Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

May 9, 2001
NOC-AE-01001093
File No.: G20.02.01
G21.02.01
10CFR50.90
STI: 31279074

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

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Proposed Change to Technical Specification 3/4.5.1, Accumulators

STP Nuclear Operating Company (STPNOC) submits the attached proposed amendment to South Texas Project Operating Licenses, NPF-76 and NPF-80. This license amendment request proposes revising Technical Specification 3.5.1, "Emergency Core Cooling Systems - Accumulators" to extend the allowed outage time for an inoperable accumulator to 24 hours in accordance with the provisions of WCAP-15049-A. In addition, STPNOC proposes to revise the requirements of the specification to be consistent with the Westinghouse Improved Standard Technical Specifications, NUREG-1431.

As an administrative change, STPNOC proposes to correct a typographical error on page 3/4 3-36 where numerical subscripts were inadvertently replaced with commas.

The proposed extension of the allowed outage time to 24 hours is a risk-informed application and has been evaluated in accordance with Regulatory Guide 1.177.

STPNOC requests approval of the proposed amendment by March 31, 2002. Once approved, the amendment shall be implemented within 60 days.

The STPNOC Plant Operations Review Committee and Nuclear Safety Review Board have reviewed and approved the proposed change to the Technical Specifications.

In accordance with 10 CFR 50.91(b), STPNOC is notifying the State of Texas of this request for license amendment by providing a copy of this letter and its attachments.

A001

If there are any questions regarding the proposed amendment, please contact Mr. A. W. Harrison (361) 972-7298 or me at (361) 972-8757.

J. J. Sheppard
Vice President
Engineering & Technical Services

awh/

Attachments:
1. Affidavit
2. Description of Changes and Safety Evaluation
3. Annotated Technical Specification Pages
4. Annotated Bases Pages
5. Technical Specification and Bases Pages with Proposed Changes Incorporated

cc:

Ellis W. Merschoff
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

John A. Nakoski
Addressee Only
U. S. Nuclear Regulatory Commission
Project Manager, Mail Stop OWFN/7-D-1
Washington, DC 20555-0001

Mohan C. Thadani
Addressee Only
U. S. Nuclear Regulatory Commission
Project Manager, Mail Stop OWFN/7-D-1
Washington, DC 20555

Cornelius F. O'Keefe
c/o U. S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77404-0910

A. H. Gutterman, Esquire
Morgan, Lewis & Bockius
1800 M. Street, N.W.
Washington, DC 20036-5869

M. T. Hardt/W. C. Gunst
City Public Service
P. O. Box 1771
San Antonio, TX 78296

A. Ramirez/C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Jon C. Wood
Matthews & Branscomb
112 East Pecan, Suite 1100
San Antonio, Texas 78205-3692

Institute of Nuclear Power
Operations - Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

R. L. Balcom/D. G. Tees
Reliant Energy, Inc.
P. O. Box 1700
Houston, TX 77251

C. A. Johnson/R. P. Powers
AEP - Central Power and Light Company
P. O. Box 289, Mail Code: N5012
Wadsworth, TX 77483

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

ATTACHMENT 1

AFFIDAVIT

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	)		
	)		
STP Nuclear Operating Company, et al.,	)	Docket Nos.	STN 50-498
	)		STN 50-499
	)		
South Texas Project	)		
Units 1 and 2	)		

AFFIDAVIT

I, J. J. Sheppard, being duly sworn, hereby depose and say that I am Vice President, Engineering & Technical Services of STP Nuclear Operating Company; that I am duly authorized to sign and file with the Nuclear Regulatory Commission the attached proposed Technical Specification change; that I am familiar with the content thereof; and that the matters set forth therein are true and correct to the best of my knowledge and belief.

J. J. Sheppard
Vice President
Engineering & Technical Services

STATE OF TEXAS)
)
COUNTY OF MATAGORDA)

Subscribed and sworn to before me, a Notary Public in and for the State of Texas, this 9th day of May, 2001.

LOIS J. MILLS
Notary Public, State of Texas
My Commission Expires
JULY 27, 2003

Notary Public in and for the
State of Texas

ATTACHMENT 2

DESCRIPTION OF CHANGES

AND

SAFETY EVALUATION

SAFETY ANALYSIS

1.0 Introduction

The proposed change will revise the allowed outage time in Technical Specification 3/4.5.1 for one inoperable accumulator from 12 hours to 24 hours in accordance with the provisions of WCAP-15049-A and STP PRA model analysis. Technical Specification 3/4.5.1 will also be revised to be generally consistent with the content of the Westinghouse Improved Technical Specifications (ITS), NUREG-1431 by relocating the operability criteria currently in the LCO to the Surveillance Requirements and by revising the Surveillance Requirements to be consistent with those in the ITS. In an unrelated administrative change, the commas following the time constants on p. 3/4 3-36 are being corrected to be subscripts to correct a typographical error.

The proposed amendment relaxes an unnecessarily restrictive allowed outage time for the accumulators and replaces it with a time that provides a more reasonable opportunity to respond to the condition. The changes to the surveillance requirements remove excessive burden for personnel performing the surveillance testing. The detailed rationale for each change is provided in the Description below.

The safety evaluation shows that STP meets the acceptance criteria of RG 1.177 for approval of the proposed change. The calculated increase in core damage frequency is less than the 1.0E-06 criterion and the calculated incremental conditional core damage probabilities are less than the 5.0E-07 criterion.

2.0 Description

STPNOC proposes to make the following changes to Technical Specification 3/4.5.1, Accumulators:

Page	Affected Section	Description of Change	Reason for Change
3/4 5-1	3.5.1 ACTION a.	In accordance with WCAP-15049-A and STP model analysis, the allowed action time in ACTION a. will be extended to 24 hours	Extended allowed outage time will allow operators a reasonable time to respond to conditions that make the accumulator inoperable. The analysis developed in this report shows that there is no significant effect on safety.
3/4 5-1	3.5.1 ACTION a. and ACTION b.	ACTION a. will be revised to delete the exclusion of its applicability to a closed isolation valve and ACTION b., which applies to a closed isolation valve will be deleted. This change will make ACTION a. applicable to a closed isolation valve	For consistency with ITS and WCAP-15049-A. There is no technical reason to have a separate action or different completion time for the accumulator being inoperable because the isolation valve is closed.
3/4 5-1	LCO 3.5.1.a	The requirement for the isolation valve to be open with power removed will be deleted from the LCO.	Administrative change because SR 4.5.1.1.a.2 and SR 4.5.1.1.c address the requirement. Consistent with ITS.

