Mr. Randall K. Edington July 3, 2001
Vice President - Operations
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: REMOVAL OF THE INCLINED FUEL TRANSFER SYSTEM PRIMARY CONTAINMENT BLIND FLANGE WHILE PRIMARY CONTAINMENT IS REQUIRED TO BE OPERABLE (TAC NO. MA7827)

Dear Mr. Edington:

The Commission has issued the enclosed Amendment No. 116 to Facility Operating License No. NPF-47 for the River Bend Station, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 20, 1999, as supplemented by letters dated November 29, 2000, and April 6, May 7, and June 7, 2001.

The amendment proposes a change to TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," to allow the removal of the inclined fuel transfer system primary containment isolation blind flange while the primary containment is required to be operable.

A copy of our related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Robert E. Moody, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosures: 1. Amendment No. 116 to NPF-47
2. Safety Evaluation

cc w/encls: See next page

Mr. Randall K. Edington
Vice President - Operations
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

July 3, 2001

SUBJECT: RIVER BEND STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: REMOVAL OF THE INCLINED FUEL TRANSFER SYSTEM PRIMARY CONTAINMENT BLIND FLANGE WHILE PRIMARY CONTAINMENT IS REQUIRED TO BE OPERABLE (TAC NO. MA7827)

Dear Mr. Edington:

The Commission has issued the enclosed Amendment No. 116 to Facility Operating License No. NPF-47 for the River Bend Station, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 20, 1999, as supplemented by letters dated November 29, 2000, and April 6, May 7, and June 7, 2001.

The amendment proposes a change to TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," to allow the removal of the inclined fuel transfer system primary containment isolation blind flange while the primary containment is required to be operable.

A copy of our related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/
Robert E. Moody, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosures: 1. Amendment No. 116 to NPF-47
2. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:
PUBLIC
PDIV-1 Reading
RidsNrrDripRtsb (WBeckner)
RidsNrrDlpmPdiv (SRichards)
RidsNrrDlpmPdivLpdiv1 (RGramm)
RidsOgcRp
RidsAcrsAcnwMailCenter
G.Hill(2)
RidsNrrPMRMoody
RidsNrrLADJohnson
RidsRgn4MailCenter (KBrockman)
R. Eckenrode (RJE1)
C. Hinson (CSH)
C. Li (CYL1)
R. Palla (RLP3)
M. Hart (MLH3)
D. Pickett (DVP1)
J. Hopkins (JBH1)

Accession No.: ML011840429 *No change from review input ** See previous concurrence

OFFICE	PDIV-1/PM	PDIV-1/LA	IOLB*	IOLB*	SPLB
NAME	RMoody	DJohnson	KGibson	DTrimble	GHubbard
DATE	6/20/01	6/20/01	6/15/01	4/13/01	6/20/01

OFFICE	SPSB*	OGC	PDIV-1/SC**
NAME	MReinhart	RWeisman	RGramm
DATE	5/29/01	3 July 2001	7/3/01

OFFICIAL RECORD COPY

ENTERGY GULF STATES, INC. **

AND

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-458

RIVER BEND STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 116
License No. NPF-47

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Gulf States, Inc.* (the licensee) dated December 20, 1999, as supplemented by letters dated November 29, 2000, and April 6, May 7, and June 7, 2001, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, as amended, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

---

* Entergy Operations, Inc. is authorized to act as agent for Entergy Gulf States, Inc, and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

**Entergy Gulf States, Inc., has merged with a wholly owned subsidiary of Entergy Corporation. Entergy Gulf States, Inc. was the surviving company in the merger.

E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment; and Paragraph 2.C.(2) of Facility Operating License No. NPF-47 is hereby amended to read as follows:

(2) <u>Technical Specifications and Environmental Protection Plan</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 116 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: July 3, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 116

FACILITY OPERATING LICENSE NO. NPF-47

DOCKET NO. 50-458

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by Amendment number and contains a marginal line indicating the area of change.

Remove	Insert
3.6-16	3.6-16 3.6-16a

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 116 TO FACILITY OPERATING LICENSE NO. NPF-47

ENTERGY OPERATIONS, INC.

RIVER BEND STATION, UNIT 1

DOCKET NO. 50-458

1.0 INTRODUCTION

By application dated December 20, 1999 (License Amendment Request (LAR) 1999-30), as supplemented by letters dated November 29, 2000, and April 6, May 7, and June 7, 2001, Entergy Operations, Inc. (EOI or the licensee) requested changes to the Technical Specifications (TS) (Appendix A to Facility Operating License No. NPF-47) for the River Bend Station, Unit 1 (RBS). The proposed change would permit removal of the Inclined Fuel Transfer System (IFTS) primary containment isolation blind flange for a period of 60 days using alternative means for containment isolation while primary containment is required. Also, the proposed changes provide flexibility to operate the IFTS for the purpose of testing and exercising the system prior to a refueling outage. The supplemental letters dated November 29, 2000, and April 6, May 7, and June 7, 2001, provided additional information that did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC or the Commission) staff's proposed no significant hazards consideration determination as published in the *Federal Register* on January 26, 2000 (65 FR 4273).

2.0 BACKGROUND

The IFTS at RBS is used to transport new fuel, irradiated fuel, control rods, and other items between the upper containment fuel storage pool (the “upper pool”) inside the primary containment, and the spent fuel storage pool (the “lower pool”) inside the fuel building (outside primary containment). The transfer tube is a 23-inch internal diameter water filled stainless steel pipe. A blind flange and a flexible bellows form the primary containment boundary near the upper pool containment penetration.

The IFTS is used to support refueling activities. The licensee indicated in LAR 1999-30 that before using the IFTS, it requires a complete checkout of the transfer system, which can not be started until the plant is shutdown for refueling and the primary containment operability is not required. This has led to IFTS checkout testing becoming a “critical path” activity. Removing the blind flange during plant operation would permit performance of a portion of the testing, exercising, and maintenance of the IFTS in advance of the start of the outage to avoid such schedule impacts. The licensee proposed, in LAR 1999-30, a modification to the RBS TS 3.6.1.3, “Primary Containment Isolation Valves (PCIVs),” and associated Surveillance Requirement (SR) 3.6.1.3.3 to allow the IFTS blind flange to be removed during operating

Modes 1, 2, or 3 so that the licensee is able to test and exercise the system prior to the start of a refueling outage. The licensee proposed an alternate means to maintain containment isolation while the flange is removed.

SR 3.6.1.3.3 currently reads, “Verify each primary containment isolation...blind flange that is...required to be closed during accident conditions is closed.” The frequency of the above SR is “Prior to entering MODE 2 or 3 from MODE 4, if not performed within the previous 92 days.” The licensee proposed to insert a new Note 4 to allow removal of the blind flange on the IFTS during Modes 1, 2, and 3 (the licensee did not initially propose a time limit, but subsequently revised the Note to limit the removal to 60 days per operating cycle by supplemental letter dated April 6, 2001), as follows:

> Not required to be met for the Inclined Fuel Transfer System (IFTS) penetration when the associated primary containment blind flange is removed, provided that the fuel building spent fuel storage pool water level is maintained greater than 23 feet above the top of the fuel, and the IFTS transfer tube drain valve and bottom gate valve remain closed. The IFTS transfer tube drain valve may be opened under administrative controls. Removal of the IFTS Blind Flange shall not exceed 60 days per operating cycle while in Modes 1, 2, or 3.

Additionally, the licensee proposed to insert a paragraph into the Bases for SR 3.6.1.3.3 to explain the justification for the new Note. The entire paragraph may be found in Attachment 4 of LAR 1999-30. As pertinent here, the insert states:

> A fourth note is added to allow for removal of the Inclined Fuel Transfer System (IFTS) blind flange when primary containment operability is required...Requiring the fuel building spent fuel storage pool water level to be > el. 108'-4" (23 feet above the top of the fuel in the lower pool) ensures a sufficient depth of water over the outlet of the transfer tube bottom valve...The pressure integrity of the IFTS transfer tube, the seal created by water depth of the fuel building spent fuel storage pool, and the administrative control of the drain line flow path create an acceptable barrier to prevent the post-DBA [design basis accident] LOCA [loss-of-coolant accident] containment building atmosphere from leaking into the fuel building.

By supplemental letter dated April 6, 2001, EOI requested that a 60-day limit for the removal of the IFTS blind flange be applied to LAR 1999-30. Removal of the blind flange would effectively extend the containment pressure boundary to include the IFTS transfer tube and associated piping and valves. Two new potential release paths to the environment would be created by this change: (1) from the upper containment to the Fuel Building through the IFTS bottom valve and spent fuel storage pool, and (2) from the upper containment to the Fuel Building through the IFTS drain line and drain tank. Removal of the blind flange would also introduce the possibility of a structural failure of the IFTS tube or connected piping at a beyond-design-basis pressure or seismic loading lower than if the blind flange were installed.

Based on anticipated IFTS operations described in the April 6, 2001, supplemental letter, the licensee estimates that the IFTS drain valves will be open (and the flap valve closed) for approximately 9 days, and the flap valve will be open (and the IFTS drain valves closed) for approximately 51 days within the requested 60-day period. With the flap valve open, the IFTS sheave box, tube, and connected piping would communicate with the containment building fuel transfer pool and be maintained in a water-solid condition. In accordance with LAR 1999-30, the IFTS bottom gate valve will be maintained closed while in Modes 1, 2, and 3 with the blind flange removed. In the May 7, 2001, supplemental letter, the licensee further committed to close the IFTS upper gate valve, located between the IFTS sheave box and the blind flange connection, when the blind flange is removed during Modes 1, 2, and 3 and the IFTS is not in use. This would reduce the time that the IFTS tube communicates with the containment building from 51 days to slightly less than 20 days within the 60-day period that the blind flange is removed.

