated water supply for accident mitigation purposes. The RWST is aligned to the suction of the high head safety injection pumps, the residual heat removal pumps and the containment spray pumps during normal operation (Modes 1 through 4). During refueling operation (Modes 5 and 6), the RWST is required to be functional as a borated water supply should the boric acid storage system not be operable. The contents of the RWST are also used to flood the refueling cavity during refueling operation. The water in the RWST is borated to a concentration sufficient to ensure that shutdown margin is maintained when the reactor is at cold shutdown conditions should RWST water be added to the reactor.

The SFP Purification Loop is a subsystem of the spent fuel pool cooling system that is connected to portions of the RWST piping. The SFP Purification Loop piping is non-safety grade and not seismically qualified. During an evaluation of a seismic event, the failure of the non-seismic SFP Purification Loop piping must be considered. Such a failure could potentially result in a loss of RWST inventory should the ASME code boundary valves between the RWST and the SFP Purification Loop be open with the SFP Purification Loop aligned to the RWST. Prior to February 15, 2012, interconnection of the SFP Purification Loop and the RWST piping was allowed under administrative controls while the RWST was required to be operable for the filtration and demineralization of the RWST inventory. To justify this configuration, operator action to close the seismically qualified manual code boundary valves was credited to prevent a loss of RWST inventory below the Technical Specification (TS) limits if there a failure in the pressure boundary of the SFP Purification Loop piping. This closure of the subject boundary valves can be taken in sufficient time to ensure that the TS required volume of water is maintained in the RWST. Further, pre-refueling outage treatment of the RWST contents ensures that refueling water clarity requirements are maintained for fuel transfer and inspection purposes. The water clarity is both a personnel and equipment safety consideration.

4.0 Technical Evaluation

Updated Final Safety Analysis Report (FSAR) 9.3.2 recognizes the past use of administrative controls to purify the RWST. Specifically, "A second pumping system is used to circulate refueling water through the demineralizer and filter for purification. This is permitted under administrative controls (i.e., an operator familiar with the operational restrictions of the RWST Purification System who is in contact with the control room)."

This assessment addresses the proposed change to TS 3.5.4, "Refueling Water Storage Tank." The TS change would revise the limitations to voluntarily connect non-seismic and seismic piping systems provided by IN 2012-01, and there would be a 14 day limit for re-circulating the contents of the RWST for the purpose of filtration during Modes 1 through 4 when the RWST is required to be operable. The following assessment provides the basis for the acceptability of the proposed change to the TS which provides for operator action to close the seismically qualified manual code boundary valves to assure RWST operability when re-circulating the tank through non-safety related piping.

The past practice has been to recirculate the RWST through the SFP demineralizers for up to 30 days. Prior to refueling outage (RO) 3R15 the RWST was recirculated for a duration of 23 days. After 3 days of recirculation the total suspended solids were less than the detectable value of 0.01 ppm. Prior to RO 3R16 in 2011 the RWST was recirculated for a duration of 18 days. A sample taken 2.5 days after the start of recirculation had total suspended solids less than the detectable value of 0.01 ppm. Although the samples indicate a shorter time is acceptable, the amendment is requesting 14 days to recirculate the RWST water. The unit 3 RWST has a nominal volume of 350,000 gallons. The recirculation/purification flowrate is nominally 90 gpm resulting in a tank turnover of 2.7 days. This would be the minimum amount of recirculation time needed to provide a representative sample for total suspended solids. The cleanup half-life for impurities such as suspended solids is 45 hours. Recirculation through the demineralizer for 14 days would reduce impurities by a factor of 181.

Suction from the RWST for the refuel water purification pump is taken from the sixteen inch line that connects the RWST to the Emergency Core Cooling System (ECCS). The suction line is initially a four inch line but it is reduced to two inch within four feet. The line is seismic class 1 until after the refueling water purification pump discharge valve AC-725. Valve AC-725 (a diaphragm valve) and, the valve AC-727A (a globe valve) on the suction side of the refueling water purification pump, are used to isolate the RWST from non-seismic piping on the suction (inlet) side of the purification loop. The return line is also a two inch line (until close to the RWST where it joins other return lines and becomes three inch). The seismic class 1 return line can be isolated from the non seismic line by check valve AC-726B, globe valve AC-727B, and diaphragm valve SI-841.