3/4 5-1	LCO 3.5.1.b SR 4.5.1.1.a.1	The requirement for a borated water volume between 8800 and 9100 gallons will be moved from LCO 3.5.1.b to SR 4.5.1.1a.1	Administrative change and consistent with ITS.
3/4 5-1	LCO 3.5.1.c SR 4.5.1.b	The requirement for a boron concentration between 2700 and 3000 ppm will be moved from LCO 3.5.1.c to SR 4.5.1.b	Administrative change and consistent with ITS
3/4 5-1	LCO 3.5.1.d SR 4.5.1.1.a.1	The requirement for a nitrogen cover pressure between 590 and 670 psig will be moved from LCO 3.5.1.d to SR 4.5.1.1.a.1.	Administrative change and consistent with ITS
3/4 5-1	APPLICABILITY and associated footnote	The APPLICABILITY statement will be modified to be consistent with ITS by changing the MODE 3 applicability to specifically state "MODE 3 with pressurizer pressure > 1000 psig". The footnote modifying the current MODE 3 applicability with the same pressurizer pressure criterion will be deleted.	Administrative change and consistent with ITS
3/4 5-1	SR 4.5.1.1.b	A footnote to SR 4.5.1.1.b. will be added to clarify that the SR to be performed within 6 hours after each solution volume increase greater than or equal to 1% tank volume is only required to be performed for the affected accumulators.	This clarifies the applicability of the SR so that it is not unnecessarily applied to accumulators that were not affected by a volume change. This change is consistent with ITS.
3/4 5-1	SR 4.5.1.1.b	SR 4.5.1.1.b will be modified to exclude applicability to changes in accumulator volume from the Refueling Water Storage Tank (RWST).	The RWST boron concentration is governed by TS and its boron concentration is within the acceptable range for the accumulators. This change is consistent with ITS.
3/4 5-2	SR 4.5.1.1.d	SR 4.5.1.1.d, to confirm the isolation valve opens when RCS pressure exceeds the P-11 setpoint or upon receipt of an SI signal, will be deleted.	The safety analysis does not require the valves to move during power operation or in a post accident situation. Since no automatic action is required for the safety function, performing this test is unnecessary and can be deleted. This is consistent with ITS.
3/4 5-2	SR 4.5.1.2	SR 4.5.1.2, for ANALOG CHANNEL OPERATIONAL TEST and CHANNEL CALIBRATION will be deleted.	These requirements are deleted since they are not necessary to meet the requirements of operability for the accumulators. This is consistent with ITS.
3/4 5-2	NA	Page is labeled "not used"	Administrative. All 3/4.5.1 requirements will be on p 3/4 5 –1.

In an unrelated administrative correction, the note for the time constants on page 3/4 3-36 is being corrected to read, "Time constants utilized... are $\tau_1 \geq 50$ seconds and $\tau_2 \leq 5$ seconds." The numeric subscripts had inadvertently been replaced with commas because of a typographical error in an earlier amendment.

3.0 Background

STP Units 1 and 2 each have 3 Emergency Core Cooling System (ECCS) Accumulators. The safety function of the accumulators is described in Section 6.3.2 of the STP UFSAR. A brief summary of pertinent UFSAR contents is provided below.

> The ECCS components are designed such that a minimum of two accumulators delivering to two unaffected loops, and one HHSI and one LHSI pump delivering to an unaffected loop, will assure adequate core cooling in the event of a design basis LOCA. The redundant onsite standby DGs assure adequate emergency power to all electrically-operated components in the event a loss-of-offsite power (LOOP) occurs simultaneously with a LOCA, even assuming a single failure in the emergency power system such as the failure of one DG to start.
>
> The accumulators are pressure vessels partially filled with borated water and pressurized with nitrogen gas. The accumulator water temperature is limited to less than or equal to 90°F, or compensatory measures are taken to ensure that the peak clad temperature does not exceed 2,200°F in the event of a large break loss of coolant accident as described in Section 15.6. During normal operation each accumulator is isolated from the RCS by two check valves in series. Should the RCS pressure fall below the accumulator pressure, the check valves open and borated water is forced into the RCS. One accumulator is attached to each of the cold legs of loops 1, 2 and 3 of the RCS. Mechanical operation of the swing-disc check valves is the only action required to open the injection path from the accumulators to the core via the cold leg.
>
> Connections are provided for remotely adjusting the level and boron concentration of the borated water in each accumulator during normal plant operation as required. Accumulator water level may be adjusted by pumping borated water from the RWST to the accumulator. Samples of the solution in the accumulators are taken periodically for checks of boron concentration.
>
> Accumulator pressure is provided by a supply of nitrogen gas, and can be adjusted as required during normal plant operation; however, the accumulators are normally isolated from this nitrogen supply. Gas relief valves on the accumulators provide protection from pressures in excess of design pressure.
>
> The accumulators are located within the Containment but outside of the secondary shield wall thus providing missile protection.
>
> Accumulator gas pressure is monitored by indicators and alarms. The operator can take action as required to maintain plant operation within the requirements of the Technical Specification addressing accumulator operability.

The proposed changes to the Technical Specifications will not affect the design basis for the accumulators as described in the UFSAR. There are no changes to the UFSAR Chapter 15 safety analyses or assumptions regarding the accumulators.

Conditions and Circumstances for Proposing the Amendment

As part of its risk-informed strategy, The Westinghouse Owners Group developed WCAP-15049-A to provide its members risk-informed extension to the allowed outage time for the ECCS Accumulators. The WCAP is generically applicable to most, if not all, of the Westinghouse plants. Since the proposed change is applicable to STP, STPNOC elected to make application for the change.

STPNOC Maintenance identified a need to revise the surveillance requirements for the accumulators. STPNOC determined that the best alternative would be to adopt the accumulator surveillance requirements from the Westinghouse Standard Technical Specifications (NUREG-1431).

Since the application for the extended allowed outage time was already planned, it was logical to submit a single proposed change that would address all the changes to the Accumulator Technical Specification.

The administrative change to page 3/4 3-36 was identified in the STP Corrective Action Program and this amendment request provided a convenient vehicle to submit this simple correction.