The NRC staff has considered the risk implications of the licensee's request to remove the blind flange for up to 60 days per operating cycle while in Modes 1, 2, and 3, and to permit limited operation of the IFTS during that period. The primary concerns in terms of risk involve the potential for blind flange removal and IFTS operation to adversely impact: (1) suppression pool makeup capability via loss of containment building fuel transfer pool inventory, (2) containment isolation reliability, and (3) containment ultimate pressure capacity. Removal of the blind flange could also affect the integrity of the containment in beyond-design-basis seismic events. An adverse impact on suppression pool makeup could result in an increase in core damage frequency (CDF), whereas an adverse impact on containment isolation capability/reliability or containment ultimate pressure capacity could result in an increase in releases to the environment. These releases could potentially contribute to the large early release frequency (LERF) for the plant. Guidance on acceptable levels of increase in CDF and LERF is contained in Regulatory Guides 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," and provides a basis for confirming that the increases are small and consistent with the intent of the Commission's Safety Goal Policy Statement. The NRC staff used this guidance in assessing the risk impact of the proposed changes.

3.0 DETERMINISTIC EVALUATION

In LAR 1999-30, the licensee initially requested the removal of the blind flange without a time limit. Based on the deterministic analysis of the original proposal, the NRC staff found that the proposed alternate means of isolation deviates from some of the requirements in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." Subsequently, the licensee amended the time limit for the blind flange removal to 60 days per operating cycle and justified its position by a risk analysis in the supplemental information of letters dated April 6 and May 7, 2001. The NRC staff has considered the limited-time operation, other alternate means to isolate the IFTS tube, and the provisions in NUREG-1434, "General Electric Plants, BWR [Boiling Water Reactor]/6, Revision 2 STS [Standard Technical Specifications]," Section 3.6.1.3 to unisolate containment penetrations intermittently under administrative controls.

3.1 Containment Isolation

The IFTS blind flange forms part of the primary containment boundary and is used to satisfy the containment isolation requirement during power operation. Removal of the flange effectively extends the containment pressure boundary to include the IFTS transfer tube and associated piping and valves creating two potential leak paths: the IFTS tube and the drain line. While the blind flange is removed, the licensee proposed an alternate isolation provision, which includes a water seal with a bottom gate valve for the IFTS tube, and an isolation valve for the drain line.

3.1.1 IFTS Water Seal

In LAR 1999-30, the licensee demonstrated the adequacy of the IFTS water seal provided by the water in the tube and in the lower pool (23 feet above the top of the spent fuel), which is able to withstand the peak containment pressure (7.6 psig) resulting from a design-basis large break LOCA (LBLOCA) without any containment atmosphere leakage when the blind flange is removed. The water level can be monitored by safety-related instruments with annunciation in the control room to verify that the proposed TS minimum water level in the spent fuel pool is maintained. The IFTS transfer tube, drain line piping and isolation valve, and transfer tube bottom valve can withstand the pressure and temperature resulting from the accident. Structural modifications as a result of the increased load, including additional pipe support as needed, will be incorporated prior to removal of the blind flange.

The NRC staff reviewed the RBS Updated Safety Analysis Report (USAR) and found that the containment design pressure is 15 psig, which is capable of handling the small break LOCA (SBLOCA) that was described in the USAR Section 6.2.1.1.3.4. The capability of the proposed water seal is designed to 7.6 psig. The licensee excluded the SBLOCA from its design of the IFTS water seal. By letter dated March 23, 2000, the NRC staff submitted a request for additional information (RAI) concerning the adequacy of water seal following a design-basis SBLOCA.

In a supplemental letter dated November 20, 2000, the licensee provided additional analysis to address the SBLOCAs. The containment pressure resulting from a SBLOCA is a function of the bypass leakage from drywell to containment. SBLOCAs, in general, will have containment pressure lower than that of a design-basis LBLOCA. However, the containment pressure for some SBLOCAs with drywell leakage on the order of the design value (1.0 $ft^2 A/\sqrt{K}$), described in USAR Section 6.2.1.1.3.4, may exceed the water seal capability (where A is the flow area and K is the geometric and friction loss coefficient). The actual drywell bypass should be significantly less than the design value. Therefore, the licensee believes that the peak containment pressure following a SBLOCA, based on the actual drywell leakage, is less than 7.6 psig. The licensee performed a confirmatory analysis using the GOTHIC computer code for a limiting small break size (0.1 ft^2), with varying values of drywell leakage. The results demonstrated that, with a drywell leakage at 10% of the design limit, the calculated peak containment pressure following a SBLOCA is less than 7.6 psig. Using the specified 10% limit conservatively bounds the range of actual drywell leakage values ($A/\sqrt{K} < 0.03$ ft^2), based on historically measured data of the drywell leakage. Therefore, the licensee concluded that the water seal was sufficient to withstand the containment pressure resulting from a SBLOCA.

The NRC staff reviewed the RBS TSs and the above response to the March 23, 2000, RAI. The acceptance criterion in TS SR 3.6.5.1.3 for the drywell leakage is “100%” of the design bypass leakage limit (1.0 $ft^2 A/\sqrt{K}$), instead of “10%” of the limit. The 10% value, referred to by the licensee in its November 29, 2000, RAI response, applies to as-left leakage prior to startup after performing a required drywell bypass leakage limit test. According to the TS Bases for SR 3.6.5.1.3, at all other times between required drywell leakage rate tests, the acceptance criterion is based on the 100% design value. This surveillance is performed once every 10 years on a performance-based frequency. Without reducing the acceptance criterion on drywell leakage to less than 10% of the design value consistent with the GOTHIC analysis, the NRC staff found the licensee's conclusion regarding the capability of the water seal to withstand a SBLOCA could be invalid.

The NRC staff discussed the above finding with the licensee in a telephone conference on March 13, 2001. By supplemental letter dated April 6, 2001, the licensee indicated that it decided to maintain its original position of excluding SBLOCA from the design of water seal. The licensee believes that the containment structure is designed to 15 psig, which is capable of handling any design-basis SBLOCA, and that the SBLOCA need not be postulated for the water seal design.

The NRC staff finds the licensee's position that a SBLOCA be excluded from consideration in the evaluation of a water seal existing above the bottom end of the IFTS transfer tube to be unacceptable. As part of the containment, the IFTS penetration was reviewed with respect to General Design Criteria (GDC) 16, 50, and 54[1]. The NRC staff believes that both LBLOCAs and SBLOCAs are DBAs for containment design such that the requirements in the GDC of Appendix A to 10 CFR Part 50 should be applied as appropriate.

Based on the above evaluation, the NRC staff finds that the IFTS water seal has the capability to withstand the accident containment pressures resulting from a DBA (LBLOCA or SBLOCA), provided that the drywell bypass leakage is less than 10% of the design value. Above this bypass leakage, the water seal may not be sufficient to sustain the accident pressure resulting from a SBLOCA. However, based upon historical low-measured drywell bypass leakage values, other provisions to maintain the water seal that are evaluated in Section 3.0, and the probabilistic risk assessment (PRA) in Section 4.0, the IFTS water seal provides reasonable assurance that containment atmosphere leakage will not enter the spent fuel pool during design basis LBLOCAs and SBLOCAs.

3.1.2 IFTS Bottom Gate Valve

The licensee stated that the gate valve (F42-F004) located in the bottom end of the transfer tube will be closed and hydraulically locked (i.e., deactivated) while the blind flange is removed. The licensee's study concluded that the IFTS, including the transfer tube and its valves, has a capability to withstand the pressure and temperature of DBAs and severe accidents. In the RAI dated March 23, 2000, the NRC staff requested information regarding the potential impact on dose consequences and flooding resulting from the undetermined amount of water leakage from this gate valve, following an accident when the IFTS flange is removed.

---

[1]GDC 16 states that reactor containment and associated systems shall be provided to establish an essentially leaktight barrier against the uncontrolled release of radioactivity to the environment. GDC 50 requires, among other things, that the containment structure, including penetrations, shall be designed so that the containment structure can accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. GDC 54, in part, requires that piping systems penetrating primary containment shall have leak detection, isolation, and containment capabilities with redundancy, reliability, and performance capabilities reflecting the importance of isolating these systems.

Regarding potential flooding in the fuel building, the licensee stated in its supplemental letter dated November 29, 2000, that if offsite power is available, a high water level in the lower pool can be pumped to either the main condenser, radwaste, or the condensate storage tank. If off-site power is not available during a loss of offsite power (LOOP), the water can be siphoned by hose to the adjacent cask washdown area, with an available capacity of about 47,000 gallons. The licensee has concluded that, given the maximum duration of LOOP and maximum leakage rate, all leakage would be contained within either the spent fuel pool or the cask washdown area. In addition, the licensee stated that any water leakage through the IFTS can be identified using the spent fuel pool level indications and associated level alarms. In the past, during IFTS operation, the plant has taken action to identify and repair IFTS system leakage exceeding 1.5 gallons per minute (gpm). The IFTS bottom valve is not specifically included in a Type C leak test program, but is within the planned local leak rate test boundary for the drain valve (F42-F003). The licensee stated that gross leakage (of water) past the bottom valve need not be postulated for LBLOCA since any bottom valve leakage would be bounded by the results of the leak test and would be corrected if the leak rate criteria could not be met. Based on the above information, the NRC staff finds the concern of potential flooding resolved.

The NRC staff notes that the IFTS leak test will be performed at a test pressure of 8 psig to represent the post-accident containment atmosphere pressure for a LBLOCA (7.6 psig). At this pressure, the leak test can demonstrate that the drain line isolation valve and the bottom valve (when the water seal remains in the IFTS) are leaktight against air pressure less than 8 psig. The water seal is included during the leak test. The test pressure of 8 psig is less than the hydrostatic pressure of the water in the spent fuel storage pool at the IFTS bottom valve outlet (9 psig). At the test pressure, the water level within the IFTS tube would be reduced as a result of leakage through the bottom valve, but would not drop sufficiently to clear the seal. The leak test does not provide assurance for the bottom valve being leaktight against the air when the water seal is cleared; however, if the water seal remains in the IFTS, it provides a leak-tight barrier against the air.

The licensee has also committed to close the IFTS upper gate valve during time periods when the system is not in use. This action significantly reduces the time that the IFTS tube is open to the containment building while the blind flange is removed.