The non seismic class 1 pipe cannot be depended upon for design basis events and provisions are made to isolate the RWST from non seismic class 1 pipe in time to ensure that the TS 3.5.4 required volume of ≥ 35.4 feet continues to be met. The non seismic pipe can be postulated to break during normal operation but the consequences would not significantly differ from a pipe beak while recirculating the SFP. Other active and passive failures could affect the purification but not the RWST level. Procedure 3-SOP-SI-003, "Recirculation and or Purification of the Refueling Water Storage Tank (currently not allowed in Modes 1, 2, 3, or 4) specify the following:

1. Prior to purification the RWST level will be raised to the overflow level of 36.8 feet (overflow observed) and the Critical Functions Monitoring System (CFMS) computer point (L0933A) will be adjusted to alarm just prior to actually reaching the 36.0 foot level. Control Room level instrument (LI-920) can be used for trending level changes
2. Other actions that will cause flow into or out of the RWST are stopped to avoid obscuring level changes.
3. The purification flow is maintained at ≤100 gpm using AC-727B to throttle.
4. There is no dedicated operator so the Operations staff awareness of the need to isolate the RWST within 46 minutes of the Plant Process Computer low level alarm is heightened. The operators are required to have flashlight, radio for communication with the CR, respirator (if HP mandates), and keys if the PAB is exited.
5. Operations Personnel isolate RWST purification on Control Room direction, SI signal actuation (awareness based on resulting loss of Plant Auxiliary Building (PAB) lighting), site page that SI has occurred, Process Computer instrument loop LT-120 inoperable, seismic motion, or unidentified area flooding.
6. Isolation of the RWST purification loop requires, in the following order, stopping the refueling water purification pump (not necessary but reduces rate of RWST loss), closing inlet valves AC-725 and AC-727A, and closing discharge valves AC-727B and SI-841. Check valve AC-726B on the discharge line will isolate the RWST from non seismic lines

once AC-725 or AC-727A is closed. Note that check valve AC-726B is checked for operability before starting the purification.

The calculated time for operator action to close AC-725 or AC-727A and terminate flow is 46 minutes based on discharge from one end of the purification loop. Check valve AC-726B is seismic and presumed to close to isolate the other end. This time frame is consistent with the 30 minutes often used for starting action outside the control room.

Entergy has confidence in the successful completion of manual actions due to the training program completed for all system operators and the specific requirements of procedure 3-SOP-SI-003. If a seismic event occurs, 0-AOP-Seismic requires that an operator verify RWST is isolated per 3-SOP-SFP-001. Based on the operator training, the RWST should already have been isolated. There is no risk of confusing IP2 and IP 3 since the operators are assigned to one unit or another. During an SI event the plant would initially be in the injection phase and radiation doses would not be a factor in operator action. The refueling water purification pump is located on the 41 foot elevation of the PAB with the pump control switch on an adjacent wall and valves AC-725 and AC-727A within three feet of each other on opposite sides of the pump. The return line isolation valve AC-727B and SI-841 are located on the PAB 34 foot elevation at opposite ends of the SI pump room. To reach the SI pump room the operator has to proceed east from the refueling water purification pump and go up the stairwell to the 55 foot elevation. The operator then proceeds west through the corridor to the stairwell at the opposite end and goes down to the SI pump room door (there are three) on the 34 foot elevation to isolate the discharge valves. There are no locked doors or card readers on the pathway.

The procedure requires heightened operator awareness. This involves directions to isolate purification based on events or direction (discussed earlier), the sequence of events for isolation, and designated operators walk down of the location of the refueling water purification pump switch and the four valves. The directions also cover the method of communication the operator will have with the control room.

