AmerenUE
Callaway Plant

PO Box 620
Fulton, MO 65251

May 30, 2001

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

ULNRC-04481

Gentlemen:

DOCKET NUMBER 50-483
UNION ELECTRIC COMPANY
CALLAWAY PLANT
REVISION TO TECHNICAL SPECIFICATION 3.5.5
"SEAL INJECTION FLOW"

Reference: Callaway License Amendment 133 dated May 28, 1999, Conversion to Improved Technical Specifications

Union Electric Company herewith transmits an application for amendment to Facility Operating License No. NPF-30 for the Callaway Plant.

This amendment application would revise LCO 3.5.5, Required Action 3.5.5.A.1, and SR 3.5.5.1 to delete the phrase "and the charging flow control valve full open" since that stipulation is not required to demonstrate compliance with the safety analysis.

The Callaway Plant Onsite Review Committee and the Nuclear Safety Review Board have reviewed this amendment application. Attachments 1 through 4 provide the Description and Assessment, Markup of Technical Specifications, Retyped Technical Specifications, and Draft Technical Specification Bases Changes, respectively, in support of this amendment request. Attachment 4 mark-ups are provided for information only. Final Bases changes will be implemented under our TS 5.5.14 Bases Control Program after NRC approval of this amendment application. It has been determined that this amendment application does not involve a significant hazard consideration as determined per 10CFR50.92. Pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

A001

Approval of this amendment application is requested by August 1, 2001. There are no specific commitments associated with this amendment application.

If you have any questions on this amendment application, please contact us.

Very truly yours,

John D. Blosser
Manager-Regulatory Affairs

Attachments:

1 - Description and Assessment
2 - Markup of Technical Specification Pages 3.5-10 and 3.5-11
3 - Retyped Technical Specification Pages 3.5-10 and 3.5-11
4 - Draft Technical Specification Bases Changes

STATE OF MISSOURI)
) SS
CALLAWAY COUNT)

John D. Blosser, of lawful age, being first duly sworn upon oath says that he is Manager Regulatory Affairs, for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By J. Blosser
John D. Blosser
Manager Regulatory Affairs

SUBSCRIBED and sworn to before me this 30th day

of May, 2001.

Gloria J. Taylor

GLORIA J. TAYLOR
NOTARY PUBLIC
STATE OF MISSOURI - CALLAWAY COUNTY
NOTARY SEAL
MY COMMISSION EXPIRES JUNE 21, 2003

cc: M. H. Fletcher
Professional Nuclear Consulting, Inc.
19041 Raines Drive
Derwood, MD 20855-2432

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

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack Donohew (2)- **OPEN BY ADDRESSEE ONLY**
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
1 White Flint, North, Mail Stop OWFN 7E1
11555 Rockville Pike
Rockville, MD 20852-2738

Manager, Electric Department
Missouri Public Service Commission
P.O. Box 360
Jefferson City, MO 65102

Ron Kucera
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Denny Buschbaum
TU Electric
P.O. Box 1002
Glen Rose, TX 76043

Pat Nugent
Pacific Gas & Electric
Regulatory Services
P.O. Box 56
Avila Beach, CA 93424

bcc: Phyllis Murdock/A160.761
/QA Record (CA-758)
E210.01
J. V. Laux
G. L. Randolph
R. J. Irwin
S. Gallagher
J. D. Blosser
D. E. Shafer (2)
S. Wideman (WCNOC)
A. J. DiPerna, (Bechtel)
J. D. Schnack
NSRB (Mary Binkholder, CA460)

ATTACHMENT ONE

DESCRIPTION AND ASSESSMENT

DESCRIPTION AND ASSESSMENT

1.0 INTRODUCTION

Union Electric Company herewith transmits an application for amendment to Facility Operating License No. NPF-30 for the Callaway Plant. This amendment application would revise Technical Specification (TS) 3.5.5, "Seal Injection Flow."

