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May 7, 2001

U. S. Nuclear Regulatory Commission
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Subject: River Bend Station
Docket No. 50-458
License No. NPF-47
Supplement 2 to License Amendment Request (LAR) 1999-30, "IFTS Blind Flange"

References:

1) Letter from Entergy to USNRC, dated December 20, 1999, License Amendment Request (LAR) 1999-30, "IFTS Blind Flange"

2) Letter from Entergy to USNRC, dated November 29, 2000, "Response to Request for Additional Information on River Bend License Amendment Request to permit removal of the Inclined Fuel Transfer System Blind Flange"

3) Letter from Entergy to USNRC, dated April 6, 2001, Supplement to License Amendment Request (LAR) 1999-30, "IFTS Blind Flange"

File Nos.: G9.5, G9.42

RBEXEC-01-024
RBF1-01-0102
RBG-45732

Gentlemen:

This letter provides supplemental information regarding License Amendment Request (LAR) 1999-30. LAR 1999-30, as submitted by Reference 1, requested that the NRC approve and issue changes to Technical Specification 3.6.1.3, "Primary Containment Isolation Valve (PCIVs)" to permit the removal of the inclined fuel transfer system (IFTS) primary containment isolation blind flange while the primary containment is required to be OPERABLE. Attachment 1 provides additional information regarding issues and questions that have been discussed in several recent conference calls that have taken place between Entergy and the NRC.

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This letter contains one new commitment. Attachment 2 contains a commitment identification form with that commitment. If you have any additional questions, please contact Mr. Gregory P. Norris at (225) 336-6391.

Pursuant to 28 U.S.C.A. Section 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 7, 2001.

Very truly yours,

RKE / RJK / GPN
attachment (2)
cc:

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ATTACHMENT 1

TO

LETTER NO. RBF1-01-0102

LICENSE NO. NPF-47

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-458

Introduction

This letter provides supplemental information regarding License Amendment Request (LAR) 1999-30. Entergy submitted LAR 1999-30 on December 20, 1999. The request consisted of a change to Technical Specification 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," to permit the removal of the inclined fuel transfer system (IFTS) primary containment isolation blind flange while the primary containment is required to be OPERABLE. The intent of the amendment was to allow limited operation of the IFTS during power operations, and enable RBS to test and exercise the system prior to the start of a refueling outage.

Entergy responded to a Request for Additional Information (RAI) by letter dated November 29, 2000 (Reference 2). Since that time Entergy has engaged in several teleconferences with the staff discussing various issues regarding the LAR. As a result of these teleconferences, Entergy agreed to provide supplemental information to aid the staff in its review. The supplemental information is being provided in two parts. The first supplement was provided by letter dated April 6, 2001 (Reference 3). This letter provides additional information regarding:

- Recent changes in the Level 1 PSA model and the impact of those changes on risk information previously provided by Reference 2.
- A discussion of the River Bend classification of a large release.
- A discussion is provided relative to the impact of the IFTS blind flange removal on the IPEEE seismic review results.
- A comparison of the IFTS drain line isolation MOVs.
- A discussion of IFTS flap valve and fill valve positions during periods when the system is not being operated.
- A discussion of IFTS bottom gate valve operational leakage.
- Clarification of Entergy's commitment for Leak Rate Testing of the IFTS drain line isolation valve.

Affect of recent PSA model changes

In Reference 2, Entergy provided an evaluation to demonstrate that removal of the blind flange is not risk significant. Core damage frequency (CDF) and large early release frequency (LERF) were used as figures of merit. This evaluation was performed using Revision 2D of the River Bend Station Level 1 PSA. Entergy concluded from the evaluation that the change would have no negative affect on CDF and would only increase the instantaneous LERF frequency by 6.12E-9/yr. This is well within the 1.0E-7 criteria for LERF changes provided in Reg. Guide 1.174.

Subsequent to the RAI response, Entergy issued Rev. 3 of the RBS Level 1 PSA. This revision included changes to Loss of Offsite Power (LOSP) and Station Blackout (SBO) events that also affect the Level 2 analysis. Although the Level 2 analysis has not yet been revised, Entergy has performed a qualitative evaluation of the impact of the Level 1 PSA changes on the LERF results reported in Reference 2. Based on engineering judgement, the resultant revised LERF is approximately 2.36E-8/yr. This represents an increase in LERF by a factor of 6.9. As with the current Level 2 analysis, the change in LERF due to removal of the IFTS blind flange is expected to increase by 100%. A more detailed summary of the review and basis for the engineering judgement is contained below.