An IP3 calculation (Reference 2) assessed the rate of loss from the RWST assuming a postulated break in one of the 2 inch non seismic lines. Flow is maximized by considering rupture of the piping downstream of the operating purification pump and ruptures without the pump operating (the greatest flow with no loss through the pump) to determine maximum flows. The calculated time to reach the TS level of 35 feet 4 inches from 36 feet is 46 minutes. Considering the alarm will alert the Control Room before the tank reaches 36 feet, there is adequate time to isolate the RWST. Although the operator would close all the isolation valves, the breach is assumed to be terminated after either one of the purification pumps suction or discharge isolation valves is closed. This is consistent with the initial IP3 licensing basis that a check valve (i.e., AC-726B) failure is not an active failure. The single failure of the operator to perform a specific action during the performance of a series of actions is accounted for by requiring two isolation valves to be closed in both the inlet and discharge pathways.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Entergy Nuclear Operations, Inc. (Entergy) has evaluated the safety significance of the proposed change to the Indian Point 3 Technical Specifications (TS) which revise IP3 TS 3.5.4, "Refueling

Water Storage Tank," to allow administrative control of the seismic RWST/non-seismic SFP Purification Loop interface. The proposed changes have been evaluated according to the criteria of 10 CFR 50.92, "Issuance of Amendment". Entergy has determined that the subject changes do not involve a Significant Hazards Consideration, as discussed below

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

Response: No. The use of the SFP Purification Loop to re-circulate the RWST does not involve any changes or create any new interfaces with the reactor coolant system or main steam system piping. Therefore, the connection of the SFP Purification Loop to the RWST would not affect the probability of these accidents occurring. The SFP Purification Loop is not credited for safe shutdown of the plant or accident mitigation. Administrative controls ensure that the SFP Purification Loop can be isolated as necessary in sufficient time to assure that the RWST volume will be adequate to perform the safety function as designed. Since the RWST will continue to perform its safety function and overall system performance is not affected, the consequences of the accident are not increased.

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

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

Response: No. The design of the RWST and the SFP Purification Loop to allow recirculation and purification has not been altered. Procedures for the operation of the plant have not been revised to create the possibility of a new or different type of accident. Contingent upon manual operator action, a SFP Purification Loop line break will not result in a loss of the RWST safety function. Similarly, an active or passive failure in the SFP Purification Loop will not be significantly different whether aligned to the SFP or the RWST.

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

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

Response: No. The SFP Purification Loop is not credited for safe shutdown of the plant or accident mitigation. Adequate RWST volume will be maximized prior to purification and timely operator action can be taken to isolate the non seismic system from the RWST to assure it can perform its function. This will result in no significant reduction in the margin of safety.

Therefore the proposed change does not significantly reduce the margin of safety.

Based on the above, Entergy concludes that the proposed amendment to the Indian Point 3 Technical Specifications 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.

5.2 Applicable Regulatory Requirements / Criteria

The NRC Order of February 11, 1980 required an evaluation of the degree of compliance with the GDC at the time. This section discusses continued compliance with certain of those criteria.

The plant will continue to meet Criterion 1 of 10 CFR 50.36 which says "Structures, systems and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems and components will satisfactorily perform their safety functions. Appropriate records of the design, fabrication, erection, and testing of structures, systems and components important to safety shall be maintained by or under the control of the nuclear power plant licensee throughout the life of the unit" and Criterion 3 which says "Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The design bases for these structures, systems and components shall reflect: (1) appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena and (3) the importance of the safety functions to be performed."

The purification of the RWST will use the seismic piping meeting these criteria but will also use the non seismic piping which does not. Manual action will be used until the end of the next two outages to assure isolation of the seismic piping from the non seismic piping during any condition requiring the RWST volume to be intact and threatening to reduce the RWST level below the TS allowable. This will assure continued compliance with these criteria.

The plant will continue to meet Criterion 35 which says "A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts." The RWST provides a support function for this criterion since it supplies the water which is injected following an event and must contain the amount of water required by analysis. Manual action will be used until the end of the next two outages to assure isolation of the seismic piping from the non credited non seismic piping to assure RWST level meets the TS allowable. This will assure continued compliance with this criterion.