The NRC staff evaluated the isolation provision of a combination of the water seal and bottom valve in the IFTS. In the previous section, it was found that the IFTS water seal is insufficient to contain the containment pressure following a SBLOCA when a large drywell bypass leakage exists. Therefore, the water seal could be cleared following such a SBLOCA. Subsequent to seal clearing, there would be an undetermined amount of containment atmosphere air leakage from the bottom valve. The IFTS isolation provision is not an essentially leak-tight barrier against an uncontrolled release of radioactivity to the environment. However, to the extent that the requested amendment establishes operational requirements that depart from the performance requirements of the GDC during an SBLOCA, it does provide for operation in keeping with the design objectives of the GDC. The licensee justifies this departure through the use of operational capabilities, described above, that, in combination, reduce the likelihood of an uncontrolled release of radioactivity to the environment to acceptable levels. Based on the closure of the IFTS bottom gate valve to augment the IFTS water seal, the closure of the top gate valve during periods when the IFTS is not in use, the evaluation of the water seal in Section 3.1.1, and the PRA in Section 4.0, the NRC staff finds the potential for leakage through the bottom valve during a SBLOCA to be acceptable.

3.1.3 IFTS Drain Valve

During blind flange removal and IFTS operation, water in the tube needs to be drained, which necessitates opening the IFTS motor-operated drain valve (F42-F003). This valve, however, also has to be closed in the event of an accident. Accordingly, the IFTS drain line is required to have its own containment isolation provision.

The IFTS drain line can be isolated by the IFTS operator's closing the motor-operated valve (MOV) from the IFTS panel. In addition, the licensee proposed to station a dedicated operator in a low dose area in the vicinity of the IFTS drain line isolation valve while the valve is open. The operator will be in communication with the control room and would manually close the drain line isolation valve at the direction of the control room or upon a LOOP.

The drain valve will be treated as a primary containment isolation valve and be maintained in accordance with the primary containment leakage rate testing program (TS 5.5.13) to ensure the leak tightness of the valve. In the supplemental letter dated May 7, 2001, the licensee committed to perform the local leak rate test for the drain valve (F42-F003) prior to first removal of the blind flange in Modes 1, 2, or 3 and thereafter at a frequency according to the Primary Containment Leakage Rate Test Program. A second MOV (F42-SFT-MOV101) is located in this drain line downstream of the containment isolation valve. However, the licensee stated that it has not taken credit for the manual operation of this second valve. The licensee has committed in its supplemental letter dated April 6, 2001, to maintain the second drain line isolation valve closed when the IFTS is not operating. In Section 4.3, the NRC staff notes that from a probabilistic perspective, the second drain line isolation valve can be credited during an event if the first drain line isolation valve fails.

To ensure pressure integrity following removal of the blind flange, the licensee has qualified the drain line piping and associated supports for increased pressure and temperature including the effects of seismic and hydrodynamic loading. In addition, the licensee will perform structural modification, including additional piping support, to account for the load increase. The licensee stated that the drain valve is qualified for the increased pressure and temperature.

Since the licensee does not take credit for the second valve downstream of the drain line (the second valve is not subject to Type C leak testing and the piping system is not designed to accident pressure and temperature), the NRC staff finds that the drain line does not have double barriers for containment isolation, which are normally required by GDC 56. Further, the NRC staff finds the isolation provision of the single valve with dedicated operator does not satisfy any of the acceptable alternate containment isolation provisions identified in Standard Review Plan Section 6.2.4. However, the licensee has proposed using operational capabilities to limit leakage from the IFTS drain line in keeping with the design objectives of the GDC, and the proposed TS limits the amount of time for which the blind flange may be removed during Modes 1, 2, and 3 during a single operational cycle. The staff finds that these performance capabilities reflect the importance to safety of isolating the IFTS.

In summary, the NRC staff finds that the drain line has the capability of being isolated as a single containment isolation barrier. Based upon the PRA in Section 4.0, the TS limitations on the time limit duration of the blind flange removal at power, and the above assessment, the NRC staff finds the licensee's proposed measures to assure IFTS drain line isolation to be acceptable.

3.2 Limited-time Operation for Blind Flange Removal

LAR 1999-30 would have allowed an indefinite removal of the IFTS blind flange. In the RAI dated March 23, 2000, the NRC staff asked the licensee to justify its position of no time limit. The licensee, in its supplemental letter dated November 29, 2000, stated that the removal of the IFTS blind flange had an acceptable and non-risk-significant effect, and therefore, determined that there is no need to restrict the flange removal with a time limit. Without a time limit, the NRC staff's evaluation, which is based on the deterministic analysis and the requirements in 10 CFR Part 50, identified several deviations from regulatory requirements and would not have been acceptable.

In response to the NRC staff's findings, the licensee, in a supplemental letter dated April 6, 2001, proposed a time limit of 60 days per operating cycle for the flange removal and justified that the risks associated with the removal of the blind flange are sufficiently low with that time limit. The 60 days was established by the licensee's previous operating experience in Refueling Outage 8.

Considering the limited-time operation, the NRC staff evaluated the proposed TS changes against Note 1 of NUREG-1434, Section 3.6.1.3. Note 1 provides that containment penetrations may be unisolated intermittently under administrative controls. Pursuant to 10 CFR 50.36, the LCO in the TSs are the lowest functional capability of performance levels of equipment required for safe operation of the facility. For the drain line, the first isolation valve is leak tight. In addition, the licensee proposed to station a dedicated operator in the vicinity of the IFTS drain line isolation valves to manually close the drain line isolation valve at the direction of the control room or upon a LOOP. Therefore, the isolation provision for the drain line satisfies the lowest functional capability for the LCO. For the IFTS tube, if the water seal remains in the IFTS, the isolation provision satisfies the lowest functional capability for the LCO. The licensee stated that any water leakage through the IFTS can be identified using the spent fuel level indications and associated level alarms in the control room. In its supplemental letter dated May 7, 2001, the licensee further explained that the Alarm Response Procedures provide the operators with instructions to determine the cause of the level alarm and initiate corrective actions. Relying on the above operator action, the water seal could be maintained in the IFTS even if the containment pressure is higher than 7.6 psig. Based on the operator action to maintain the water seal, limited time operation with the blind flange removed, the PRA in Section 4.0, and Note 1 of NUREG-1434, the NRC staff has determined that the proposed removal of the blind flange for 60 days during each operating cycle is acceptable.

4.0 PROBABILISTIC RISK ASSESSMENT

The impact of the proposed LAR on suppression pool makeup, containment isolation reliability, containment ultimate pressure capacity, and seismic risk is provided below.

4.1 Suppression Pool Makeup

In most plants with Mark III containments, a loss of water from the upper containment pool through the IFTS could result in the failure of makeup to the suppression pool from the Suppression Pool Makeup (SPMU) system. Reduced suppression pool volume and increased suppression pool temperature could result in a subsequent loss of emergency core cooling system suction pressure for some LOCA scenarios, and a net increase in CDF. However, unlike other plants with Mark III containment designs, RBS does not have an “upper pool dump” as part of the design, and the water in the containment building fuel transfer pool does not have a role in any accident analysis. Accordingly, SPMU is not reflected in the Level 1 PRA event trees. Because of the lack of any dependencies between the containment building fuel transfer pool inventory and severe accident initiating events and accident response, the NRC staff concludes that blind flange removal and operation of the IFTS during Modes 1, 2, or 3 will have no direct impact on CDF for RBS.

4.2 Containment Isolation Reliability

Two new potential release paths to the environment are created by removal of the blind flange: (1) from the upper containment to the Fuel Building through the IFTS bottom valve and spent fuel storage pool, and (2) from the upper containment to the Fuel Building through the IFTS drain line and drain tank. Each of these release paths are discussed separately in the sections that follow.

The licensee’s commitment to close the IFTS upper gate valve (F42-VF002) when the blind flange is removed during Modes 1, 2, and 3 and the IFTS is not in use, substantially improves the reliability of containment isolation. The upper gate valve is a non-safety-related, 24-inch manually-operated valve with 24-inch handwheel. The licensee indicates that it is qualified for a temperature of 185 °F, and that the hydrostatic shell test pressure is 113 psig. This pressure capability is substantially greater than the pressure to which the valve will be exposed in a DBA, and at the containment ultimate pressure capacity. Given the substantial pressure capacity of the valve relative to the expected accident pressures, the NRC staff considers the probability of over-pressure failure of the upper valve to be negligible.

Based on anticipated IFTS operations within the 60-day period that the blind flange is removed, the upper gate valve will be closed the equivalent of about 40 days. In this configuration, the IFTS tube is isolated from the containment. The IFTS bottom gate valve (F42-MOV-F004) provides an additional barrier to releases via the bottom of the IFTS tube, and the IFTS drain line isolation valves (F42-MOV-F003 and F42-SFT-MOV101) provide an additional barrier to releases via the IFTS drain line. The IFTS bottom valve and IFTS drain line isolation valves will also be administratively controlled closed during periods when the upper gate valve is closed. The NRC staff concludes that the redundant isolation provisions in place when the upper gate valve is closed would result in a negligible potential for a containment isolation failure. Accordingly, the time period of concern for containment isolation is limited to the period when the blind flange is removed and the upper gate valve is open, which would be slightly less than 20 days. The IFTS system would generally be in use when the upper gate valve is open, and additional administrative controls would be in effect as described below.

4.2.1 Releases Via the Bottom Valve

Containment isolation for the first path is provided by the IFTS bottom gate valve and by the IFTS water seal in the spent fuel storage pool. These isolation provisions will be administratively controlled as follows:

– The bottom valve will be maintained closed at all times when the blind flange is removed during Modes 1, 2, or 3. To provide added assurance that the valve remains closed, it will be hydraulically locked (i.e., deactivated).

– The water level of the spent fuel storage pool will be maintained at an elevation greater than 23 feet above the top of fuel at all times when the blind flange is removed during Modes 1, 2, or 3. This elevation provides about 3 feet more than is necessary to assure that the IFTS water seal is preserved in the design basis LBLOCA, which produces a peak containment pressure of 7.6 psig.