The current revision to the River Bend Level 2 analysis was completed in early 2000. The Level 2 was based on the latest Level 1 revision at that time which was revision 2D. Since the completion of the Level 2 revision, the Level 1 analysis has been revised. The revision to the Level 1 analysis increased the core damage frequency from 3.16 E-6 to 9.45 E-6. For Revision 3, the probability of non-recovery of offsite power was changed to include additional industry data accumulated since Revision 2D, which resulted an overall increase in probability of non-recovery of offsite power. A major contributor to the increase was an industry event in which it took 23 hours to recover from a loss of offsite power caused by a tornado at Davis Besse. Also, the modeling of recovery probabilities were revised to improve internal consistency. This included the adoption of a representative Weibull distribution for modeling the data. These were the changes that had the greatest impact to Revision 3 core damage frequency (CDF). As described below, the Level 2 Containment Event Trees (CETs) and Decomposition Event Trees (DETs) were reviewed and engineering judgement was used to determine the affect the revision to the Level 1 analysis will have on the Level 2 analysis results.

The Level 2 analysis was reviewed and it has been determined that the revision to the Level 1 analysis does not change insights provided by the current Level 2 analysis. This does not imply that the large early release frequency (LERF) or containment failure probabilities are unaffected. Given that the starting point for the Level 2 analysis is core damage, a change in core damage frequency (CDF) inherently changes Level 2 analysis results. With the current Level 2 analysis, only a hydrogen burn or a failure of the containment isolation system resulting in a leakage path of one square foot or larger contribute to LERF. This is unchanged by the Level 1 revision. The Level 1 revision does change the probability of a LOSP or SBO leading to core damage.

For LOSP events that are not SBO events, the operating diesel generator supplies the igniters. Since only one train of igniters is required to control hydrogen, an uncontrolled hydrogen burn is prevented. If the igniters fail due to mechanical failure or a human performance error, then hydrogen will build to a point that an uncontrolled burn is possible. A controlled hydrogen burn may lead to gross failure; however, the potential gross failure does not represent a LERF due to the slow containment pressurization. MAAP analyses have shown that a uncontrolled hydrogen burn that occurs before vessel failure is not likely to cause a large containment failure (~10% probability) due to the limited amount of hydrogen released in the containment. These events will not be further discussed in lieu of the discussion of the more dominant LERF contributors. (i.e. hydrogen burns at vessel failure). These uncontrolled hydrogen burns which lead to gross failures may contribute to LERF depending on the timing of the failure in relation to the initiating event or core damage. Containment failures that occur eight hours after the initiating event are not early in the RBS Level 2 analysis. MAAP analyses have demonstrated that the time between the onset of core damage and vessel failure is 5 hours. Therefore, since hydrogen burns that occur at or after vessel failure result in the majority of the large release, only core damage events that occur within 3 hours for a vessel failure are significant to LERF.

Per the Level 1 analysis, the CDF increased from 3.16 E-6 to 9.45 E-6, an increase of 300%. This increase was mainly due to the increase in non-recovery of offsite power. LOSP represented 32% of the core damage for the previous Level 1 analysis. This has increased to 79% for the current revision. This represents an increase of 750 %. However, the non-SBO LOSP events that result in core damage within 3 hours did not significantly change. The lack of change in the CDF due to early LOSP is due to the fact that the early portion of the power non-recovery curve was not significantly changed. Therefore, it has been concluded, using engineering judgement that the LERF frequency associated with a LOSP initiator (excluding SBOs) would not be significantly increased.

For SBO events, the hydrogen igniters are not available as long as offsite power is not recovered. If the power is recovered prior to vessel failure, the igniters will control hydrogen concentration. The containment will continue to pressurize; however, since the hydrogen is being slowly burned off, the containment pressurization is slow (i.e. not an early containment failure and therefore not a LERF). If the power is not recovered after vessel failure, the hydrogen concentration is expected to rapidly increase due to the vessel failure and core concrete interaction. The resultant hydrogen burn could lead to a gross failure of containment. The gross failure could be considered an early failure, depending on the timing of the vessel failure in relation to the initiating event or core damage. As with the LOSP events only SBO events that result in core damage within 3 hours contribute to the LERF for the same reason as the LOSP events.

In the current Level 2 analysis, there is an approximate 95% offsite power recovery probability before vessel failure. Therefore, only about 5% of SBO sequence can result in a LERF. Using the revised offsite power non-recovery curves decreases the probability of offsite power recovery before vessel failure to approximately 70%. Therefore, it is 6 times more likely that a SBO would result in a LERF. Additionally, most of this increase in LOSP events leading to core damage was a result of long term SBO events. These long-term SBO events result in core damage after 3 hours (i.e. do not increase LERF). The short-term SBO events only increased by 15%. Given that the short term SBOs increase by 15% and the probability of these short term SBOs could result in a LERF increased by 600%, the total increase in LERF due to an SBO is a factor of 6.9 (1.15*6.0 = 6.9).