2.0 DESCRIPTION

This amendment application would revise LCO 3.5.5, Required Action 3.5.5.A.1, and SR 3.5.5.1 to delete the phrase "and the charging flow control valve full open" since that stipulation is not required to demonstrate compliance with the safety analysis. Attachment 2 provides the Technical Specification markups.

3.0 BACKGROUND

During the performance of post-maintenance testing during Refuel 11 to assure the reactor coolant pump (RCP) seal injection throttle valves were properly positioned, it was discovered that the differential pressure across the seal injection throttle valves specified in LCO 3.5.5 (105 +5/-2 psid) could not be established with charging flow control valve BGFCV0121 in the full open position. When the post-maintenance testing was performed with both BGFCV0121 and the charging header backpressure control valve, BGHCV0182, in their full open positions, the measured differential pressure was 124.3 psid and the corresponding seal injection total flow rate to all four RCPs was approximately 36 gpm. However, the post-maintenance testing confirmed the OPERABILITY of the seal injection throttle valves when the retest was performed while throttling BGFCV0121 and BGHCV0182 to meet the specified differential pressure (105 +5/-2 psid) and the seal injection flow rate per pump was within the acceptance criteria of 7.5 ± 0.5 gpm.

Prior to implementation of the Improved Technical Specifications (ITS) on April 1, 2000, Callaway had no Technical Specification that specified a seal injection flow rate. Surveillance testing to demonstrate correct seal injection throttle valve positioning had been performed for the last several operating cycles to support LCO 3.5.2, but prior to ITS implementation the performance of this surveillance allowed the throttling of BGFCV0121 as necessary to meet the safety analysis specified differential pressure assumption. The old CTS 4.5.2.g required that the mechanical stops for the seal injection throttle valves be verified in their correct positions at least once per 18 months and within 4 hours after adjustment when the ECCS was required to be OPERABLE. This was done by performing the surveillance test procedure while adjusting BGFCV0121 to get the necessary differential pressure.

During the conversion to the ITS, Union Electric added LCO 3.5.5 as a more restrictive change (2-20-M) in response to NRC's Request for Additional Information (RAI) Q 3.5.5-2 to conform to the Standard Technical Specifications (STS) embodied by NUREG-1431 Revision 1. However, for Callaway's ITS, Union Electric chose to utilize charging header vs. reactor coolant system (RCS) differential pressure rather than the CCP discharge header pressure used in the STS. This change to differential pressure was made to be consistent with the ECCS analysis assumptions provided by Westinghouse. However, it was inadvertently not recognized at that time that the specification of a differential pressure negates any need to specify charging flow control valve position.

The centrifugal charging pumps (CCPs) are used to provide flow to both the high head safety injection (SI) portion of the emergency core cooling system (ECCS) and to the RCP seals. The function of the seal injection throttle valves during an accident is similar to the function of the ECCS throttle valves in that each restricts flow from the CCP header to the RCS. The LCO 3.5.5 RCP seal injection flow limit restricts the amount of ECCS flow that could be diverted from the SI flow path to the seal injection flow path following a loss of coolant accident (LOCA). The seal injection flow limit supports safety analysis assumptions that are required because RCP seal injection flow is not isolated by a SI signal and RCP seal injection is not credited for core cooling. The seal injection flow limit is met by controlling the seal injection flow path flow resistance. The intent of LCO 3.5.5 is to control that resistance through proper positioning of the seal injection throttle valves.

The requirement that the charging flow control valve, BGFCV0121, be fully open in TS LCO 3.5.5, Required Action 3.5.5.A.1, and SR 3.5.5.1 is not required to demonstrate compliance with the safety analysis. Further, the specified pressure differential of 105 (+5, -2) psid between the charging header pressure and the RCS pressure can not be met at Callaway with BGFCV0121 fully open, as discussed previously.

The controlling parameter to satisfy the safety analysis, and thus the intent of the LCO, is the hydraulic flow resistance rather than the flow value itself. Positioning of charging flow control valve BGFCV0121 may vary during normal plant operating conditions, resulting in a proportional change to RCP seal injection flow. However, the hydraulic resistance of the RCP seal injection throttle valves will remain fixed as long as the manual seal injection throttle valve positions are not adjusted.