Potential mechanisms for releases via the bottom gate valve are: over-pressure failure or inadvertent operation of the bottom valve with concomitant clearing/displacement of the water seal, and excessive leakage of the bottom valve with clearing/displacement of the water seal. These release modes are relevant when the IFTS upper gate valve is open and the IFTS tube communicates with the containment. In the event of bottom valve failure or leakage, the water seal will continue to maintain a leak-tight barrier to the release of fission products up to a containment pressure of about 9 psig. At containment pressures greater than 9 psig, which could develop in a beyond-DBA, the pressure inside the IFTS tube will exceed the hydrostatic pressure at the bottom valve outlet, and releases into the spent fuel storage pool will occur. In all cases, releases would pass through and be scrubbed by approximately 21 feet of overlying water in the spent fuel storage pool, as discussed below.

4.2.1.1 Failure or Inadvertent Operation of Bottom Valve

The IFTS bottom valve (F42-MOV-F004) is a 24-inch hydraulically-operated gate valve. The licensee indicates that, at a temperature of 185 °F, the gate valve has a rated pressure of 500 psig. This pressure capability is substantially greater than the pressure to which the valve will be exposed in a DBA, and at the containment ultimate pressure capacity. Based on the substantial pressure capacity of the valve relative to the expected accident pressures, the NRC staff considers the probability of over-pressure failure of the bottom valve to be negligible.

Based on the commitment and administrative controls to maintain the bottom valve closed, the likelihood of inadvertent operation of the valve coincident with a severe reactor accident is also extremely small. The failure rate for spurious operation of an MOV is estimated to be about 1E-7 per hour per NUREG/CR-2728, "Interim Reliability Evaluation Program Procedures Guide" (January 1983). This value is considered conservative for this application since it does not reflect the fact that the valve will be locked closed; it is used here as a scoping value for the hydraulically-operated bottom gate valve. The failure probability of the valve will be the failure rate multiplied by the exposure time of 20 days (when the IFTS tube is not isolated from the containment), or approximately 5E-5. The total CDF for internal events at RBS is approximately 1E-5 per year, based on the latest revision of the Probabilistic Safety Assessment (Revision 3, January 11, 2001).

Spurious operation of the bottom valve could result in two different leakage paths/scenarios, depending on the position of the flap valve at the onset of the accident. If the flap valve and upper gate valve are open, as anticipated for about 9 days out of the 60-day period, spurious operation of the bottom valve would result in a 23-inch diameter flow area for fission product release (based on the inside diameter of the IFTS transfer tube). The water in the containment building fuel transfer pool will be released into the spent fuel storage pool initially, followed by atmospheric releases from the upper containment airspace (assuming the containment pressure is greater than 9 psig, as discussed earlier). Given the large flow area, upper pool depletion and atmospheric releases could occur within several hours, and would be considered "early" in accordance with the definition in Regulatory Guide 1.174. If the flap valve is closed and the upper gate valve is open, as anticipated for about 9 days out of the 60-day period, fission product releases would be limited to vapor flow through the four-inch diameter line connecting the upper containment airspace and the IFTS sheave box. Water in the containment building fuel transfer pool would not need to be released into the spent fuel storage pool as a precondition for atmospheric release, since the flap valve would be closed, and these releases would also be considered "early".

If all events involving inadvertent opening of the IFTS bottom valve coincident with a severe reactor accident are hypothetically assumed to be "large" releases and therefore contribute to large early release frequency (LERF), the increase in LERF associated with the requested license amendment can be estimated as:

ΔLERF = 1E-5 per year x 5E-5 = 5E-10 per year.

This represents the instantaneous increase in the LERF from this failure mode during the period the blind flange is removed, expressed on an annual basis. This value is below the guideline value of 1E-7 per year provided in Regulatory Guide 1.174 for assuring that the increase in risk associated with a LAR is small and consistent with the intent of the Commission's Safety Goal Policy Statement. Similarly, the incremental conditional large early release probability (ICLERP) for an exposure of 20 days within an 18-month fuel cycle can be estimated as:

ICLERP = 1E-5 per year x 5E-5 x 20/548 year = 2E-11.

This reflects the impact of the proposed change on the large early release probability, taking into account the actual time of exposure during each fuel cycle. This value is below the ICLERP guideline value of 5E-8 provided in Regulatory Guide 1.177 for confirming that a proposed permanent TS change has only a small quantitative impact on plant risk.

Regulatory Guide 1.174 defines LERF as the frequency of those accidents leading to significant, unmitigated releases from containment in a time frame prior to effective evacuation of the close-in population such that there is a potential for early health effects. Such accidents generally include unscrubbed releases associated with early containment failure at or shortly after vessel breach, containment bypass events, and loss of containment isolation. Scrubbed releases are not considered to contribute to LERF, since fission product removal by deep water pools is sufficient to virtually eliminate the potential for early health effects.

Releases through the IFTS bottom gate valve will be scrubbed by at least one water pool before entering the environment. Scrubbing would occur within the suppression pool inside containment prior to the fission products reaching the upper containment in those sequences or portions of sequences in which the fission products pass through the suppression pool. This includes the in-vessel phase of transient events, during which the fission products are released directly into the suppression pool via the safety relief valves, and the late (ex-vessel) phase of a severe accident, during which the fission products pass from the drywell to the wetwell via the suppression pool. However, the existence of a drywell-to-wetwell bypass flow area, even within the limits permitted by TSs, could result in a substantial portion of the fission products bypassing the suppression pool during the in-vessel phase of LOCAs and the ex-vessel phase of all accidents. Thus, suppression pool scrubbing is not assured for all phases of all accidents.

Regardless of suppression pool scrubbing or bypass inside containment, all releases passing through the IFTS bottom valve will then be scrubbed by approximately 20 feet of overlying water in the spent fuel storage pool. Accordingly, while the above quantitative estimates provide a bounding assessment for comparison to regulatory guidance, these releases would not be considered large releases based on the guidance in Regulatory Guide 1.174 and supporting documents, such as NUREG/CR-6595, "An Approach for Estimating the Frequencies of Various Containment Failure Modes and Bypass Events," (August 1998).

4.2.1.2 Leakage of the Bottom Valve

The IFTS bottom valve is not specifically included in the leak rate test program, but is within the planned local leak rate test boundary for the drain valve (F42-MOV-F003). The licensee has committed to perform this leak test as a one-time action prior to removal of the blind flange in Modes 1, 2, or 3, and thereafter at a frequency established by the Primary Containment Leakage Rate Test Program. In its November 29, 2000, response to the NRC's RAI on bottom valve leakage, the licensee stated that gross leakage past the bottom valve need not be postulated since any bottom valve leakage would be bounded by the results of the leak test and would be corrected if the leak rate criteria could not be met. The NRC staff notes that the leak test will be performed at a test pressure of 8 psig to represent the post-accident containment atmosphere pressure for a LBLOCA (7.6 psig). This test pressure is less than the hydrostatic pressure of the water in the spent fuel storage pool at the IFTS bottom valve outlet (9 psig). At the test pressure, the water level within the IFTS tube would be reduced as a result of leakage through the bottom valve, but would not drop sufficiently to clear the seal. Thus, during the test, an equilibrium water level will be established within the IFTS tube and leakage through the bottom valve may not be detected.

Although the leak test pressure is insufficient to reveal leakage of the bottom valve, the pressure to which the valve is exposed during IFTS operations with the blind flange removed would be sufficient to identify moderate leakage through the valve. After the blind flange is removed and the flap valve is opened, there will be about 35 psig of hydrostatic pressure on the containment side of the bottom valve due to the head of water in the containment building fuel transfer pool (the top surface of the pool is approximately 80 feet above the bottom valve). Because the bottom valve is submerged approximately 21.5 feet in the fuel building spent fuel storage pool, there is a hydrostatic pressure of about 9 psig at the bottom valve outlet in the reverse direction. The net differential pressure across the bottom valve after blind flange removal and opening of the flap and fill valves would be about 26 psid. Under these conditions, leakage through the bottom valve would result in a gradual transfer of water from the containment building fuel transfer pool to the fuel building spent fuel storage pool, and a corresponding increase in the fuel building spent fuel storage pool level. The increase in spent fuel storage pool level would be detected by safety-related pool level indications and alarms in the control room. Operator response would involve closing the flap valve, and as necessary, the manual gate valve located between the sheave box and the blind flange. The NRC staff concludes that although the leak test is inadequate for purposes of assessing leakage through the valve, excessive leakage of the IFTS bottom gate valve would be readily identified and isolated after the IFTS tube is flooded.

Excessive valve leakage can also be identified during IFTS operation. For example, during an IFTS raise sequence (after the IFTS tube is filled but prior to opening the flap valve) conducted as part of an operability test in Refueling Outage 8, operators noted that the “tube full” indication extinguished after a short time, indicating the level in the transfer tube had dropped due to leakage. (The associated level sensors are located in the four-inch vent line approximately two feet below the surface of the upper pool, and would be uncovered by a water displacement of approximately 1.5 gallons.) The IFTS bottom valve was determined to be leaking at about 1.5 gpm, and was repaired.

Should the potential for excessive leakage of the bottom valve go undetected and an accident occurs under these conditions, atmospheric leakage could occur from the upper containment airspace, through the sheave box vent line, and out the IFTS bottom valve. If containment pressure exceeds 9 psig, flow rates would be limited by the size and length of the sheave box vent line (four-inch diameter, 20 feet long), and fission products would be scrubbed by the overlying water in the spent fuel storage pool. Also, with the bottom valve closed and flow limited to leakage, the hydrodynamic loads on the IFTS tube and fuel storage pool are not anticipated to challenge the integrity of these structures, and flow through the IFTS bottom valve will be scrubbed by approximately 20 feet of overlying water in the spent fuel storage pool. Accordingly, these releases would not be considered large releases based on the guidance in Regulatory Guide 1.174 and supporting regulatory documents, such as NUREG/CR-6595. Additional fission product scrubbing by the water in the suppression pool may also occur prior to the fission products reaching the upper containment since releases from the reactor generally pass into or through the suppression pool before reaching the upper containment.