4.0 Regulatory Requirements and Guidance

The accumulator LCO helps to ensure that the following acceptance criteria established for the ECCS by 10 CFR 50.46 will be met following a LOCA:

a. Maximum fuel element cladding temperature is $\leq 2200°$ F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react; and

d. Core is maintained in a coolable geometry.

5.0 Technical Analysis

A technical analysis of each of the changes described in Section 2.0 is presented below.

This proposed change will extend the allowed outage time in ACTION a. to 24 hours in accordance with STP PRA model analysis and WCAP-15049-A

The proposed license amendment increases the accumulator allowed outage time (AOT, referred to as Completion Time in the Improved Technical Specifications) to 24 hours for one accumulator inoperable for conditions other than boron concentration not within specification. In support of this proposed license amendment, the Westinghouse Owners Group initiated a program to evaluate the impact of this change on plant risk on a generic basis using representative calculations. The approach used in this program is consistent with the Nuclear Regulatory Commission's approach for using probabilistic risk assessment in risk-informed decisions on plant-specific changes to the current licensing basis. This approach is presented in Regulatory Guides 1.174 and 1.177, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis", "An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications", respectively. The approach addresses, as documented in WCAP-15049-A, the impact on defense-in-depth and the impact on safety margins, as well as an evaluation of the impact on risk. The risk evaluation uses the three-tiered approach as presented by the NRC in Regulatory Guide 1.177. Tier 1, PRA Capability and Insights, assessed the impact of the proposed AOT change on core damage frequency (CDF), incremental conditional core damage probability (ICCDP), large early release frequency (LERF), and incremental conditional large early release probability (ICLERP). Tier 2, Avoidance of Risk-Significant Plant Configurations, considered potential risk-significant plant operating configurations. Tier 3, Risk-Informed Plant Configuration Control and Management, was not addressed in WCAP-15049-A, but is addressed below on a plant-specific basis for STP.

Several sets of accumulator success criteria, ranging from that required for design basis analysis to best estimate success criteria used in a number of probabilistic safety analysis (PSA) models, were evaluated in WCAP-15049-A. The analysis considered 2-, 3-, and 4-loop plants. Sensitivity cases were also evaluated that considered increased initiating event frequencies for medium and small break LOCA events. The following was concluded from this analysis:

- The impact of the increase in the accumulator AOT on core damage frequency (CDF) for all the cases evaluated is within the acceptance limits set by the NRC. The acceptance limit is 1E-06/yr CDF increase providing the total plant CDF is less than 1E-03/yr. The specific values for 4-loop plants are provided in Table 8-7 of the WCAP.

- The calculated incremental conditional core damage probabilities (ICCDP) meet the criterion of 5E-07 set by the NRC for the increased AOT except for those that are based on design basis success criteria. Design basis accumulator success criteria is not considered necessary to mitigate large break LOCA events and is only included as a worst case data point. In

addition, the NRC has indicated that an ICCDP greater than 5E-07 does not necessarily mean the change is unacceptable. The ICCDP values are provided in Table 8-8 of the WCAP.

- The impact on the large early release frequency (LERF) and incremental conditional large early release probability (ICLERP) is similar to the impact on the CDF and ICCDP. Since the success or failure of the containment systems are independent of the accumulators, the LERF will increase only in direct proportion to the increased frequency of the core damage sequences involving accumulator failures. Since the impact of the accumulator AOT increase on CDF is small and the ICCDP is acceptable, the impact of the accumulator AOT increase on LERF will also be small and the ICLERP will also be acceptable.

- The impact of the AOT increase has no impact on defense-in-depth. There is no impact on maintaining a reasonable balance between prevention of core damage, prevention of containment failure, and consequence mitigation. There is no over reliance on programmatic activities. System redundancy, independence, and diversity is maintained; independence of barriers is not degraded; and defenses against common cause failures and human errors are maintained.

- Although the safety margin with regard to accumulator response to design basis large break LOCA events (i.e., a large break LOCA with loss of offsite power) is impacted by extending the AOT, the CDF increase for all large break LOCA cases considered in WCAP-15049-A is less than the 1.0E-06/yr acceptance limit (see Tables 8-6 through 8-9 of the WCAP).

Applicability of the WCAP Evaluation to South Texas Project

Although the likelihood of severe core damage is not affected by the accumulators (reference NRC Notes dated July 27, 1990 for NRC-STP PRA Review Meeting on May 30-31, 1990), for the purposes of this study, the accumulators were added to the STP PRA model (ACCUM97 - cloned from model 1997_SQA modified 11/7/00) to conservatively assume an effect on core damage frequency.

To determine the applicability of the WCAP-15049-A evaluation to the South Texas Project (STP) requires a review and comparison of several relevant PRA modeling parameters and assumptions used in the Westinghouse Owners Group (WOG) study against those comparable parameters and assumptions used in the STP PRA model. These parameters and assumptions include:

- Initiating events that require accumulators for mitigation.
- Initiating event frequencies for those events that require accumulators for mitigation.
- Accumulator success criteria for each event for which they are required for mitigation.
- Accumulator maintenance and test intervals.
- Accumulator failure modes.

The initiating events used in the WOG analysis and the corresponding parameter or assumption value used in the STP PRA are summarized in Table 1. This shows a favorable comparison. Accumulator injection is included in the STP PRA model to mitigate large and medium break LOCAs, but not for mitigation of small break LOCAs. Including the accumulators to mitigate small break LOCAs as part of an alternate success path, as was done in the WCAP analysis, is conservative since accumulator unavailability changes will not impact the small break LOCA core damage frequency contribution in the STP PRA model.

The accumulator success criteria used in the WOG analysis differs from the criteria used in the STP PRA. Although STP is a 4-loop plant, the design incorporates 3 accumulators to 3 of 4 loops. With regard to large break LOCAs, the specific success criteria used in the STP PRA model is 2 accumulators to 2 intact loops. The success criteria accounts for the loss of an accumulator if it is injecting into a loop containing the RCS pipe break. A similar case was evaluated in the WCAP analysis as PSA Model Basis 1 Case for a 4-loop plant, 2 accumulators to 2 of 3 intact loops. With regard to medium break LOCAs, the specific success criteria used in the STP PRA model is 1 accumulator to 1 of 3 intact loops. A similar case was not evaluated in the WCAP analysis. Therefore, for both large and medium break LOCAs, the STP accumulator design was evaluated in the STP PRA model. The STP PRA analyses results satisfy the acceptance limits previously discussed and are summarized in Table 2.