The current Level 2 LERF frequency is 5.916E-09/yr, of that 3.00E-9/yr is due to SBO the other 2.916E-9/yr is due to other initiators. Given that is has been estimated that the SBO contributor to LERF is increased by a factor of 6.9 and all other contributors are unaffected, the revised LERF is estimated to be 2.36E-8/yr.

Based on engineering judgement and the reviews of the Level 2 CET and DETs it is concluded that the change in the Level 1 analysis would not result in any other significant changes to the Level 2 analysis than those listed above.

As with the current Level 2 analysis, the removal of the blind flange should approximately double the LERF frequency. This would increase the LERF to approximately 4.72E-8. This LERF frequency conservatively assumes that the blind flange is removed 24 hours a day and 365 days. Per License Amendment Requests (LAR) 1999-30, and LAR 2000-27, the IFTS blind flange will only be removed for 60 days during an 18 month operating cycle. This limited allowable removal time reduces the change in LERF due to the blind flange removal from 2.36E-8/yr to 2.58E-9. The change in LERF is still considered non-risk significant according to the methodology defined in ERPI document EPRI TR-105396, PSA Applications Guide. This change is also well within the 1.0E-7 criteria for LERF changes provided in Reg. Guide 1.174.

LERF definition

In Reference 2, Entergy stated that Level 2 analysis sequences are considered LERF sequences if core damage and an unscrubbed release occur within the first six hours and the release path is a gross containment failure. A gross containment failure was described as those failures that are equal to or larger than six inches in diameter. That description of what constitutes a gross failure is incorrect. As stated above, gross containment failures are those that are equal to or greater than one square foot.

Affect of the IFTS blind flange removal on IPEEE results

Entergy provided a response to Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities" by letter dated June 30, 1995. Regarding the IPEEE seismic analysis, Entergy 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. It is noted that RBS was characterized as a reduced scope plant based on low seismicity. Additional information concerning the analysis is contained in Reference 4 and 5.

For the containment structure and appurtenances, seismic ruggedness of the primary containment structure was defined in terms of the following:
a.) it is seismically adequate,
b.) it has adequate anchorage, and
c.) it is not subject to damaging system (spatial) interactions with non-seismic sub-components.

As discussed below, removal of the IFTS tube blind flange does not invalidate or negate any of these considerations and therefore, does not invalidate the conclusions of the IPEEE. A recent discussion of the proposed IFTS change on IPEEE conclusions with the principal author of the IPEEE report, Dr. John Reed, corroborated that removal of the blind flange would not invalidate IPEEE conclusions.

Seismic Adequacy:
The seismic adequacy of the IFTS tube and appurtenant piping/valves was demonstrated and documented in a plant engineering document. As discussed in Reference 1, this included reviews for structural integrity and pressure capability under applicable seismic/dynamic loading conditions.

Anchorage:
Containment anchorage is not affected by the removal of the blind flange.

Spatial Interaction:
The IPEEE walk down reviews focused on the presence of block walls and other large, non-seismic sub-components with potential to impact target equipment during seismic events. There are no such walls or other sub-components near the portions of the IFTS tube proposed for use. Also, the lower portion of the tube is protected from tornado missiles by its enclosure within the fuel building, and there is no large rotating equipment inside the fuel building in the vicinity to generate potentially damaging internal missiles.

IFTS drain line isolation MOVs

As discussed within Reference 3, Entergy performed three simulations to demonstrate that the existing emergency lighting in the Fuel Building 70 foot elevation was adequate for the designated operators to safely perform the action of closing the IFTS drain line isolation MOV. At the time of these simulations, the actuator for F42-MOVF003 was removed for rework of the valve. Therefore, Entergy recommended the use of the other IFTS drain line isolation MOV, SFT-MOV101, for performing this simulation. This was discussed with the NRR Project Manager before proceeding with the simulation.

The use of SFT-MOV101 in lieu of F42-MOVF003, for the simulation was determined to be acceptable by Entergy, in that, both valves are installed on a common four-inch drain line pipe and located in close proximity to each other on a valve platform in the Fuel Building 70 foot elevation. The operator action required to close either of these MOVs was judged to be similar. The differences in design and manufacturer of these two motor operated valves are discussed below.