4.2.1.3 IFTS Water Seal Clearing

The IFTS water seal provides an additional barrier to the release of fission products through the IFTS bottom valve. A new NOTE 4 to TS SR 3.6.1.3.3 will specify that the spent fuel storage pool level will be maintained at an elevation greater than 23 feet above the top of fuel at all times when the blind flange is removed during Modes 1, 2, or 3. This elevation provides 21.5 feet of submergence of the IFTS bottom valve outlet, and results in a hydrostatic pressure of about 9 psig at the IFTS bottom valve outlet. Maintaining the pool at this level will prevent leakage of containment atmosphere into the spent fuel storage pool (via the bottom valve) provided containment pressure is less than 9 psig.

Administrative controls will ensure that the gate is open between the spent fuel storage pool and the region of the lower pool where the IFTS tube terminates. This will ensure that the safety-related level instruments in the spent fuel storage pool, which alarm at approximately 26 feet 9 inches, reflect the water level in the IFTS transfer pool. Administrative controls will also ensure the gate is open between the spent fuel storage pool and the spent fuel cask pool.

Although the water seal would be maintained for containment pressures up to 9 psig (even without the IFTS bottom valve), a fraction of the core damage events would be expected to result in higher containment pressures. For example, sequences involving station blackout or loss of containment heat removal are typically among the dominant contributors to CDF at BWR plants, and result in containment pressures above 9 psig within the first few hours of the event. Based on a review of the CDF contributors for several BWR Mark III plants, the NRC staff estimates that a substantial fraction of sequences, accounting for perhaps one-third of the CDF, would not lead to containment failure or bypass, but could result in containment pressures sufficient to clear the water seal. However, even if seal clearing occurs, fission products would be scrubbed by the overlying water in the spent fuel storage pool. Additional fission product scrubbing by the water in the suppression pool may also occur prior to the fission products reaching the upper containment since releases from the reactor generally pass into or through the suppression pool. Thus, these releases would not be considered large releases based on the guidance in Regulatory Guide 1.174 and supporting regulatory documents, such as NUREG/CR-6595.

The NRC staff concludes the following regarding releases via the IFTS bottom gate valve:

– Catastrophic failure or inadvertent operation of bottom gate valve is not expected due to the high pressure capacity of the valve relative to the anticipated accident loads, and the administrative controls proposed by the licensee for maintaining the valve closed. Even if such releases are conservatively assumed to comprise a large early release, the estimated increase in LERF is well below the guideline values provided in Regulatory Guides 1.174 and 1.177.

– Excessive leakage is not expected as it would be readily detected and isolated as a result of significant differential pressures across the bottom valve when the flap valve and fill valves are opened. If excessive leakage through the bottom valve does occur and containment pressure is sufficient to clear the water seal, fission products would be scrubbed by the overlying water in the spent fuel storage pool. Thus, these releases would not be considered large releases. Additional fission product scrubbing by the water in the suppression pool may also occur prior to the fission products reaching the upper containment since releases from the reactor generally pass into or through the suppression pool.

4.2.2 Releases via the Drain Valve

Containment isolation for the IFTS transfer tube drain line is provided by two non-safety-related MOVs in the drain line. These valves would be permitted to be opened in Modes 1, 2, and 3 while the IFTS is being utilized. The normal method of isolating the drain line is for the MOVs to be electrically closed by the IFTS operator from the IFTS panel located near the spent fuel pool. While the reliance on manual actions and non-safety-related power would tend to increase the likelihood of containment isolation failure, the level of risk increase is minimized by a 60-day limit on the period during which the blind flange is permitted to be open, together with the following administrative controls regarding the isolation valves:

– The IFTS transfer tube drain line isolation valves may only be opened under administrative controls (described below) when the IFTS is being operated. When the IFTS is not operating, for example on weekends and night shifts when work is not being performed, the system will be isolated by closure of both drain line isolation valves.

– A dedicated operator will be stationed in a low dose area in the vicinity of the IFTS drain line isolation valves whenever the drain valves are opened with the blind flange removed during Modes 1, 2, or 3. The dedicated operator is to manually close an IFTS drain line isolation valve if they fail to close properly. The operator will be in continuous communication with the control room, and available to manually close an isolation valve either at the direction of the control room or upon a LOOP. The operator will be equipped with a flashlight and will be fully trained to perform this action.

– The first IFTS transfer tube drain line isolation valve (F42-MOV-F003) will be maintained in accordance with the Primary Containment Leakage Rate Testing Program (TS 5.5.13) to help ensure its reliability and leak tight integrity.

Failure modes of interest for releases via the IFTS drain line are: over-pressure failure of the drain line/isolation valves, excessive leakage of the isolation valves, and inadvertent operation or failure to manually close the isolation valves. These release modes are relevant when the IFTS upper gate valve is open and the IFTS tube communicates with the containment. In the event of drain line isolation failure, releases will be via the four-inch IFTS drain line into the IFTS drain tank and then into the adjacent area of the fuel building. With the flap valve closed, as required by system interlocks when the drain line isolation is open, the releases would occur early in the accident, coincident with containment pressurization. The size of the flow path (four-inch diameter sheave box vent line and four-inch diameter drain line) would reduce the magnitude of the release, but is not sufficiently restrictive to completely eliminate the potential for early health effects. The fission products would not pass through (and be scrubbed by) the water in the spent fuel storage pool. The releases might be scrubbed by the suppression pool prior to reaching the upper containment, however, the drywell-to-wetwell leakage allowed by TS is large enough that fission products released during the late stages of an accident (at low steaming rates) may bypass the suppression pool. The net result is that releases via the IFTS drain line may contribute marginally to LERF. However, as discussed in Section 4.2.2.3, the estimated increase in LERF is below the guidelines provided in Regulatory Guides 1.174 and 1.177.

4.2.2.1 Over-pressure Failure of the Drain Line/Isolation Valves

The IFTS drain line is not safety-related. The piping is designed in accordance with the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, and installed in conformance with ASME B31.1. In order to ensure pressure integrity following removal of the blind flange, the licensee has qualified the piping and associated supports for increased pressure and temperature, and the effects of seismic and hydrodynamic loading. Structural modifications, including additional pipe supports, will be required as a result of the increase in load resulting from use of the IFTS in Modes 1, 2, and 3, and will be incorporated in the field prior to removal of the blind flange.

The IFTS drain line is isolated by a first valve (F42-MOV-F003) that is part of the IFTS, and a second isolation valve (F42-SFT-MOV101). Both valves are four-inch, non-safety-related MOVs equipped with hand wheels. The licensee indicates that, at a temperature of 185 °F, the drain line isolation valves have a rated pressure of 150 psig. This pressure capability is substantially greater than the pressure to which the valve will be exposed in a DBA, and at the containment ultimate pressure capacity.

Based on the structural modifications to address the increased pressure loading, and the substantial pressure capacity of the valves relative to the expected accident pressures, the NRC staff considers the probability of over-pressure failure of the drain line and associated isolation valves to be negligible.

4.2.2.2 Excessive Leakage of the Isolation Valves

The first IFTS drain line isolation valve is specifically included in the Primary Containment Leak Rate Testing Program. This will ensure that leakage past this valve will be maintained consistent with the leakage rate assumptions of the RBS radiological analysis. The licensee has committed to perform this leak test as a one-time action prior to removal of the blind flange in Modes 1, 2, or 3, and thereafter at a frequency established by the Primary Containment Leakage Rate Test Program. The second drain line isolation valve is not included in the leak rate test program. The concern identified previously regarding the adequacy of the leak test for detecting leakage through the IFTS bottom valve does not apply to the drain line isolation valve, since there is no hydrostatic back-pressure at the drain line valve outlet, and the test pressure is sufficient to detect pre-existing leakage.

The potential for excessive leakage though the IFTS drain line is considered very unlikely since: (1) the first valve will be leak tested prior to removal of the blind flange, (2) both of the drain line isolation valves can be closed remotely by the IFTS operator at the IFTS control panel, or if necessary (e.g., in a LOOP event), closed locally by the dedicated equipment operator, and (3) either valve is capable of withstanding full accident pressures. In the event of excessive leakage through the drain line, the manual gate valve located between the sheave box and the blind flange can also be closed, if necessary. The NRC staff concludes that the potential for excessive leakage through the IFTS drain line is insignificant in terms of its potential contribution to risk.

4.2.2.3 Inadvertent Operation or Failure to Manually Close Isolation Valve

The IFTS control system contains an interlock that prevents the first drain line isolation valve from opening when the flap valve is open. The licensee has also committed, in LAR 1999-30 and its supplemental letter dated April 6, 2001, to maintain the second drain line isolation valve closed when the IFTS is not operating, and to station a dedicated operator in the vicinity of the IFTS drain line isolation valves whenever the drain valves are opened with the blind flange removed during Modes 1, 2, or 3. Spurious or inadvertent operation of the valves, or failure to close an isolation valve that may be open during an IFTS evolution, could defeat the isolation provisions and result in releases to the environment as discussed below.

With the flap valve open, the first drain line isolation valve would be closed and interlocked, and the second valve would be closed by administrative controls. Spurious operation of both valves would be required to establish a release path to the environment. Given the large inventory of the upper containment pool and the four-inch diameter of the drain line, considerable time would elapse before pool depletion and the onset of atmospheric releases from the upper containment airspace. In this time period, flow of water into the drain tank area could be detected by the IFTS operator, locally-stationed operator, control room operator, or other personnel in the drain tank area. Based on a failure rate of 1E-7 per hour for each valve, the likelihood of spurious operation of both valves would be on the order of 2E-9 for the 20-day period that the blind flange is removed and the upper gate valve is open ($[1\text{E-}7 \text{ per hour} \times 480 \text{ hours}]^2$). This does not consider the additional failure of the interlock that would be required. If releases via the drain line were unmitigated and assumed to contribute to LERF, the ICLERP likelihood of this failure mode for an exposure of 20 days within an 18-month fuel cycle would be well below 1E-9 and the ICLERP value of 5E-8 provided in Regulatory Guide

1.177 for confirming that a proposed permanent TS change has only a small quantitative impact on plant risk.