The large break LOCA initiating event frequency used in the STP PRA is 2.874E-04. This is consistent with the value used in the WCAP. As discussed in WCAP-15049-A, the initiating event frequencies for Westinghouse NSSS plants range from approximately 5E-04/year (yr) to 1E-04/yr for large break LOCA break sizes greater than 6 inches diameter. Several plants use initiating event frequencies significantly less than this, but their minimum large break LOCA size is much larger (> 12 inches). The mean large break LOCA initiating event frequency is 3.1E-04/yr and a typical value is 3.0E-04/yr. Based on this information, the large break LOCA initiating event frequency that was used in the WCAP analysis was 3E-04/yr. Based on recent work done on risk-informed inservice inspection programs, large break LOCA initiating event frequencies considerably lower than 3.0E-04/yr, by a factor of 10 to 100, can be justified. In addition, the report NUREG/CR-5750, INEEL/EXT-98-00401, "Rates of Initiating Events at U.S. Commercial Nuclear Power Plants, 1987 through 1995," indicates a large break LOCA break frequency of 5E-06/critical year for large break LOCAs. To remain consistent with plant specific PSA models, a value of 3.0E-04/yr was used in the WCAP base analysis. Therefore, the WCAP large break LOCA initiating event frequency is consistent with the STP PRA.

The medium break LOCA initiating event frequency used in the STP PRA is 6.558E-04. This is consistent with the medium break LOCA initiating event frequency value used in the WCAP analysis. As discussed in WCAP-15049-A, the initiating event frequencies for Westinghouse NSSS plants range from approximately 3.4E-05/yr to 2.3E-03/yr for medium break LOCA break sizes ranging from approximately 2 inches to 6 inches. The mean medium break LOCA initiating event frequency is 7.1E-04/yr and a typical value is 8.0E-04/yr. Based on this information, the medium break LOCA initiating event frequency that was used in the WCAP analysis was 8.0E-04/yr.

The accumulator maintenance and test intervals used in the STP PRA model are consistent with respect to the WCAP analysis. Consistent with the WCAP assumption, test activities that cause the accumulators to be inoperable are not done while the plant is at power. In addition, maintenance activities at power that cause an accumulator to be inoperable are restricted to repair or unplanned activities. For STP PRA analyses, the WCAP analysis frequency of 0.1/year/accumulator was utilized.

Accumulator failure modes between the WCAP and STP fault tree models are not completely consistent. However, those that differ have no impact on the increase in core damage frequency (e.g., boron concentration outside specified limits). They are constants in the analysis which are not impacted by the increased AOT and, therefore, have no impact on the change in CDF.

Finally, the CDF for STP is calculated to be 1.16E-05/yr for at power events. This value is significantly below the CDF guideline provided by the NRC in Regulatory Guide 1.177 for allowing small increases in risk providing the total plant CDF is less than 1.0E-03/yr. A small increase is indicated in the Regulatory Guide to be less than 1.0E-06/yr. This CDF value does not include shutdown operation because STP has not completed its shutdown PRA. However, STP is confident that the shutdown contribution is less than 1E-04/yr. Since the proposed change has no effect on shutdown risk, it can be concluded that the total CDF will remain below 1E-03/yr.

Therefore, due to differences in design from the WCAP analyses, the STP PRA model was used to calculate changes to core damage frequency due to AOT extension and incremental conditional assessments. However, many of the conclusions drawn from the WCAP analyses remain applicable to STP. These include the conclusions for impacts on LERF and ICLERP, impact on defense-in-depth, impact on safety margin, and application of Tiers 1 and 2 of the three tiered approach.

Three Tiered Approach

As discussed previously, the WCAP-15049-A risk evaluation uses the three tiered approach consistent with that presented by the NRC in Regulatory Guide 1.177. Tier 1, PRA Capability and Insights, which assesses the impact of the proposed AOT change on core damage frequency, incremental conditional core damage probability, large early release frequency, and incremental conditional large early release probability, has been presented and discussed in WCAP-15049-A and summarized above, yields acceptable results for STP.

Tier 2, Avoidance of Risk-Significant Plant Configurations, is discussed in Section 8.4 of WCAP-10549. As noted in this section, restrictions or limitations on plant system unavailability while one accumulator is unavailable, beyond those currently contained in the Standard Technical Specifications (NUREG-1431, Revision 1) are not necessary. This conclusion is also applicable to STP since the supporting analysis in WCAP-15049-A is applicable to STP.

For Tier 3, Risk-Informed Plant Configuration Control and Management, the risk impact associated with performance of maintenance and testing activities is evaluated in accordance with the STP Configuration Risk Management Program. An on-line risk assessment is performed for activities within a weekly schedule. Compensatory measures are addressed for activities deemed to be risk significant. The weekly scheduled activities and associated operational risk assessment are approved by the Plant Manager or his designee. The Configuration Risk Management Program also addresses the impact on the calculated on-line risk due to added or emergent activities and activities which have slipped from the scheduled completion time. Since the accumulators do not affect core damage frequency, apart from this study, maintenance and testing of the accumulators is not evaluated under this program.

Table 1
STP PRA[1]/WCAP-15049-A Initiating Event Frequencies Comparison

Initiating Event	WCAP-15049-A	STP PRA[1]
Large break LOCA	3.0E-04/yr	2.874E-04/yr
Medium break LOCA	8.0E-04/yr	6.558E-04/yr
Small break LOCA	7.1E-03/yr	6.307E-03

Table 2
STP PRA[1]: CDF and ICCDP Summary

Initiating Event	Initiating Event Frequency (/yr)	CDF baseline	CDF 24 hr AOT	CDF increase	CDF conditional	ICCDP[2]
Large break LOCA	2.874E-04	1.11226E-06	1.16523E-06	**5.297E-08**	1.30003E-04	**3.5313E-7**
Medium break LOCA	6.558E-04	9.75412E-07	9.75412E-07	**<1.0E-12**	9.79204E-07	**1.0389E-11**
Small break LOCA	6.307E-03	not required	not required	not required	not required	not required
Total				**5.297E-08**		**3.5314E-7**

[1]Model ACCUM97 - cloned from model 1997_SQA modified 11/7/00
[2]ICCDP = ($CDF_{conditional}$ - $CDF_{baseline}$) X 24hr AOT / 8760 hr/yr

Conclusions

Based on the above discussion, the STP PRA model analysis supports that extending the allowed outage time to 24 hours for the conditions when one accumulator is inoperable for reasons other than boron concentration not within specification is acceptable.