F42-MOVF003 is a motor operated ball valve with a RAMCON Model 901CR4 rotary electric actuator provided by Hills-McCanna. During manual operation of this MOV it requires approximately 10.45 rotations of the hand-wheel to stroke the valve from full open to full closed, or 90 degrees. The actuator is configured with a clutch device and hand-wheel on the side. Remote position indication for the valve is provided by open and close limit switches that are actuated by a switch actuator arm connected to the rotating stem of the valve. During manual operation of the valve, position of the valve may be determined by observing stem rotation and the position of the limit switch actuator arm as it contacts either the open or close limit switch.

SFT-MOV101, which was used for the simulation, is a motor operated Velan gate valve with a Limitorque actuator. It is configured with a hand-wheel on the top of the actuator and requires approximately 16.5 rotations of the hand-wheel to stroke the valve from full open to full closed. The stem travel of this gate valve is 4 1/8 inches, from full open to full closed.

Manual operation of both valves is performed by engaging a de-clutch lever on the valve actuator and manually rotating the hand-wheel to either open or close the valve. As described above, the SFT-MOV101 valve, which was used for the simulation, required more turns of the hand-wheel to close.

IFTS flap valve and fill valve positions during periods when the system is not being operated

Following the April 6, 2001 supplement, Entergy was requested to consider extending the commitment to maintain the second IFTS drain line MOV closed to include the closing of the flap and fill valves as well.

The current procedure for IFTS operation requires the IFTS carriage to be positioned in the upper pool any time IFTS operation is interrupted for extended periods. This procedure also requires that the carriage be positioned in the upper pool during system shutdown. In this condition, with the IFTS carriage located in the upper pool, the carriage and its follower extend through the sheave box and flap valve and therefore, prevent closure of the flap valve.

As an alternative to closing the flap and fill valves, Entergy will extend the commitment to maintain the second IFTS drain line 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. This manual gate valve is located inside the containment and is below the IFTS carriage during storage in the upper pool. It will provide an additional barrier in the penetration, during the time periods stated above.

The IFTS manual gate valve, F42-VF002, is a stainless steel double-disk gate valve with a 24-inch hand-wheel. The design specifications for the gate valve, F42-VF002, indicate that it is qualified for 185°F, and that the hydrostatic shell test pressure is 113 PSIG.

Discussion of IFTS bottom gate valve operational leakage

Normally, an intermittent water make-up to the Spent Fuel Pool is required to maintain pool level due to system losses (e.g. evaporation, system losses). When the Spent Fuel Pool level is high or rising, Operations, during their routine monitoring, will make adjustments to the local fill rate and/or secure the make-up in order to maintain the pool level within its normal range. Pool level indicators and High/Low level alarms are provided in the Main Control Room. Alarm Response Procedures (ARPs) provide the operators with instructions to determine the cause of high/low level alarm and initiate appropriate corrective action. Among other probable causes, leaking valves or components are listed. The ARPs also direct the Operator to refer to Abnormal Operating Procedure, AOP-027 FUEL HANDLING MISHAPS, which addresses refueling cavity/upper containment pool level problems and lower fuel pool level problems as two of the potential mishaps having the potential to cause damage to nuclear fuel. The primary emphasis of AOP-027 is on minimizing both radiation exposure to plant personnel and offsite radioactive releases. In addition to instructions for placing fuel bundles or irradiated devices in safe locations, AOP-027 contains instructions for emergency water addition to pools, and directs the Operator to take appropriate actions to isolate and repair the leak.

During refueling operations, and when IFTS is configured for operation, there is increased awareness regarding changing pool levels. In general, this awareness is due to the increased work activities occurring around the pools. And, in addition to the Control Room indications monitored by Operations, personnel working near the pools can also observe the pool level using level marker bands on the Spent Fuel Pool and Refueling Cavity pool walls.

As the IFTS system is operated, water that is drained from the transfer tube is collected in the IFTS drain tank and then pumped back to the upper pools. Minor fluctuations in the containment (upper) pool level can be observed as this transfer occurs. Approximately 750 gallons per ITFS drain cycle is transferred. Any leakage through the IFTS bottom gate valve would be observed as a level increase in the Spent Fuel Pool and a corresponding lowering trend in the containment pools. It should be noted that due to differences in pool surface areas, the Spent Fuel Pool rises faster than the Containment pool will lower if leakage occurs. Because of this, any leakage though the IFTS bottom gate valve would become apparent in the lower Spent Fuel Pool first.