5.3 Environmental Considerations

The proposed changes to the IP3 Technical Specifications do 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(c)(9). Therefore, pursuant to 10 CFR

51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 PRECEDENCE

Joseph M. Farley Units 1 and 2 received approval for taking manual action to isolate the RWST from the non seismic SFP lines in Amendments 188 and 183, respectively (Reference 3).

7.0 REFERENCES

1. "Pressurized Water Reactor Primary Water Chemistry Guidelines", Revision 6. EPRI, Palo Alto, CA: 2007. 1014986.

2. IP3-CALC-SI-03333, R0, "Engineering Evaluation of Postulated RWST Inventory Loss In support of ACT-99-44077"

3. NRC Letter to Southern Nuclear Operating Company, Inc., "Issuance of Amendments regarding Refueling Water Storage Tank (TAC NOS. ME8005 AND ME8006)", dated March 24, 2012.

ATTACHMENT 2 TO NL-12-090

MARKED UP TECHNICAL SPECIFICATIONS PAGES FOR PROPOSED CHANGES REGARDING CONNECTION OF NON SEISMIC PURIFICATION LINE TO REFUEL WATER STORAGE TANK

Changes indicated by lineout for deletion and Bold/Italics for additions

Unit 3 Affected Pages:

3.5.4-1

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

LCO 3.5.4 The RWST and two channels of RWST low level alarm shall be OPERABLE.

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

ACTIONS

.....

NOTE 1

The RWST isolation valves connected to non-safety related piping may be opened under administrative controls for up to 14 days per fuel cycle for filtration until the end of refuel outage 18.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RWST boron concentration not within limits of SR 3.5.4.3. OR RWST borated water temperature not within limits of SR 3.5.4.1.	A.1 Restore RWST to OPERABLE status.	8 hours
B. One channel of RWST low level alarm inoperable.	B.1 Restore RWST low level alarm to OPERABLE status.	7 days
C. RWST inoperable for reasons other than Condition A or B.	C.1 Restore RWST to OPERABLE status.	1 hour
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

ATTACHMENT 3 TO NL-12-090

MARKED UP TECHNICAL SPECIFICATION BASES CHANGES ASSOCIATED WITH THE PROPOSED CHANGES REGARDING CONNECTION OF NON SEISMIC PURIFICATION LINE TO REFUEL WATER STORAGE TANK

Changes indicated by lineout for deletion and Bold/Italics for additions

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.4 Refueling Water Storage Tank (RWST)

BASES

BACKGROUND

The RWST supplies borated water to the Chemical and Volume Control System (CVCS) during abnormal operating conditions, to the refueling cavity during refueling, to the ECCS to fill accumulators, and to the ECCS and the Containment Spray System during accident conditions.

The RWST supplies the ECCS and the Containment Spray System through separate supply headers during the injection phase of a loss of coolant accident (LOCA). Motor operated isolation valves are provided to isolate the RWST from the ECCS subsystems once the system has been transferred to the recirculation mode. The switchover to the cold leg recirculation phase is manually initiated when the RWST level has reached the low-alarm setpoint and sufficient coolant inventory to support pump operation in recirculation mode is verified to be in the containment. Use of a single RWST to supply all of the injection trains of the ECCS and Containment Spray System is acceptable since the RWST is a passive component, and passive failures are not required to be assumed to occur coincidentally with Design Basis Events.

During normal operation in MODES 1, 2, and 3, the high head safety injection (HHSI) and residual heat removal (RHR) pumps are aligned to take suction from the RWST.

The ECCS and Containment Spray System pumps are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at or near shutoff head conditions.

This LCO ensures that:

a. The RWST contains sufficient borated water to support the ECCS during the injection phase;

(continued)

BACKGROUND (continued)

b. Sufficient water volume exists in the recirculation sump or the containment sump to support continued operation of the ECCS and Containment Spray System pumps at the time of transfer to the recirculation mode of cooling; and

c. The reactor remains subcritical following a LOCA or MSLB.

Insufficient water in the RWST could result in insufficient cooling capacity when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following the LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the containment due to improper pH in the sumps.