The calculated increase in core damage frequency is less than the 1.0E-06 criterion and the calculated incremental conditional core damage probabilities are less than the 5.0E-07 criterion.

Based on the above discussions and the considerations presented in Section 7.0, the proposed change does not involve a significant increase in the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report; or create a possibility for an accident or malfunction of a different type than any previously evaluated in the safety analysis report; or involve a significant reduction in the margin of safety as defined in the basis for any technical specification. Therefore, the proposed change does not adversely affect or endanger the health or safety of the general public or involve a significant safety hazard.

Changes for Consistency with ITS and WCAP-15049-A:

ACTION a. will be revised to delete the exclusion of its applicability to a closed isolation valve and ACTION b., which applies to a closed isolation valve will be deleted. This change will make ACTION a. applicable to a closed isolation valve. ACTION b. currently has the same allowed outage time and required action as ACTION a. There is no reason to require a different allowed outage time for a condition with a closed isolation valve, and the evaluation performed in the WCAP to extend the allowed outage time to 24 hours is applicable in for both actions. This change is also consistent with the requirements in ITS.

The administrative changes being proposed to reformat TS 3/4.5.1 to relocate the LCO requirements to the SRs have no safety implications. There is no change in the technical requirements. Similarly, moving the current footnote and relocating its requirement to the APPLICABILITY has no safety implication because no requirement has changed.

A footnote to SR 4.5.1.1.b. will be added to clarify that the SR to be performed within 6 hours after each solution volume increase greater than or equal to 1% tank volume is only required to be performed for the affected accumulators. This clarifies the applicability of the SR so that it is not unnecessarily applied to accumulators that were not affected by a volume change. This change is consistent with ITS and is essentially an administrative clarification which has no safety impact.

SR 4.5.1.1.b will be modified to exclude applicability to changes in accumulator volume from the Refueling Water Storage Tank (RWST). The current TS requirement of Surveillance 4.5.1.1.b requires the verification of the accumulator's boron concentration whenever makeup to the tank exceeds 1% of the tank's volume. This verification is modified to be consistent with NUREG-1431 version of ITS SR 3.5.1.4. The proposed change requires verification of the accumulator's boron concentration after makeup to the tank exceeds 1% from any source other than the Refueling Water Storage Tank (RWST). The RWST is a TS surveilled source of borated water, monitored for OPERABILITY every 7 days for boron concentration. Makeup from the RWST is a fully acceptable source of water for the accumulators. The RWST is also used for other ECCS functions for the mitigation of DBA. The proposed change is less

restrictive in that the accumulators are presently monitored for boron concentration change for makeups of 1% or more from the RWST. Makeups from sources other than the RWST will continue to require boron concentration verification within 6 hours of exceeding the makeup limit. This change is acceptable because makeup from the RWST can not reduce the accumulator boron concentration below the minimum limit since the water contained in the RWST is within the accumulator boron concentration requirements

SR 4.5.1.1.d, which currently requires an 18 month test to verify that the accumulator isolation valves automatically open when a simulated or actual P-11 interlock setpoint is exceeded, or when an SI signal is received, will be deleted. The TS already requires the valves to be verified open every 24 hours and the valve's electrical power be verified removed once per 31 days. These requirements ensure the accumulator isolation valves do not prevent the accumulators from performing their safety function. The safety analysis does not require the valves to move during power operation or in a post accident situation. Since no automatic action is required for the safety function, performing this test is unnecessary and can be deleted. This less restrictive change is acceptable because it does not impact the public health and safety. This change is consistent with NUREG-1431.

SR 4.5.1.2 currently specifies requirements for testing the accumulator pressure and level instruments. These requirements will be deleted since they are not necessary to meet the requirements of operability for the accumulators. Operability of the accumulators is dependent on the quantity and concentration of borated water and the pressure of the cover gas. The method of determining the volume of the borated water and the pressure of the cover gas is not an assumption or initial condition for any safety analysis. This change is considered less restrictive because it deletes a test previously required in the TS and is acceptable because its removal does not alter the safety analysis. This change is consistent with NUREG-1431 and is similar to the TS for the RWST where the temperature and level limits, not the instrumentation are specified.

The correction of the typographical error on page 3/4 3-36 is administrative and has no safety significance.

6.0 Regulatory Analysis

The evaluation demonstrates that WCAP-15049-A applies to STP and that there is no significant effect on the existing design basis for the accumulators. The non-risk-informed changes associated with the WCAP and the Improved Technical Specifications have no significant effect on the capability of the accumulator to perform its design basis function. Consequently, it can reasonably be concluded that the accumulators remain capable of meeting the 10CFR50.46 criteria described in Section 3.0 above; consequently, the proposed change meets the required regulations.

In conclusion, 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.

7.0 No Significant Hazards Determination

STPNOC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10CFR50.92, "Issuance of amendment," as discussed below.

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

Response: No

The proposed changes involve no significant increase in the probability of an accident previously evaluated because the accumulator has no role as an accident initiator.

The proposed extension to the allowed outage time has no significant effect on the availability of the accumulator to perform its design function and has no effect on the configuration or accident response of the accumulator. The proposed change involves no changes to the accident analyses. Consequently, the proposed extended allowed outage time involves no significant increase in the consequences of an accident previously evaluated.

The proposed changes to eliminate the surveillance requirements also have no significant effect on the availability of the accumulator to perform its design function and have no effect on the configuration or accident response of the accumulator. The changes to the surveillance requirements involve no change to the accident analyses. Consequently, the changes to the surveillance requirements involve no significant increase in the consequences of an accident previously evaluated.

The proposed changes in the structure of the specification to be more consistent with ITS are adminstrative and have no technical impact. Consequently, they involve no significant increase in the probability or consequences of an accident previously evaluated.

The correction of the typographical error is an administrative change which has no operational significance.