The purpose of setting the seal injection throttle valves at the specified pressure differential of 105 (+5, -2) psid to meet a seal injection flow limit of 7.5 ± 0.5 gpm is to ensure that under large break LOCA conditions the flow through the seal injection header does not exceed 80 gpm (nominally) which ensures adequate flow through the boron injection header. However, the seal injection flow resistance is not dependent on the position of the charging flow control valve, BGFCV0121, which throttles the CCP discharge flow as required to maintain the programmed level in the pressurizer. This flow control valve fails open to assure that, in the event of either loss of air or loss of control signal to the valve, seal injection flow to the RCP seals is maintained when the CCPs are supplying charging flow.

4.0 TECHNICAL ANALYSIS

Design Basis Function

All ECCS subsystems, including the centrifugal charging pump subsystem, are credited for injection during the large break LOCA. The LOCA analysis establishes the minimum and maximum flow rates for the ECCS pumps. The CCPs are also credited in the small break LOCA analysis. The interface between the seal injection and SI functions of the CCPs is shown on FSAR Figure 9.3-8 (sheets 1 and 3) and FSAR Figure 6.3-1 (sheet 3).

As discussed in the Bases for LCO 3.5.2 and LCO 3.5.5, the maximum CCP injection flow rate is limited to 550 gpm. This upper pump flow rate limit is comprised of the total flow to the four branch injection lines of 469 gpm and a seal injection flow of 79 gpm plus 2 gpm for instrument uncertainties. LCO 3.5.5 ensures that the total seal injection flow resistance meets the analysis requirements. With seal injection flow resistance properly established, seal injection flow will be sufficient for RCP seal integrity, but will also be limited so that the ECCS trains are capable of delivering sufficient water to match boiloff rates in sufficient time to minimize uncovering of the core following a large break LOCA.

The ECCS analysis models the RCP seal injection flow path as a hydraulic flow resistance. The method used in the ECCS analysis model determines RCP seal flow as a function of system conditions rather than specifying an actual flow rate.

The seal injection flow rate can vary during operation, but the hydraulic flow resistance is fixed by positioning the manual seal injection throttle valves. The resistance does not change if the valves are not adjusted. Since resistance is a function of differential pressure divided by flow squared, RCP seal flow variation due to changing RCS backpressure following a LOCA is explicitly accounted for as a result of modeling the RCP seal injection flow path resistance. Seal injection flow to the RCP seals is maintained during the injection phase of an SI following a design basis accident. The ECCS analyses do not credit core cooling from that portion of the safety injection flow that enters the RCP through the seal injection flow path under minimum safeguards conditions. The limitation on seal injection flow ensures that in the event of an accident, the safety injection flow will be controlled within the constraints assumed in the accident analyses.

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that sufficient CCP injection flow is directed to the core via the boron injection header. The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The pressure and flow values are established by LCO 3.5.5. The seal injection flow line resistance is established by adjusting the RCP seal water injection throttle valves per SR 3.5.5.1 such that flow to the RCP seals is limited to 20 gpm (nominal) per pump in the event of a large break LOCA. If it is necessary to change the RCP seal injection line hydraulic flow resistance, the positions of the manual seal injection throttle valves are adjusted to provide the desired resistance values. Following adjustment, the throttle valves are secured with locking devices and mechanical position stops.