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWST provides a source of borated water to the ECCS and Containment Spray System pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS – Operating"; B 3.5.3, "ECCS – Shutdown"; and B 3.6.6, "Containment Spray System and Containment Fan Cooler System." These analyses are used to assess changes to the RWST in order to evaluate their effects in relation to the acceptance limits in the accident analyses.

The RWST must also meet volume, boron concentration, and temperature requirements for non-LOCA events. The volume is not an explicit assumption in non-LOCA events since the required volume is a small fraction of the available volume. The deliverable volume limit is set by the LOCA and containment analyses. For the RWST, the deliverable volume is different from the total volume contained since, due to the design of the tank, more water can be contained than can be delivered.

For a large break LOCA analysis, the minimum water volume limit of 195,800 gallons and the lower boron concentration limit of 2400 ppm are used to compute the post LOCA sump boron concentration necessary

(continued)

APPLICABLE SAFETY ANALYSES (continued)

to assure subcriticality. The large break LOCA is the limiting case since the safety analysis assumes that all control rods are out of the core.

The RWST level required by Technical Specifications includes allowances for instrument accuracy, the unusable volume in the RWST, and the maximum volume expected to remain in the RWST when the plant is switched from the injection to recirculation modes of operation.

The upper limit on boron concentration of 2600 ppm is used to determine the maximum allowable time to switch to hot leg recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident.

In the ECCS analysis, the containment spray temperature is assumed to be equal to the RWST lower temperature limit of 35·F. If the lower temperature limit is violated, the containment spray further reduces containment pressure, which decreases the rate at which steam can be vented out the break and increases peak clad temperature. The upper temperature limit of 110·F is used in the LOCA containment integrity analysis. Exceeding this temperature will result in higher containment pressures due to reduced containment spray cooling capacity. The minimum boron concentration is an explicit assumption in the main steam line break (MSLB) analysis to ensure the required shutdown capability. For the containment response following an MSLB, the lower limit on boron concentration and the upper limit on RWST water temperature are used to maximize the total energy release to containment.

Following a LOCA, switchover from the injection phase to the recircuation phase must occur before the RWST empties to prevent damage to the pumps and a loss of cooling capability. For similar reasons, switchover must not occur before there is sufficient water in the containment to support recirculation pump suction. Furthermore, early switchover must not occur to ensure that sufficient borated water is injected from the RWST.

(continued)

APPLICABLE SAFETY ANALYSES (continued)

The IP3 ESFAS design does not include automatic switchover from the safety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who must be alerted by redundant RWST low level alarms. The switchover to the cold leg recirculation phase is manually initiated when the RWST level has reached the low alarm setpoint and sufficient coolant inventory to support pump operation in recirculation mode is verified to be in the containment.

The RWST low level alarm setpoint has both upper and lower limits. The upper limit is set to ensure that switchover does not occur until there is adequate water inventory in the containment to provide ECCS pump suction. (This is confirmed by recirculation and/or containment sump level indication.) The lower limit is set to ensure switchover occurs before the RWST empties, to prevent ECCS pump damage.

Requiring 2 channels of RWST low level alarm ensures that the alarm function will be available assuming a single failure of one channel.

The RWST satisfies Criterion 3 of 10 CFR 50.36.

LCO

The RWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA), to cool and cover the core in the event of a LOCA, to maintain the reactor subcritical following a DBA, and to ensure adequate level in the recirculation sump and the containment sump to support ECCS pump operation in the recirculation mode.

To be considered OPERABLE, the RWST must meet the water level, boron concentration, and temperature limits established in the SRs.

APPLICABILITY

In MODES 1, 2, 3, and 4, RWST OPERABILITY requirements are dictated by ECCS and Containment Spray System OPERABILITY

(continued)

APPLICABILITY (continued)

requirements. Since both the ECCS and the Containment Spray System must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.4, "Residual Heat Removal (RHR) and Coolant Circulation-High Water Level," and LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation-Low Water Level."