Inadvertent or deliberate opening of both valves, with a failure to close at least one valve, introduces an additional release mode. The IFTS interlock would prevent operation of the first drain line isolation valve unless the flap valve is closed; thus, these events would occur with the flap valve closed. An unisolated IFTS drain line, in conjunction with an accident, would result in a release from the upper containment airspace, through the four-inch diameter sheave box vent line, and into the IFTS drain line and drain tank. Administrative controls to maintain both the first and second isolation valves closed when the IFTS is not being used minimizes the potential for releases through this path when the IFTS is unattended. The requirement to station a dedicated operator in a low dose area in the vicinity of the IFTS drain line isolation valves whenever the IFTS is being operated (with the blind flange removed during Modes 1, 2, or 3), reduces the likelihood that valves that may be open during an IFTS evolution are not closed in a timely manner following an accident.

The likelihood of mis-positioning both drain line isolation valves open when the blind flange is removed, or failing to close at least one of the valves in response to an accident that occurs during IFTS operation, is considered very small due to system interlocks, and related licensee commitments and administrative controls. The failure probability reflects the likelihood that the dedicated operator does not close at least one valve during a core damage accident with LOOP, plus the likelihood that neither the IFTS operator nor the dedicated operator close at least one valve during a core damage accident with offsite power available. The failure probability can be conservatively estimated by crediting only the dedicated equipment operator. The failure rate for operator action would be on the order of 0.001 to 0.01 per demand. The lower value is justified in this application on the basis of a number of licensee commitments or analyses that would improve the likelihood of successful operator action. These include:

– Stationing a dedicated operator in the vicinity of the IFTS drain line isolation valve whenever the drain lines are opened with the blind flange removed during Modes 1, 2, or 3. The operator will be in continuous communication with the control room, and available to manually close an isolation valve either at the direction of the control room or upon a LOOP. The operator will be equipped with portable lighting and will be properly trained to perform this action. [LAR 1999-30]

– Providing training related to manual operation of MOVs and use of their position indications to all dedicated operators. This training will include hands-on instruction using a MOV of similar design in a training facility mock-up and a walk-down of the actual IFTS drain line MOV in the Fuel Building. [Supplemental letter dated April 6, 2001]

– Notifying the dedicated operator prior to each operation of the IFTS drain valve. [Supplemental letter dated April 6, 2001]

– Installing additional emergency lighting in order to provide adequate illumination of the IFTS drain valve platform in the event that any loss of normal power occurs. [Supplemental letter dated November 29, 2000]

– An analysis that demonstrates the doses received by the dedicated operator during the time required to manually close the drain line isolation would be within the GDC 19 acceptance criterion of 5 rem. [LAR 1999-30].

The increase in LERF (during the time period that the drain line isolation valves are open) can be estimated as:

ΔLERF = 1E-5 per year x 0.001 failures/demand x 1 demand/event = 1E-8 per year

This is below the guideline value of 1E-7 per year provided in Regulatory Guide 1.174 for assuring that the increase in risk associated with a license amendment request is small and consistent with the intent of the Commission's Safety Goal Policy Statement. The ICLERP for an exposure of 9 days within an 18 month fuel cycle would be:

ICLERP = 1E-5 per year x 0.001 x 9/548 year = 2E-10.

This is below the ICLERP guideline value of 5E-8 provided in Regulatory Guide 1.177 for confirming that a proposed permanent TS change has only a small quantitative impact on plant risk.

The NRC staff concludes the following regarding releases via the IFTS drain line isolation valves:

– Catastrophic failure or excessive leakage of the drain line isolation valves is not expected due to the high pressure capacity of the valves relative to the anticipated accident loads, and the administrative controls proposed by the licensee for leak testing the first valve and maintaining both valves closed when the IFTS is not in use.

– Failure to close the drain line isolation valves is also very unlikely due to the administrative controls proposed by the licensee for stationing a dedicated operator near the isolation valves whenever the IFTS is in use, and maintaining both valves closed when the IFTS is not in use. Even if such releases are assumed to comprise a large early release, the estimated increase in LERF is below the guideline values provided in Regulatory Guides 1.174 and 1.177.

4.3 Containment Ultimate Pressure Capacity

Removal of the blind flange introduces the possibility of a structural failure of the IFTS tube or connected piping at a beyond-design-basis pressure or seismic loading lower than if the blind flange were installed. Accordingly, the licensee assessed the pressure capacity of the IFTS transfer tube and connected piping, and its impact on the ultimate pressure capacity of the containment and LERF.

The licensee did not perform a fragility analysis to determine the failure pressure of the IFTS transfer tube, but performed an evaluation that showed the IFTS components could withstand a containment pressure of 40 psig with considerable margin to the code allowable stresses. On this basis, they characterized the IFTS as having a 5% probability of failure at 50 psig and a median failure pressure of 62 psig. These failure pressures are slightly lower than the corresponding failure pressures with the blind flange installed (a 5% failure probability of 50 psig versus 58 psig, and a median failure pressure of 62 psig versus 88 psig, with the blind flange removed and the blind flange installed, respectively). As described in the licensee's supplemental letter dated April 6, 2001, other containment structures such as the equipment hatch are expected to leak at lower pressures, but the associated leak areas for those structures are much less than for the IFTS tube. As characterized in the licensee's analysis, the IFTS tube would be the first major component to fail. The next highest failure mode involves failure of the containment dome at a median failure pressure of 107 psig.

The licensee estimated the impact of the reduction in containment pressure capacity on LERF. In their RAI response dated November 29, 2000, the licensee indicated the increase in LERF to be about 6E-9 per year based on Revision 2D of the RBS PRA. Subsequent to the RAI response, the licensee issued Revision 3 to the RBS Level 1 PRA. This revision included changes to the LOOP and station blackout events that also affect the Level 2 analysis. Although the Level 2 analysis has not been changed, the licensee performed a qualitative evaluation of the impact of the Level 1 changes on the previously reported LERF results. The reevaluation indicates that the ΔLERF would be on the order of 2E-8 per year using the latest version of the PRA. These values were based on the blind flange being removed for the entire fuel cycle, and the actual ΔLERF would be about a factor of 30 lower, considering that, in accordance with LAR 1999-30, the blind flange is expected to be removed with the upper gate valve open for only about 20 days within this 18-month period. The increase in LERF is driven by intermediate level hydrogen burns large enough to cause failure of the IFTS tube, but small enough that they do not result in failure of major containment structures. Events involving gradual over-pressurization of containment do not contribute to this increase since these events are generally addressed by containment venting at a maximum containment venting pressure of 30 psig.

In the licensee's analysis, sequences were considered to contribute to LERF if core damage and an unscrubbed release occur within the first eight hours of the event, and the release path is a gross containment failure. Gross containment failures were considered to be those failures that are equal to or larger than one-square foot. Using this definition, the only IFTS-related releases that contribute to the licensee's ΔLERF estimate involve gross failure of the IFTS transfer tube when the flap valve is open. The following releases do not contribute to LERF:

- releases via the IFTS drain line, since the drain line is only four inches in diameter,
- releases via the IFTS bottom gate valve, since the release is scrubbed by the overlying water in the spent fuel storage pool, or
- releases via gross failure of the IFTS transfer tube when the flap valve is closed, since the vent path would be via the sheave box vent line, which is only four inches in diameter.

The NRC staff is in general agreement with the licensee's characterization of LERF contributors, with the exception of releases via the IFTS drain line and the exclusion of releases that may occur somewhat later than eight hours. As noted previously, the size of the flow path (four-inch diameter) would reduce the magnitude of the release, but is not sufficiently restrictive to completely eliminate the potential for early health effects, since the fission products might bypass the suppression pool and would not pass through (and be scrubbed by) the water in the spent fuel storage pool. The net result is that releases via the IFTS drain line may contribute to

LERF. The LERF estimates could also be higher if releases occurring somewhat later than eight hours are also included as LERF contributors. However, the impact on LERF if such releases were included is not expected to be significant.

As previously discussed, the NRC staff conservatively estimated the ΔLERF for drain line releases to be below the guideline value of 1E-7 per year provided in Regulatory Guide 1.174, and the ICLERP for an exposure of nine days within an 18-month fuel cycle to be below the ICLERP guideline value provided in Regulatory Guide 1.177. The actual ΔLERF would likely be somewhere between the licensee and NRC staff value. In either case, even if such releases are assumed to comprise a large early release, the estimated increase in large early release probability would be well below the guideline values provided in Regulatory Guides 1.174 and 1.177.

4.4 Seismic Risk

The licensee evaluated the IFTS components for the increase in pressures and temperatures associated with DBAs and beyond-DBAs. The evaluations considered a pressure of 55 psig and temperature of 285 °F to represent severe accidents and bound containment design parameters for DBAs. The licensee concluded that stresses will be maintained below code allowables under all anticipated loadings, including design basis seismic and hydrodynamic loads. In order to ensure pressure integrity under the increased load, structural modifications of the drain line, including additional pipe supports, will be necessary. The licensee has committed to incorporate these modifications prior to removal of the blind flange during power operation [LAR 1999-30].

The licensee also evaluated the effect of the IFTS blind flange removal on the results of the RBS Individual Plant Examination of External Events (IPEEE). EOI concluded that RBS was seismically rugged, that the seismic input was adequately considered for all components in the safe shutdown paths, and that no vulnerabilities to seismic events were identified. In support of the subject license amendment, the licensee assessed the impact of the blind flange removal on the conclusions of the IPEEE. This included consideration of the seismic adequacy, anchorage, and spatial interactions of the IFTS tube and connected piping and valves. The licensee concluded that the IPEEE findings remain valid.

The NRC staff notes that the seismic hazard for the RBS site is among the lowest in the eastern United States. As such, a reduced scope seismic evaluation was performed for purposes of the IPEEE. The reduced scope evaluation involved a detailed plant walk-down with capacity of equipment evaluated against the plant's design basis earthquake. Equipment with capacity below desired levels would be considered an outlier, and addressed by the licensee. No outliers were identified and no plant improvements were implemented. Thus, the IPEEE was effectively a sampling verification that the as-built condition conforms to the plant design basis. The NRC staff reviewed the RBS IPEEE and concluded that pertinent containment issues appear to have been considered within the scope of the seismic IPEEE. On the basis of the low seismicity of the RBS site, the implementation of the seismic upgrades to the IFTS drain line, and the further assessment of seismic aspects of the IFTS on the IPEEE findings, the NRC staff concludes that the removal of the blind flange would not have a substantial impact on the LERF from seismic events.