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

Response: No

The proposed change does not involve the installation or operation of any new or different kinds of equipment, nor does it involve a new or different mode of operation. The proposed changes do not result in systems operating in a manner different from existing procedures and practices. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed changes in the structure of the specification to be more consistent with ITS are adminstrative and have no technical impact. Consequently, they do not create the possibility of a new or different kind of accident from any accident previously evaluated.

The correction of the typographical error is an administrative change which has no operational significance.

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

Response: No

The proposed change will allow plant operation in a configuration outside the design basis for up to 24 hours before being required to begin shutdown. The impact of this on plant risk was evaluated and found to be very small. That is, increasing the time the accumulators will be unavailable to respond to a large LOCA event, assuming design basis accumulator success criteria is necessary to mitigate the event, has a very small impact on plant risk. The analyses quantitatively demonstrate the change does not involve a significant reduction in the margin of safety.

The proposed change removes the 18 month test to verify that the accumulator isolation valves automatically open when a simulated or actual P-11 interlock setpoint is exceeded, or when an SI signal is received. The valves are verified open every 24 hours and the power is verified removed every 31 days in accordance with the TS. Should the valves be inadvertently closed, the normal testing would adequately identify the condition. If the condition is recognized, the failure would be addressed by plant administrative controls that would immediately result in the appropriate Actions being taken for all affected systems. Based on the existence of other measures which adequately address the reason for the current requirement, this change does not involve a significant reduction in a margin of safety.

The proposed change removes the requirement from the Technical Specifications to perform surveillances on the accumulator instrumentation. The TS does not specifically

require this instrumentation to be used to meet the required pressure and level verification surveillances. The verification of accumulator level and pressure may be determined by either installed instrumentation or temporary test equipment. Therefore, the change does not involve a significant reduction in a margin of safety.

The proposed changes in the structure of the specification to be more consistent with ITS are adminstrative and have no technical impact. Consequently, they do not involve a significant reduction in the margin of safety.

The correction of the typographical error is an administrative change which has no operational significance.

Conclusion

Based upon the analysis provided herein, the proposed amendments will not increase the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a reduction in a margin of safety. Therefore, the proposed amendments meet the requirements of 10 CFR 50.92 and do not involve a significant hazards consideration.

8.0 Environmental Evaluation

10 CFR 51.22(b) specifies the criteria for categorical exclusions from the requirements for a specific environmental assessment per 10 CFR 51.21. This amendment request meets the criteria specified in 10 CFR 51.22(c)(9). The specific criteria contained in this section are discussed below.

(i) the amendment involves no significant hazards consideration

As demonstrated in the No Significant Hazards Consideration Determination, the requested license amendment does not involve any significant hazards consideration.

(ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite

The requested license amendment involves no change to the facility and does not involve any change in the manner of operation of any plant systems involving the generation, collection or processing of radioactive materials or other types of effluents. Therefore, no increase in the amounts of effluents or new types of effluents would be created.

(iii) there is no significant increase in individual or cumulative occupational radiation exposure

The requested license amendment involves no change to the facility and will not increase the radiation dose resulting from the operation of any plant system. Furthermore, implementation of this proposed change will not involve work activities which could contribute to occupational radiation exposure. Therefore, there will be no increase in individual or cumulative occupational radiation exposure associated with this proposed change.

Based on the above it is concluded that there will be no impact on the environment resulting from this change. The change meets the criteria specified in 10 CFR 51.22 for a categorical exclusion from the requirements of 10 CFR 51.21 relative to specific environmental assessment by the Commission.

9.0 Precedent

The extension of the allowed outage time in accordance with WCAP-15049-A is a generically applicable topical report that was reviewed and approved by the NRC for application to Westinghouse plants.

The extension to the accumulator allowed outage time in accordance with WCAP-15049-A was approved by the NRC for the Wolf Creek plant in Amendment No. 124, dated April 27, 1999.

10.0 References

1. NUREG-1431 "Standard Technical Specifications, Westinghouse Plants"
2. WCAP-15049-A
3. Regulatory Guide 1.177
4. South Texas Project Updated Final Safety Analysis Report, Revision 7

ATTACHMENT 3

PROPOSED TECHNICAL SPECIFICATION CHANGES

TABLE 3.3-4 (Continued)

TABLE NOTATIONS

* Time constants utilized in the lead-lag controller for Steam Line Pressure-Low are $\tau_1 \geq 50$ seconds and $\tau_2 \leq 5$ seconds. CHANNEL CALIBRATION shall ensure that these time constants are adjusted to these values.

** The time constant utilized in the rate-lag controller for Steam Line Pressure-Negative Rate-High is greater than or equal to 50 seconds. CHANNEL CALIBRATION shall ensure that this time constant is adjusted to this value.

\# Deleted

\## Deleted

\### This setpoint value may be increased up to the equivalent limits of ODCM Control 3.11.2.1 in accordance with the methodology and parameters of the ODCM during containment purge or vent for pressure control, ALARA and respirable air quality considerations for personnel entry.

3/4.5.1 ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1 Each Safety Injection System accumulator shall be OPERABLE ~~with:~~

~~a. The isolation valve open and power removed,~~

~~b. A contained borated water volume of between 8800 and 9100 gallons,~~

~~c. A boron concentration of between 2700 ppm and 3000 ppm.~~

~~d. A nitrogen cover pressure of between 590 and 670 psig.~~

APPLICABILITY: MODES 1 **and** 2~~, and 3*~~.
MODE 3 with pressurizer pressure > 1000 psig

ACTION:

a. With one accumulator inoperable, except as a result of ~~a closed isolation valve or the~~ boron concentration outside the required limits, restore the inoperable accumulator to OPERABLE status within ~~12~~ **24** hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

~~b. With one accumulator inoperable due to the isolation valve being closed, either open the isolation valve within 12 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.~~

~~c~~**b**. With the boron concentration of one accumulator outside the required limit, restore the boron concentration to within the required limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

SURVEILLANCE REQUIREMENTS

~~*~~4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

a. At least once per 24 hours by:

1) Verifying~~, by the absence of alarms,~~ the contained borated water volume **is ≥ 8800 gallons and ≤ 9100 gallons** and nitrogen cover-pressure ~~in the tanks~~ **is ≥ 590 psig and ≤ 670 psig**, and

2) Verifying that each accumulator isolation valve is open.

b. At least once per 31 days and within 6 hours* after each solution volume increase of greater than or equal to 1% of tank volume **that is not the result of addition from the RWST** by verifying the boron concentration of the accumulator solution **is ≥ 2700 ppm and ≤ 3000 ppm** and

~~*Pressurizer pressure above 1000 psig~~. **The 6 hr. SR is only required to be performed for affected accumulators**

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 31 days when the RCS pressure is above 1000 psig by verifying that power to the isolation valve operator is removed.