ACTIONS

A note allows the RWST valves that isolate non seismic piping to be opened under administrative control until the end of RO 18. The controls are sufficient to assure that the TS required amount of water will be available under all conditions.

A.1

With RWST boron concentration or borated water temperature not within limits of SR 3.5.4.3 and SR 3.5.4.1, respectively, they must be returned to within limits within 8 hours. Under these conditions neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE condition. The 8 hour limit to restore the RWST temperature or boron concentration to within limits was developed considering the time required to change either the boron concentration or temperature and the fact that the contents of the tank are still available for injection.

B.1

Condition B applies when one channel of RWST low level alarm is inoperable. Required Action B.1 requires restoring the inoperable channel to OPERABLE status within 7 days. The 7 day Completion Time for restoration of redundancy to the alarm function is needed because the IP3 ESFAS design does not include automatic switchover from the safety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who is alerted by the RWST low level alarm as the primary indicator for determining the time for the switchover. The 7 day Completion Time for restoration of redundancy for this alarm function is acceptable because of the remaining alarm channel and the availability of containment and recirculation sump level indication in the containment.

(continued)

ACTIONS (continued)

C.1

With the RWST inoperable for reasons other than Condition A (e.g., water volume) or B (e.g., two level alarms inoperable), it must be restored to OPERABLE status within 1 hour.

In this Condition, neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE status or to place the plant in a MODE in which the RWST is not required. The short time limit of 1 hour to restore the RWST to OPERABLE status is based on this condition simultaneously affecting redundant trains.

D.1 and D.2

If the RWST cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.5.4.1

The RWST borated water temperature should be verified every 24 hours to be within the limits assumed in the accident analyses band. This Frequency is sufficient to identify a temperature change that would approach either limit and has been shown to be acceptable through operating experience.

The SR is modified by a Note that eliminates the requirement to perform this Surveillance when ambient air temperatures are within the operating limits of the RWST and the heating steam isolation valves are locked closed. With ambient air temperatures within the band, the RWST temperature should not exceed the limits.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.4.2

The RWST water volume should be verified every 7 days to be above the required minimum level in order to ensure that a sufficient initial supply is available for injection and to support continued ECCS System pump operation on recirculation.

Since the RWST volume is normally stable and is protected by an alarm, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.4.3

The boron concentration of the RWST should be verified every 31 days to be within the required limits. This SR ensures that the reactor will remain subcritical following a LOCA. Further, it assures that the resulting sump pH will be maintained in an acceptable range so that boron precipitation in the core will not occur and the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized. Since the RWST level is normally stable, a 31 day sampling Frequency to verify boron concentration is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.4.4

Performance of the CHANNEL CHECK every 7 days ensures that a gross failure of the RWST level instruments has not occurred. A CHANNEL CHECK is normally the comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same channel should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure: thus, it is key to verifying that the RWST level instruments continue to operate properly between each CHANNEL CALIBRATION.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.5.4.4 (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the RWST level instrument channel has drifted outside the limit. If the channels are within criteria, it is an indication that the RWST level instrument channels are OPERABLE.

The frequency of 7 days is based on operating experience that demonstrates that channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of displays associated with the LCO required RWST level instruments.

SR 3.5.4.5

A CHANNEL CALIBRATION of the RWST level switch is performed at least every 184 days. CHANNEL CALIBRATION is a complete check of the level switch loop including the required alarm. The test verifies the RWST level switch responds to RWST level within the required range and accuracy. The test also verifies that the RWST level switch will cause the low level alarm to annunciate at $\geq$10.5 feet and $\leq$12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.

SR 3.5.4.6

A CHANNEL CALIBRATION of the RWST level transmitter is performed at least every 18 months. CHANNEL CALIBRATION is a complete check of the RWST level transmitter loop including the required alarm. The test verifies the RWST level transmitter responds to RWST level within the required range and accuracy.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.5.4.6 (continued)

The test also verifies that the RWST level transmitter will cause the low level alarm to annunciate at $\geq$10.5 feet and $\leq$12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.

REFERENCES

1. FSAR, Chapter 6 and Chapter 14.