Impact on Nuclear Safety

In support of Callaway License Amendment 68 dated March 24, 1992, Westinghouse performed an analysis to support revising the ECCS pump flow rate limits. For the minimum safeguards (one ECCS train) large break LOCA scenario, Westinghouse developed ECCS flow rate requirements for both minimum and maximum flow resistance cases. For the minimum flow resistance case at an RCS pressure of 0 psig (which would correspond to the upper CCP flow rate limit of 550 gpm), 349 gpm is injected into the core, 120 gpm is assumed to spill out the break, and 81 gpm is directed to the RCP seals. For the maximum flow resistance case at an RCS pressure of 0 psig (which would correspond to the lower CCP flow rate limit of 478 gpm), 302 gpm is injected into the core, 104 gpm is assumed to spill out the break, and 72 gpm is directed to the RCP seals. These flow rates will continue to be met under this proposed change based on the setting of the ECCS injection throttle valves and the RCP seal injection throttle valves, regardless of the post-accident position of BGFCV0121 or the alternate seal injection valves. These flow rates were developed based on the assumption that the 3-inch charging flow control valve BGFCV0121 is fully open, since it will either fail open on a loss of air or control signal or it will be driven open by its controller responding to a low pressurizer level signal. However, as stated above, the core injection and seal injection flow rates would continue to be met regardless of the post-accident position of BGFCV0121 or the 2-inch alternate seal injection valves BGHV8357A and BGHV8357B.

The discussion on minimum and maximum CCP flow rates can also be found in the Applicable Safety Analysis Bases for LCO 3.5.2 and in FSAR Section 16.5.2.

The post-maintenance testing already performed, as discussed previously, satisfies the safety analysis requirements.

Probabilistic Safety Assessment (PSA) Evaluation

Although all ECCS subsystems, including the centrifugal charging pump subsystem, are credited for injection in the safety analysis for large break LOCA, the Callaway PSA large break LOCA success criteria require ECCS injection by one (1) train of residual heat removal (RHR) only. Therefore, this proposed change has no impact on the Callaway large break LOCA core damage frequency. In addition, the post-maintenance testing already performed verified that the CCP flow to the SI branch lines is consistent with safety analysis. Therefore, there is no impact on the Callaway core damage frequency stemming from smaller LOCA break sizes, which do credit the centrifugal charging pump ECCS subsystem for mitigation.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Determination

The proposed change does not involve a significant hazards consideration because operation of Callaway Plant in accordance with this change would not:

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

The emergency core cooling system (ECCS) analysis models the reactor coolant pump (RCP) seal injection flow path as a hydraulic flow resistance. The proposed change clarifies that RCP seal injection flow is a function of system conditions. The seal injection flow rate can vary during operation, but the hydraulic flow resistance is fixed by positioning the manual seal injection throttle valves. The resistance does not change if the valve adjustments are not changed. Thus, RCP seal injection flow variation due to changing reactor coolant system (RCS) backpressure following a loss of coolant accident (LOCA) is explicitly accounted for as a result of modeling the RCP seal injection flow path resistance.

The proposed change does not impact the way the RCP seal injection flow should be established per the safety analysis and does not affect RCP seal integrity. The seal injection flow resistance only affects ECCS flow. Since ECCS flow occurs after an accident, the proposed change cannot impact the probability of an accident.

Overall ECCS performance will remain within the bounds of the previously performed accident analyses since there are no hardware changes. The ECCS will continue to function in a manner consistent with the plant design basis. All design, material, and construction standards that were applicable prior to the proposed change are maintained.

The proposed change will not affect the probability of any event initiators. There will be no degradation in the performance of, or an increase in the number of challenges imposed on, safety-related equipment assumed to function during an accident situation. There will be no change to normal plant operating parameters or accident mitigation performance.

The proposed change will not alter any assumptions or change any mitigation actions in the radiological consequence evaluations in the FSAR.

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

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

There are no hardware changes nor are there any changes in the method by which any safety-related plant system performs its safety function. The proposed change will not affect the normal method of plant operation. No performance requirements will be affected.

Since the proposed change continues to assure that the assumed ECCS flow is available after a large break LOCA, no new accident scenarios, transient precursors, failure mechanisms, or limiting single failures are introduced as a result. There will be no adverse effect or challenges imposed on any safety-related system as a result of this request.

The proposed change does not alter the design or performance characteristics of the ECCS. It simply corrects the description of how to properly set the position of the RCP seal injection throttle valves in support of the ECCS flow balance assumptions.

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

(3) Involve a significant reduction in a margin of safety.