4.5 Risk Conclusions

The primary concerns in terms of risk involve the potential for blind flange removal and IFTS operation to adversely impact: (1) suppression pool makeup capability via loss of containment building fuel transfer pool inventory, (2) containment isolation reliability, and (3) containment ultimate pressure capacity. Removal of the blind flange could also affect the integrity of the containment in beyond-design-basis seismic events. Guidance on acceptable levels of increase in CDF and LERF is contained in Regulatory Guides 1.174 and 1.177, and provides a basis for confirming that the increases are small and consistent with the intent of the Commission's Safety Goal Policy Statement. The NRC staff used this guidance in assessing the risk impact of the proposed changes. NRC staff conclusions are summarized below.

Blind flange removal and operation of the IFTS during Modes 1, 2, or 3 will have no direct impact on CDF for RBS, since RBS does not have an "upper pool dump" as part of the design, and the water in the containment building fuel transfer pool does not have a role in any accident analysis.

Catastrophic failure or inadvertent operation of the IFTS bottom gate valve is not expected due to the high pressure capacity of the valve relative to the anticipated accident loads, and the administrative controls proposed by the licensee for maintaining the valve closed. Excessive leakage is not expected, as it would be readily detected and isolated as a result of significant differential pressures across the bottom valve when the flap valve and fill valves are opened during IFTS operation. In any event, flow through the IFTS bottom valve will be scrubbed by approximately 20 feet of overlying water in the spent fuel storage pool. Accordingly, these releases would not be considered "large releases" based on the guidance in Regulatory Guide 1.174 and supporting regulatory documents, such as NUREG/CR-6595.

Catastrophic failure or excessive leakage of the drain line isolation valves is not expected due to the high pressure capacity of the valves relative to the anticipated accident loads, and the administrative controls proposed by the licensee for leak testing the first valve and maintaining both valves closed when the IFTS is not in use. Failure to close the drain line isolation valves is also very unlikely due to the administrative controls proposed by the licensee for stationing a dedicated operator near the isolation valves whenever the IFTS is in use. Even if such releases are assumed to comprise a large early release, the estimated increase in LERF is below the guideline values provided in Regulatory Guides 1.174 and 177.

Removal of the blind flange introduces the possibility of a structural failure of the IFTS tube or connected piping at a beyond-design-basis pressure or seismic loading lower than if the blind flange were installed. The licensee estimated the impact of the reduction in containment pressure capacity on LERF to be well below the guideline values provided in Regulatory Guide 1.174. The NRC staff expects the LERF estimates would be somewhat higher if releases via the IFTS drain line and releases occurring somewhat later than eight hours are also included as LERF contributors. However, the increase in LERF is expected to remain well below the guideline values provided in Regulatory Guide 1.174.

Finally, on the basis of the low seismicity of the RBS site, the licensee's implementation of seismic upgrades to the IFTS drain line, and the licensee's assessment of seismic aspects of the IFTS on the IPEEE findings, the NRC staff concludes that the removal of the blind flange would not have a substantial impact on the LERF from seismic events.

5.0 RADIATION DOSE AND HUMAN FACTORS EVALUATION

5.1 Post-Accident Dose Analysis

The removal of the IFTS blind flange alters the containment boundary for the IFTS penetration and causes the potential for two additional leakage pathways allowing release of the post-accident containment atmosphere to the environment. The larger pathway is the IFTS transfer tube itself, and the other is a branch line used for draining the IFTS transfer tube during its operation. The drain line will be isolated if required via administrative controls on the first drain piping isolation valve to prevent any potential radioactivity release, if required. This drain piping isolation valve will be added to the Primary Containment Leakage Rate Testing Program to ensure that leakage past this valve will be maintained consistent with the accident analysis assumptions. The licensee has performed evaluations that have determined that, in the event of a postulated design basis LBLOCA, (1) the IFTS piping can withstand the projected peak containment pressure, and (2) the water seal created by the water depth in the lower IFTS transfer pool is more than sufficient to withstand the containment pressure due to the LBLOCA. Because of the water seal formed by the lower pool, the containment atmosphere is not able to escape through the IFTS transfer tube, through the lower pool water, into the fuel building atmosphere, and eventually into the outside environment. The lower pool water seal, along with administrative controls on the drain piping isolation valve, maintain containment integrity and no new radioactivity release pathways are expected in the event of a design basis LBLOCA with the IFTS blind flange removed.

The staff finds that, from the above information, specifically since no new release pathways are postulated for a LBLOCA with the IFTS blind flange removed, removal of the IFTS blind flange has no impact on the design basis LOCA dose analysis assumptions or results. The staff finds that the current USAR Chapter 15.6.5 LOCA dose analysis remains bounding for the proposed TS changes.

5.2 Dedicated Operator Dose

The licensee stated that the drain valve on the IFTS drain pipe would be open approximately 9 out of the 60 days needed to perform IFTS checkout testing during plant operation prior to the start of a refueling outage. As part of their LAR, the licensee has addressed the concern of a LOCA or other accident occurring during this period while the IFTS blind flange is removed during the drain-down of the IFTS tube. Since the IFTS transfer tube and drain pipe have the potential to be a release path for the containment atmosphere following a LOCA or other accident, the licensee has developed contingencies to isolate the IFTS transfer tube drain line when the IFTS is being tested during plant operations.

The preferred method of isolating the IFTS transfer tube drain line is to have the IFTS operator electrically close the MOV on the drain line from the IFTS panel located near the spent fuel pool. However, the licensee has also committed to stationing a dedicated operator in the vicinity of the IFTS drain line isolation valves during plant operation when these valves are open. This operator will be in constant communication with the control room and will be available to manually close one of the isolation valves on the drain line immediately (1) at the direction of the control room, or (2) upon a LOOP. This operator will be stationed near the IFTS transfer tube drain line and tank on the 70-foot level of the Fuel Building in a low dose waiting area where the normal operation background dose rate is generally $\leq$2 mR/hr.

Following a LOCA, the area in the vicinity of the IFTS transfer tube drain line and tank will be designated as a vital area since this area may require occupancy to permit an operator to aid in the mitigation of or recovery from an accident. NUREG-0737, "Clarification of TMI [Three Mile Island Nuclear Station] Action Plan Requirements," indicates that the design dose rate for personnel in a vital area should not exceed the dose limits set for personnel in the control room in 10 CFR Part 50, Appendix A, GDC 19, during the course of the accident.[2] In compliance with the guidelines of NUREG-0737, the licensee performed a detailed dose analysis to determine the total whole body dose that would be received by the dedicated operator while performing the task of manually closing one of the isolation valves on the IFTS drain line and then exiting the area.

The licensee performed walk-downs in the Fuel Building to determine the time required for the dedicated operator to access the IFTS transfer tube drain line, isolate the drain line by manually closing the isolation valve, and then exit the Fuel building via a route that would minimize the dose to the operator. On the basis of these walk-downs, the licensee determined that it would take the dedicated operator approximately one minute to close one of the isolation valves. For determining the overall dose to the operator, the licensee conservatively assumed it would take two minutes to isolate this valve. The licensee assumed it would take the operator an additional five minutes to leave the area after closing the isolation valve.

As part of this LAR, the licensee has requested to apply a timing-only selective application of the alternate source term (AST) under 10 CFR 50.67. Using the timing-only application of the AST, the licensee can assume that the gap release from the fuel is delayed by up to 121 seconds following a LOCA (as is documented in the NRC approved General Electric Report "Prediction of the Onset of Fission Gas Release from Fuel in Generic BWRs"). In calculating the dose to the dedicated operator, the licensee assumed that the dose to the operator would be negligible during the initial two minutes (the time it takes the operator to isolate the drain line) following a LOCA due to the low ambient radiation levels in the vicinity of the IFTS transfer tube drain line. For the remaining five minutes (the time it takes for the operator to exit the Fuel Building), the licensee used the TID-14844/Regulatory Guide 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," dose methodology to calculate the dose to the operator from shine from airborne isotopes inside containment, shine from isotopes within the suppression pool, and containment leakage which would potentially enter the Fuel Building following a LOCA. The resulting calculated total effective dose equivalent (TEDE) to the operator would be 3.76 person-rem for the seven minutes needed to isolate the IFTS transfer tube drain line and leave the Fuel Building following a LOCA. The licensee did not calculate the potential thyroid doses to the operator, since there would not be a significant amount of airborne iodide in the Fuel Building for the first few minutes of the accident.

This licensing action is considered a selective implementation of the AST. It is limited to the use of the 121-second delay in the onset of gap release due to fuel damage as it applies to the dose to a dedicated operator assigned to isolate the IFTS transfer tube drain line following the

[2] GDC 19 requires that adequate radiation protection be provided to permit access and occupancy of the control room under accident conditions such that the dose to personnel shall not be in excess of 5 rem whole body, or its equivalent to any part of the body for the duration of the accident.

occurrence of a LOCA while the IFTS blind flange is removed. This approval is limited to this specific implementation. Subsequent modifications to the IFTS transfer tube drain line or procedures related to its use that are based on this 121-second delay may be possible under the provisions of 10 CFR 50.59. However, use of other characteristics of an AST or the use of TEDE criteria for offsite and control room dose consequences, and changes to this approved 121-second delay assumption, requires prior staff approval under 10 CFR 50.67. Extension of the 121-second delay assumption to other aspects of the plant design or operation requires prior NRC review under 10 CFR 50.67.

On the basis of our review of this portion of the RBS license amendment, the staff finds the licensee's calculated operator dose of 3.76 person-rem TEDE to isolate the IFTS transfer tube drain line to be acceptable since it is based on conservative assumptions and is within the 5 person-rem whole body acceptance criteria contained in 10 CFR Part 50, Appendix A, GDC 19.

5.3 Human Factors

5.3.1 Scope of Human Factors Review

This review is limited to the use of a dedicated operator stationed in the vicinity of the IFTS drain line isolation valves who would be available to manually close an isolation valve immediately at the direction of the control room or upon a LOOP. The staff's guidance for this review includes Information Notice 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," which references Generic Letter 91-18, Revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," and American National Standards Institute (ANSI)/American Nuclear Society (ANS) publication ANSI/ANS-58.8, "Time Response Design Criteria for Safety Related Operator Actions," 1984. In addition, NUREG-0700, Revision 1 and the Illuminating Engineering Society of North America Lighting Handbook were consulted for emergency lighting levels.