~~d. At least once per 18 months by verifying that each accumulator isolation valve opens automatically under each of the following conditions:~~

~~1) When an actual or a simulated RCS pressure signal exceeds the P-11 (Pressurizer Pressure Block of Safety Injection) Setpoint, and~~

~~2) Upon receipt of a Safety Injection test signal.~~

~~4.5.1.2 Each accumulator water level and pressure channel shall be demonstrated OPERABLE:~~

~~a. At least once per 31 days by the performance of an ANALOG CHANNEL OPERATIONAL TEST, and~~

~~b. At least once per 18 months by the performance of a CHANNEL CALIBRATION.~~

NOT USED

ATTACHMENT 4
PROPOSED BASES PAGES

3/4. 5 EMERGENCY CORE COOLING SYSTEMS

BASES

3/4.5.1 ACCUMULATORS

The OPERABILITY of each Reactor Coolant System (RCS) accumulator ensures that a sufficient volume of borated water will be immediately forced into the reactor core through three cold legs in the event the RCS pressure falls below the pressure of the accumulators. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

~~The limits for operation with an accumulator inoperable for any reason except an isolation valve closed minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional accumulator which may result in unacceptable peak cladding temperatures. If a closed isolation valve cannot be opened within 12 hours, the full capability of one accumulator is not available and prompt action is required to place the reactor in a mode where this capability is not required.~~

If one accumulator is inoperable for a reason other than boron concentration, the accumulator must be returned to OPERABLE status within 24 hours. In this Condition, the required contents of two accumulators cannot be assumed to reach the core during a LOCA. The 24 hours is a risk-informed Completion Time that minimizes the potential for exposure of the plant to a LOCA under these conditions.

If the boron concentration of one accumulator is not within limits, it must be returned to within the limits within 72 hours. In this Condition, ability to maintain subcriticality or minimum boron precipitation time may be reduced. The boron in the accumulators contributes to the assumption that the combined ECCS water in the partially recovered core during the early reflooding phase of a large break LOCA is sufficient to keep that portion of the core subcritical. One accumulator below the minimum boron concentration limit, however, will have no effect on available ECCS water and an insignificant effect on core subcriticality during reflood. Boiling of ECCS water in the core during reflood concentrates boron in the saturated liquid that remains in the core. In addition, current analysis techniques demonstrate that the accumulators do not discharge following a large main steam line break for the majority of plants. Even if they do discharge, their impact is minor and not a design limiting event. Thus, 72 hours is allowed to return the boron concentration to within limits.

The **surveillance** limits on accumulator volume represent a spread about an average value used in the safety analysis and have been demonstrated by sensitivity studies to vary the peak clad temperature by less than 20°F. The **surveillance** limit on accumulator pressure ensures that the assumptions used for accumulator injection in the safety analysis are met.

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31 day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 1% volume increase will identify whether inleakage has caused a reduction in boron concentration to below the required limit. It is not necessary to verify boron concentration if the added water inventory is from the refueling water storage tank (RWST),

because the water contained in the RWST is within the accumulator boron concentration requirements

Verification every 31 days that power is removed from each accumulator isolation valve operator when the pressurizer pressure is ≥1000 psig ensures that an active failure could not result in the undetected closure of an accumulator motor operated isolation valve. If this were to occur, only one accumulator would be available for injection given a single failure coincident with a LOCA. Since power is removed under administrative control, the 31 day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when pressurizer pressure is < 1000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during plant startups or shutdowns. Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves.

Should closure of a valve occur in spite of the interlock, the SI signal provided to the valves would open a closed valve in the event of a LOCA.

~~The accumulator power operated isolation valves are considered to be "operating bypasses" in the context of IEEE Std. 279-1971, which requires that bypasses of a protective function be removed automatically whenever permissive conditions are not met. In addition, as these accumulator isolation valves fail to meet single failure criteria, removal of power to the valves is required.~~

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of three independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Each subsystem operating in conjunction with the accumulators is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. One ECCS is assumed to discharge completely through the postulated break in the RCS loop. Thus, three trains are required to satisfy the single failure criterion. Note that the centrifugal charging pumps are not part of ECCS and that the RHR pumps are not used in the injection phase of the ECCS. Each ECCS subsystem and the RHR pumps and heat exchanges provide long-term core cooling capability in the recirculation mode during the accident recovery period.

When the RCS temperature is below 350°F, the ECCS requirements are balanced between the limitations imposed by the low temperature overpressure protection and the requirements necessary to mitigate the consequences of a LOCA below 350°F. At these temperatures, single failure considerations are not required because of the stable reactivity condition of the reactor and the limited core cooling requirements. Only a single Low Head Safety Injection pump is required to mitigate the effects of a large-break LOCA in this mode. However, two are

ATTACHMENT 5

TECHNICAL SPECIFICATION AND BASES PAGES WITH PROPOSED CHANGES INCORPORATED

TABLE 3.3-4 (Continued)

TABLE NOTATIONS

* Time constants utilized in the lead-lag controller for Steam Line Pressure-Low are $\tau_1 \geq 50$ seconds and $\tau_2 \leq 5$ seconds. CHANNEL CALIBRATION shall ensure that these time constants are adjusted to these values.

** The time constant utilized in the rate-lag controller for Steam Line Pressure-Negative Rate-High is greater than or equal to 50 seconds. CHANNEL CALIBRATION shall ensure that this time constant is adjusted to this value.