There will be no effect on the manner in which safety limits or limiting safety system settings are determined nor will there be any effect on those plant systems necessary to assure the accomplishment of protection functions. There will be no impact on the overpower limit, departure from nucleate boiling ratio limits, heat flux hot channel factor (F_Q) nuclear enthalpy rise hot channel factor ($FN/\Delta H$), loss of coolant accident peak cladding temperature (LOCA PCT), peak local power density, or any other margin of safety. The radiological dose consequence acceptance criteria listed in the Standard Review Plan will continue to be met.

Therefore, the proposed change does not involve a significant reduction in any margin of safety.

Conclusion:

Based on the preceding information, it has been determined that the proposed request meets the requirements of 10CFR50.92(c) and does not involve a significant hazards consideration.

5.2 Regulatory Safety Analysis

Applicable Regulatory Requirements/Criteria

The regulatory bases for TS 3.5.5 are 10CFR50.46 and 10CFR Appendix A, GDCs 35, 36, and 37.

TS 3.5.5, in conjunction with TS 3.5.2, helps to ensure that the following acceptance criteria, established by 10CFR50.46, will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 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 generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react;

d. Core is maintained in a coolable geometry; and

e. Adequate core cooling capability is maintained.

GDC 35, "Emergency Core Cooling," requires that a system be provided for abundant emergency core cooling. The GDC requires redundancy be provided such that the safety function of the ECCS shall be met while energized from either offsite or onsite power, assuming a single failure.

GDC 36, "Inspection of Emergency Core Cooling System," requires the ECCS to be designed to permit periodic inspections.

GDC 37, "Testing of Emergency Core Cooling System," requires the ECCS to be designed to permit periodic demonstrations of the full operational sequence that brings the system into operation.

Analysis

There have been no changes to the ECCS design such that any of the above regulatory requirements and criteria would not be met. This amendment application only involves the correction of the literal wording contained within TS 3.5.5.

Conclusion

The evaluation performed by Union Electric Company concludes that Callaway Plant continues to comply with the above regulatory requirements.

6.0 ENVIRONMENTAL EVALUATION

Union Electric Company has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, or would change an inspection or surveillance requirement. Union Electric Company has evaluated the proposed change and has determined that the change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), an environmental assessment of the proposed change is not required.

7.0 REFERENCES

1. Callaway License Amendment 133 dated May 28, 1999, Conversion to Improved Technical Specifications.

2. Callaway License Amendment 68 dated March 24, 1992, Revised ECCS Flow Rate Limits.

ATTACHMENT TWO

MARKUP OF TECHNICAL SPECIFICATIONS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.5 Seal Injection Flow

LCO 3.5.5 Reactor coolant pump seal injection flow to each RCP seal shall be 7.5 ± 0.5 gpm with a 105 (+5, -2) psi differential between the charging header and RCS pressure, ~~and the charging flow control valve full open.~~

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Seal injection flow not within limit.	A.1	Adjust manual seal injection throttle valves to give a flow within limit with a 105 (+5, -2) psi differential between the charging header and RCS pressure, ~~and the charging flow control valve full open.~~	4 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.5.1	-------------------------------NOTE------------------------------- Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at ≥ 2215 psig and ≤ 2255 psig. -- Verify manual seal injection throttle valves are adjusted to give a flow within limit with a 105 (+5, -2) psi differential between the charging header and RCS pressure~~, and the charging flow control valve full open.~~	18 months

ATTACHMENT THREE

RETYPED TECHNICAL SPECIFICATIONS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.5 Seal Injection Flow

LCO 3.5.5 Reactor coolant pump seal injection flow to each RCP seal shall be 7.5 ± 0.5 gpm with a 105 (+5, -2) psi differential between the charging header and RCS pressure.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Seal injection flow not within limit.	A.1	Adjust manual seal injection throttle valves to give a flow within limit with a 105 (+5, -2) psi differential between the charging header and RCS pressure.	4 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.5.1	-------------------------------- NOTE ---------------------------- Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at ≥ 2215 psig and ≤ 2255 psig. --- Verify manual seal injection throttle valves are adjusted to give a flow within limit with a 105 (+5, -2) psi differential between the charging header and RCS pressure.	18 months