5.3.2 Human Factors Evaluation

In LAR 1999-30, EOI stated that the preferred method of isolating the IFTS transfer tube drain line is for the MOV to be electrically closed by the IFTS operator from the IFTS panel located near the spent fuel pool. However, as a contingency, in the event of a LOCA or any other event, EOI has proposed to station a dedicated operator in a low dose area in the vicinity of the IFTS drain line valves whenever the blind flange is removed to be available to manually close an isolation valve immediately either at the direction of the control room or upon a LOOP. EOI further states that the time restraints of ANSI/ANS-58.8 are not considered applicable. In justifying this position, EOI has stated that the dedicated operator is already in position in the plant, is trained to close the valve, and is in continuous communication with the control room. Thus, no decision time, preparation time, nor travel time is involved. Furthermore, in two trial walk-throughs, the action was completed in an average of 46 seconds. EOI has stated that the earliest fuel damage would occur, following a design basis-LOCA, would be at least 121 seconds.

The staff reviewed the following issues related to the proposed operator action:

- Length of time an operator would have to stand watch - The staff's concern here is operator vigilance over a long period of time while doing essentially nothing. EOI has committed to rotate the operator(s) periodically and to establish an administrative procedure to contact the operator prior to opening the drain valve to ensure his/her vigilance. This is acceptable to the staff.

- Time available and time required to accomplish the manual valve closing - As stated above by the licensee, the dedicated operator requires no decision time, no preparation time, and no travel time to accomplish the task, and two trial walk-throughs have shown the task can be accomplished well within the time available. Based on these trials, the staff finds that the use of ANSI/ANS-58.8 is not applicable in this case, and finds the time available and required to be acceptable.

- Communications - EOI has stated that the operator will have a wireless communication set with belt pack and optional toggle or open handheld microphone. Also, as backup, an in-plant telephone is located a short distance away. This communication capability is acceptable to the staff.

- Environmental conditions - EOI has stated that the temperature in the area is between 70 °F and 80 °F, and there is low to moderate noise level, good lighting, and radiation dose rate < 2mR. The valve hand wheels are located approximately four feet above the valve platform level. The environmental conditions in the area and accessibility to the hand wheels are acceptable to the staff.

- Emergency lighting level - Since one postulated event is a LOOP, sufficient emergency lighting is a necessity. EOI has stated that emergency lighting in the area of the valve control is being upgraded and the emergency lighting level at the valve control will be between three and five foot-candles. Since the available lighting guidance indicates 10 foot-candles to be the minimum for emergency lighting, the staff suggested that EOI conduct a trial with three different operators in LOOP conditions. The trial was conducted with emergency lighting levels below three footcandles and the three operators accomplished the valve closing in an average of 65 seconds; approximately one half of the time available (121 seconds). The operator will also have a portable light or flashlight as a backup. The upgraded emergency lighting level with flashlight backup is acceptable to the staff.

- Operator training - The licensee has stated that the operator will be fully trained to perform the task. The specific task involves walking approximately 30 feet to the valve platform, climbing a three-rung ladder to the platform, depressing a lever, and rotating a 12-inch diameter hand wheel approximately six revolutions clockwise until it stops. The training will include hands-on instruction using an MOV of similar design in a training facility, instruction on use of position indicators and methods of verifying valve position, and a walk-down of the actual IFTS drain line MOV in the Fuel Building. In two simulated trials, operators have been able to accomplish the task in an average of 46 seconds with an available time of 121 seconds (See also emergency lighting level trials in previous issue). Ability of the operators to accomplish the task is acceptable to the staff.

Therefore, the NRC staff concludes that use of a dedicated operator, stationed in the vicinity of the IFTS drain line isolation valves, as backup in case of an emergency to manually close an isolation valve immediately at the direction of the control room or upon LOOP, is an acceptable contingency alternative for isolating the IFTS transfer tube drain line while the blind flange is removed when the plant is in Modes 1, 2, or 3. This conclusion is based on the conditions described in the licensee's submittals and its commitment to provide upgraded emergency lighting at the valve location, specialized training for designated operators, and an administrative procedure to alert the dedicated operator when a drain valve is to be opened. The proposed changes to the TSs are, therefore, acceptable.

6.0 DETERMINISTIC/PROBABILISTIC EVALUATION CONCLUSION

The deterministic evaluation of this LAR considered the provisions of the STS to unisolate containment penetrations intermittently under administrative controls, the limited-time that the blind flange would be removed during power operation, and other alternate means to isolate the IFTS tube. The PRA evaluated the impact of the proposed LAR on suppression pool makeup, containment isolation reliability, containment ultimate pressure capacity, and seismic risk. Also, an evaluation of the off-site post-accident radiation doses was performed; the radiation dose to the operator dedicated to closing a valve on the IFTS drain pipe was evaluated, and human factors associated with dedicated operator activities were reviewed. When considered collectively, the above evaluations show that the licensee's proposed actions will provide reasonable assurance that the risk of IFTS blind flange removal at power is low, therefore, the proposed TS change is acceptable.

7.0 COMMITMENTS

In reviewing LAR 1999-30, as supplemented by letters dated November 29, 2000, and April 6, May 7, and June 7, 2001, the NRC staff noted that the licensee made commitments regarding activities associated with the proposed use of the removal of the IFTS blind flange at power. The commitments that the NRC staff considers to be significant are as follows:

1. Structural modifications, as a result of the increase in load, including additional pipe supports as needed, will be incorporated in the field prior to removal of the blind flange during power operation. Calculations that coincide with the piping evaluations will be completed prior to implementation of the amendment (i.e., calculation AX-144B, Rev 1A and F42-D001, Rev 0A).

2. Implement administrative controls to maintain the gate open between the lower pool and the lower IFTS transfer pool, and between the lower pool and the cask pool, while the blind flange has been removed during power operations.

3. The bottom gate valve will be hydraulically locked in Modes 1, 2, and 3.

4. Implement administrative controls to maintain the gates open between the upper pool, the upper IFTS pool, and the upper cavity, while the blind flange has been removed during power operations.

5. Implement administrative controls such that, when draining a percentage of the upper pool (e.g., pre-outage), a nominal maximum of seven feet of water will be permitted to be drained.

6. Implement administrative controls to ensure that the IFTS transfer tube drain line can be isolated under any accident scenario. This involves stationing a dedicated operator in a low dose area in the vicinity of the IFTS drain line isolation valve whenever the drain valves are opened with the blind flange removed during power MODES 1, 2, or 3. This operator is to manually close the drain valve if it fails to close properly. This operator is in addition to the normal shift crew composition. The operator will be equipped with portable lighting, and will remain in continuous communication with the control room. The operator will be properly trained, and will be in addition to the normal shift crew composition required to be onsite.

7. The IFTS transfer tube drain isolation valve will be maintained in accordance with the Primary Containment Leakage Rate Testing Program (TS 5.5.13), which helps to ensure its reliability and leak tightness. Due to the test methodology, the portion of the large transfer tube outboard of the blind flange will also be part of the test boundary. This leak rate test on the IFTS tube will also check other potential (but unlikely) leak paths, such as past the liquid level sensors for the tube.

8. A leakage rate test of the IFTS drain isolation valve will be performed prior to the first removal of the IFTS blind flange in Modes 1, 2, or 3.

9. When the IFTS blind flange is removed during power operations, RBS will stage necessary equipment to facilitate the siphoning of water from the Spent Fuel Pool into the adjacent cask washdown area in the event that leakage through the IFTS system occurs and offsite power is not available.

10. RBS will track the time that the IFTS blind flange is removed during MODES 1, 2, and 3.

11. RBS will install additional emergency lighting prior to removing the IFTS blind flange in MODES 1, 2, and 3, in order to provide adequate illumination of the IFTS drain valve platform in the event that any loss of normal power occurs.

12. RBS will also maintain the second drain line MOV closed during the periods when the IFTS is not operating.

13. RBS will notify the designated operator prior to each operation of the IFTS drain valve. This requirement will be placed within the procedure for operating the IFTS in MODES 1, 2, and 3.

14. RBS will provide training related to the manual operation of MOVs and use of their position indications to all designated operators. This training will include hands-on instruction using an MOV of similar design in the training facility mock-up and a walk-down of the actual IFTS drain line MOV in the Fuel Building. The training will include instruction on the use of position indicators and methods of verifying valve position.

15. EOI will extend the commitment to maintain the second IFTS drain valve MOV closed to also include closing the IFTS manual gate valve, F42-VF002, during the same periods on weekends or night shifts when work is not being performed.

The NRC staff finds that reasonable controls for the implementation and for the subsequent evaluation of proposed changes to the above regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program. The above regulatory commitments do not warrant the creation of regulatory requirements. The NRC staff notes that pending industry and regulatory guidance pertaining to 10 CFR 50.71(e) may call for some information relative to the above commitments included in a future update of the RBS USAR.

8.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State Official was notified of the proposed issuance of the amendment. The State official had no comments.

9.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 4273, January 26, 2000). The amendment also relates to changes in recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

10.0 CONCLUSION

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

Principal Contributors: R. Eckenrode
C. Hinson
C. Li
R. Palla
M. Hart

Date: July 3, 2001

cc:

Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

Manager - Licensing
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Senior Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

President of West Feliciana
Police Jury
P. O. Box 1921
St. Francisville, LA 70775

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Ms. H. Anne Plettinger
3456 Villa Rose Drive
Baton Rouge, LA 70806

Mr. Ronald Wascom, Administrator
and State Liaison Officer
Department of Environmental Quality
P. O. Box 82135
Baton Rouge, LA 70884-2135

Wise, Carter, Child & Caraway
P. O. Box 651
Jackson, MS 39205

Executive Vice President and
Chief Operating Officer
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286

General Manager - Plant Operations
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Director - Nuclear Safety
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Vice President - Operations Support
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286-1995

Attorney General
State of Louisiana
P. O. Box 94095
Baton Rouge, LA 70804-9095