In the November 29, 2000, letter (Reference 2), Entergy provided information related to previous observations of IFTS bottom valve leakage, actions taken to correct the leakage and the management of pool inventory. It was stated in that letter, that during Refueling Outage 8, excessive leakage through the IFTS bottom gate valve was observed during the performance of the surveillance IFTS PRE-OP AND WEEKLY OPERABILITY TEST. The section of that surveillance which resulted in the observation of excessive leakage is an operability test of the IFTS blocking valve. The blocking valve, which is a part of the IFTS lower hydraulic control unit, is actuated by water pressure sensed at the bottom of the transfer tube and functions to isolate the hydraulic line connected to the IFTS bottom gate valve. A head of water corresponding to approximately 15 psig closes the blocking valve and prevents the IFTS bottom gate valve from opening. In short, the blocking valve test is performed by closing the IFTS bottom gate valve, drain line isolation, and then filling the IFTS transfer tube using the fill valve. The IFTS flap valve is maintained closed and the carriage is maintained in the fill/drain position just above the bottom valve. After the transfer tube is confirmed to be full by observing the TUBE FULL status light, the fill valve is closed. With both ends of the transfer tube isolated in this manner, an attempt to open the IFTS bottom gate valve is then made to confirm that the blocking valve is functioning. As discussed in the November 29, 2000, letter, the TUBE FULL indication was lost shortly after closing the fill valve. System Engineers measured the time from closure of the fill valve until loss of TUBE FULL indication to be approximately 90 seconds. The transfer tube level sensors are located in the 4-inch vent line approximately two feet below the surface of the upper pool. The volume of water displaced to uncover the sensors is approximately 1.5 gallons. The loss of TUBE FULL indication in this configuration provided evidence of excessive leakage through the bottom valve, since no change in the IFTS Drain tank level indication was observed. During this time period, the Control Room had also been monitoring the rising level in the Spent Fuel Pool and was investigating possible sources of input or leakage into the Spent Fuel Pool.

In conclusion, Entergy considers the current monitoring of the Inclined Fuel Transfer System and pools to be sufficient to identify and respond to any postulated leakage through the bottom gate valve.

Clarification of Entergy's commitment for Leak Rate Testing of the IFTS drain line isolation valve

In Reference 1, Entergy committed to maintain the IFTS transfer tube drain line isolation valve (F42-MOVF003) in accordance with the Primary Containment Leakage Rate Test Program (Technical Specification 5.5.13). In that submittal, Entergy also committed, as a one-time action, to perform a leakage rate test of the IFTS drain line isolation valve (F42-MOVF003) prior to removal of the IFTS blind flange before RF-09.

RF-09 was completed prior to an approval of License Amendment Request (LAR) 1999-30. Therefore, the commitment was changed in Entergy's January 24, 2001, submittal of License Amendment Request (LAR) 2000-27 (Reference 6) to state that "A leakage rate test of the IFTS drain isolation valve will be performed prior to the first removal of the blind flange in Modes 1, 2 or 3". This commitment was specified as a one-time action and was intended to apply to both LAR 1999-30 and LAR 2000-27.

Entergy plans to perform the leak rate test of the IFTS drain line isolation valve (F42-MOVF003), as a one-time action, prior to the first removal of the IFTS blind flange while in Mode 1,2 or 3. Thereafter, the test will be performed at a frequency established by the Primary Containment Leakage Rate Test Program as a continuing compliance commitment.

References

1. Letter from Entergy to USNRC, dated December 20, 1999, License Amendment Request (LAR) 1999-30, "IFTS Blind Flange"

2. Letter from Entergy to USNRC, dated November 29, 2000, "Response to Request for Additional Information on River Bend License Amendment Request to permit removal of the Inclined Fuel Transfer System Blind Flange"

3. Letter from Entergy to USNRC, dated April 6, 2001, Supplement to License Amendment Request (LAR) 1999-30, “IFTS Blind Flange”

4. SEA-95-001, R0, Individual Plant Examination of External Events, (IPEEE)

5. NE-RA-93-009-M, R0, Seismic IPE Review, River Bend Nuclear Station – Unit 1

6. Letter from Entergy to USNRC, dated January 24, 2001, License Amendment Request (LAR) 2000-27, “IFTS Operation in Modes 1,2 and 3”

ATTACHMENT 2

TO

LETTER NO. RBF1-01-0102

LICENSE NO. NPF-47

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-458

Commitment Identification Form

COMMITMENT	ONE-TIME ACTION*	CONTINUING COMPLIANCE *
Entergy will extend the commitment to maintain the second IFTS drain line 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. *(Extracted from Attachment 1 Page 6 of 9, under heading " IFTS flap valve and fill valve positions during periods when the system is not being operated")*		X

*Check one only