\# Deleted

\## Deleted

\### This setpoint value may be increased up to the equivalent limits of ODCM Control 3.11.2.1 in accordance with the methodology and parameters of the ODCM during containment purge or vent for pressure control, ALARA and respirable air quality considerations for personnel entry.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1 Each Safety Injection System accumulator shall be OPERABLE

APPLICABILITY: MODES 1 and 2
MODE 3 with pressurizer pressure > 1000 psig

ACTION:

a. With one accumulator inoperable, except as a result of boron concentration outside the required limits, restore the inoperable accumulator to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

b. With the boron concentration of one accumulator outside the required limit, restore the boron concentration to within the required limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

a. At least once per 24 hours by:

1) Verifying the contained borated water volume is ≥ 8800 gallons and ≤ 9100 gallons and nitrogen cover-pressure is ≥ 590 psig and ≤ 670 psig, and

2) Verifying that each accumulator isolation valve is open.

b. At least once per 31 days and within 6 hours* after each solution volume increase of greater than or equal to 1% of tank volume that is not the result of addition from the RWST by verifying the boron concentration of the accumulator solution is ≥ 2700 ppm and ≤ 3000 ppm and

c. At least once per 31 days when the RCS pressure is above 1000 psig by verifying that power to the isolation valve operator is removed.

---

* The 6 hr. SR is only required to be performed for affected accumulators

NOT USED

3/4.5.1 ACCUMULATORS

The OPERABILITY of each Reactor Coolant System (RCS) accumulator ensures that a sufficient volume of borated water will be immediately forced into the reactor core through three cold legs in the event the RCS pressure falls below the pressure of the accumulators. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

If one accumulator is inoperable for a reason other than boron concentration, the accumulator must be returned to OPERABLE status within 24 hours. In this Condition, the required contents of two accumulators cannot be assumed to reach the core during a LOCA. The 24 hours is a risk-informed Completion Time that minimizes the potential for exposure of the plant to a LOCA under these conditions.

If the boron concentration of one accumulator is not within limits, it must be returned to within the limits within 72 hours. In this Condition, ability to maintain subcriticality or minimum boron precipitation time may be reduced. The boron in the accumulators contributes to the assumption that the combined ECCS water in the partially recovered core during the early reflooding phase of a large break LOCA is sufficient to keep that portion of the core subcritical. One accumulator below the minimum boron concentration limit, however, will have no effect on available ECCS water and an insignificant effect on core subcriticality during reflood. Boiling of ECCS water in the core during reflood concentrates boron in the saturated liquid that remains in the core. In addition, current analysis techniques demonstrate that the accumulators do not discharge following a large main steam line break for the majority of plants. Even if they do discharge, their impact is minor and not a design limiting event. Thus, 72 hours is allowed to return the boron concentration to within limits.

The surveillance limits on accumulator volume represent a spread about an average value used in the safety analysis and have been demonstrated by sensitivity studies to vary the peak clad temperature by less than 20°F. The surveillance limit on accumulator pressure ensures that the assumptions used for accumulator injection in the safety analysis are met.

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31 day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 1% volume increase will identify whether inleakage has caused a reduction in boron concentration to below the required limit. It is not necessary to verify boron concentration if the added water inventory is from the refueling water storage tank (RWST), because the water contained in the RWST is within the accumulator boron concentration requirements

3/4.5.1 ACCUMULATORS (Continued)

Verification every 31 days that power is removed from each accumulator isolation valve operator when the pressurizer pressure is $\geq$1000 psig ensures that an active failure could not result in the undetected closure of an accumulator motor operated isolation valve. If this were to occur, only one accumulator would be available for injection given a single failure coincident with a LOCA. Since power is removed under administrative control, the 31 day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when pressurizer pressure is < 1000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during plant startups or shutdowns. Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves.

Should closure of a valve occur in spite of the interlock, the SI signal provided to the valves would open a closed valve in the event of a LOCA.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of three independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Each subsystem operating in conjunction with the accumulators is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. One ECCS is assumed to discharge completely through the postulated break in the RCS loop. Thus, three trains are required to satisfy the single failure criterion. Note that the centrifugal charging pumps are not part of ECCS and that the RHR pumps are not used in the injection phase of the ECCS. Each ECCS subsystem and the RHR pumps and heat exchanges provide long-term core cooling capability in the recirculation mode during the accident recovery period.

When the RCS temperature is below 350°F, the ECCS requirements are balanced between the limitations imposed by the low temperature overpressure protection and the requirements necessary to mitigate the consequences of a LOCA below 350°F. At these temperatures, single failure considerations are not required because of the stable reactivity condition of the reactor and the limited core cooling requirements. Only a single Low Head Safety Injection pump is required to mitigate the effects of a large-break LOCA in this mode. However, two are provided to accommodate the possibility that the break occurs in a loop containing one of the Low Head pumps. Low Head Safety Injection pumps are not required inoperable below 350°F because their shutoff head is too low to impact the low temperature overpressure protection limits.

Below 200° F (MODE 5) no ECCS pumps are required, so the High Head Safety Injection pumps are locked out to prevent cold overpressure.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS (Continued)

The Surveillance Requirements provided to ensure OPERABILITY of each component ensure that, at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance Requirements for flow testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA.

3/4.5.4 (This specification number is not used)

3/4.5.5 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 by the ECCS in the event of a LOCA or a steamline break. The limits on RWST minimum volume and boron concentration ensure that: (1) sufficient water is available within containment to permit recirculation cooling flow to the core, (2) the reactor will remain subcritical in the cold condition (68°F to 212°F) following a small break LOCA assuming complete mixing of the RWST, RCS, Spray Additive Tank, Containment Spray System and ECCS water volumes with all control rods inserted except the most reactive control rod assembly (ARI-1), (3) the reactor will remain subcritical in cold condition following a large break LOCA (break flow area > 3.0 ft^2) assuming complete mixing of the RWST, RCS, Spray Additive Tank, Containment Spray System and ECCS water volumes and other sources of water that may eventually reside in the sump post-LOCA with all control rods assumed to be out (ARO), and (4) long term subcriticality following a steamline break assuming ARI-1 and preclude fuel failure.

The maximum allowable value for the RWST boron concentration forms the basis for determining the time (post-LOCA) at which operator action is required to switch over the ECCS to hot leg recirculation in order to avoid precipitation of the soluble boron.

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 7.5 and 10.0 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.

3/4.5.6 RESIDUAL HEAT REMOVAL (RHR) SYSTEM

The OPERABILITY of the RHR system ensures adequate heat removal capabilities for Long-Term Core Cooling in the event of a small-break loss-of -coolant accident (LOCA), an isolatable LOCA, or a secondary break in MODES 1, 2, and 3. The limits on the OPERABILITY of the RHR system ensure that at least one RHR loop is available for cooling including single active failure criteria.