ATTACHMENT FOUR

DRAFT TECHNICAL SPECIFICATION BASES CHANGES

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.5 Seal Injection Flow

BASES

BACKGROUND

This LCO is applicable ~~only to those units that~~ to Callaway since the plant utilizes the centrifugal charging pumps for safety injection (SI). The function of the seal injection throttle valves during an accident is similar to the function of the ECCS throttle valves in that each restricts flow from the centrifugal charging pump header to the Reactor Coolant System (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power (Ref. 1). The LOCA analysis establishes the minimum flow for the ECCS pumps. The centrifugal charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the centrifugal charging pumps. The safety analyses make assumptions with respect to: (1) both the maximum and minimum total system resistance; (2) both the maximum and minimum branch injection line resistance; and (3) the maximum and minimum ranges of potential pump performance. These resistances and ranges of pump performance are used to calculate the maximum and minimum ECCS flows assumed in the safety analyses. The CCP maximum total pump flow SR in FSAR Section 16.5 ensures the maximum injection flow limit of 550 gpm is not exceeded. This value of flow is comprised of the total flow to the four branch lines of 469 gpm and a seal injection flow of 79 gpm plus 2 gpm for instrument uncertainties. The Bases for LCO 3.5.2, "ECCS - Operating," contain additional discussion on the safety analyses. The steam generator tube rupture and main steam line break event analyses also credit the centrifugal charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the centrifugal charging pumps will deliver sufficient water for a small break

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the centrifugal charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory. Seal injection flow satisfies Criterion 2 of 10CFR50.36(c)(2)(ii).
LCO	The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that sufficient centrifugal charging pump injection flow is directed to the RCS via the injection points (Ref. 2). The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is established by adjusting the RCP seal water injection throttle valves ~~(BGV0198, BGV0199, BGV0200, BGV0201, and BGV0202)~~ such that flow to the RCP seals is limited to 20 gpm per pump in the event of a large break LOCA. This accident analysis limit is met by positioning the valves so that the flow to each RCP seal is 7.5± 0.5 gpm with a 105 (+5, -2) psi differential between the charging header and RCS pressure~~, with BGFCV0121 full open~~. Once set, these throttle valves are secured with locking devices and mechanical position stops. These devices help to ensure that the following safety analyses assumptions remain valid: (1) both the maximum and minimum total system resistance; (2) both the maximum and minimum branch injection line resistance; and (3) the maximum and minimum ranges of potential pump performance. These resistances and pump performance ranges are used to calculate the maximum and minimum ECCS flows assumed in the LOCA analyses of Reference 1. The centrifugal charging pump discharge header pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed differential pressure result in a conservative valve position should RCS pressure decrease. The limit on seal injection flow must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed in the accident analyses.
APPLICABILITY	In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower, however, because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these

(continued)

BASES

APPLICABILITY (continued)

MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

ACTIONS

A.1

With the seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual seal injection throttle valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and provides a reasonable time to restore seal injection flow within limits. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

B.1 and B.2

When the Required Action cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in Required Action B.1, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4 where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1

Verification every 18 months that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The seal water injection throttle valves are set to ensure proper flow resistance and pressure drop in the piping to each injection point in the event of a LOCA. The seal injection flow line resistance is established by adjusting the RCP seal water injection throttle valves ~~(BGV0198, BGV0199, BGV0200, BGV0201, and BGV0202)~~ such that flow to the RCP seals is limited to 20 gpm per pump in the event of a large break LOCA. This accident analysis limit is met by positioning the valves so that the flow to each RCP seal is 7.5 ± 0.5 gpm with a 105 (+5, -2) psi differential between the charging header and RCS pressure, ~~with~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1 (continued)

~~BGFCV0121 full open.~~ Once set, these throttle valves are secured with locking devices and mechanical position stops. The Frequency of 18 months is based on engineering judgment and the controls placed on the positioning of these valves. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual seal injection throttle valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.

REFERENCES

1. FSAR, Sections 6.3 and 15.6.5.
2. 10 CFR 50.46.