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October 29, 1999

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

Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
License Amendment Request (LAR) 99-24, "Revision To Post-Loss Of Coolant Accident
Dose Calculation"

File Nos.: G9.5, G9.42

RBEXEC-99-035
RBF1-99-0289
RBG-45154

Gentlemen:

In accordance with 10 CFR 50.59(c) and 10CFR50.90, Entergy Operations, Inc. (EOI) hereby applies for amendment of Facility Operating License No. NPF-47, for River Bend Station (RBS). This request consists of an unreviewed safety question (USQ) concerning the post-loss of coolant accident (LOCA) dose calculations.

The RBS calculation for radiological doses following a LOCA has been revised. The primary reason for the revision was to increase the positive pressure period (PPP) to account for a phenomenon which was not considered prior to NRC Information Notice (IN) 88-76. This effect had been previously analyzed, but RBS did not reflect the analysis at that time. The new revision (Revision 1) of the calculation also uses an updated and more conservative value for the suppression pool volume. Additionally, Revision 1 of the calculation adds an additional unfiltered liquid leakage term of 50 gpm for 30 minutes, consistent with Standard Review Plan (SRP) Section 15.6.5, Appendix B, to conservatively provide margin to account for any post-LOCA radiological liquid leakage outside areas subject to engineered safety feature (ESF) filtration, as described in NRC Information Notice (IN) 91-56. A change to Sections 6.2 and 15.6 of the USAR is required in order to reflect the new PPP and revised post-LOCA dose calculation. It has been determined that the proposed changes to the USAR involve an increase in consequences and thus constitute a USQ. The USQ is the result of an increase in the dose consequences following a LOCA; however, the increased doses remain within the guidelines of 10 CFR 100 and 10 CFR 50, Appendix A, Criterion 19. The USQ is being submitted to the NRC for review and approval.

The proposed change was reviewed against the criteria of 10 CFR 50.92, and was determined to not involve a significant hazards consideration. Attachment 1 provides a description of the proposed changes and the associated justification (including the determination of no significant hazards consideration). Attachment 2 contains marked-up pages reflecting the amendment being requested. Enclosure 1 is an

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affidavit supporting the facts set forth in this letter and the attachments. This request has been reviewed and approved by the RBS Facility Review Committee and the Safety Review Committee.

EOI has reviewed this request against the criteria of 10CFR51.22 for environmental considerations. As stated above, the proposed change does not involve a significant hazards consideration. Also, the type of effluent released from RBS is not changed, and the amount of effluent (post-LOCA, as described in Attachment 1) is considered to be not significant. Further, the amount of individual or cumulative occupational dose is not considered to increase significantly, since the doses themselves are not considered to increase significantly. Therefore, based on the foregoing, EOI concludes that the proposed change meets the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

If you have any questions regarding this request or require additional information, please contact Mr. Joseph W. Leavines at 225-381-4642.

Sincerely,



RKE/RJK/BFT

enclosure
attachments (2)

cc: U. S. Nuclear Regulatory Commission
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ENCLOSURE 1

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

LICENSE NO. NPF-47

DOCKET NO. 50-458

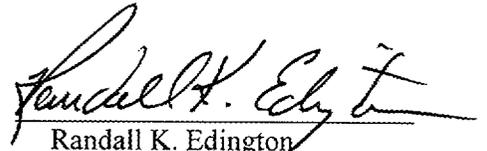
IN THE MATTER OF
ENTERGY GULF STATES, INC.

AND

ENTERGY OPERATIONS, INC.

AFFIRMATION

I, Randall K. Edington, state that I am Vice President - Operations of Entergy Operations, Inc. at River Bend Station; that on behalf of Entergy Operations, Inc., I am authorized by Entergy Operations, Inc., to sign and file with the Nuclear Regulatory Commission, this River Bend Station License Amendment Request (LAR) 99-24, "Revision To Post-Loss Of Coolant Accident Dose Calculation;" that I signed this letter as Vice President - Operations at River Bend Station of Entergy Operations, Inc.; and that the statements made and the matters set forth therein are true and correct to the best of my knowledge, information, and belief.


Randall K. Edington

STATE OF LOUISIANA
PARISH OF WEST FELICIANA

SUBSCRIBED AND SWORN TO before me, a Notary Public, commissioned in the Parish above named, this 29th day of October, 1999.

(SEAL)




Claudia F. Hurst
Notary Public

ATTACHMENT 1

ENTERGY OPERATIONS, INCORPORATED RIVER BEND STATION DOCKET 50-458/LICENSE NO. NPF-47

REVISION TO POST-LOSS OF COOLANT ACCIDENT DOSE CALCULATION

(LAR 1999-24)

LICENSING DOCUMENT INVOLVED

River Bend Station (RBS) Updated Safety Analysis Report (USAR), as required by 10CFR50.59:

- Section 6.2
- Section 15.6

BACKGROUND

The RBS calculation for radiological doses following a loss-of-coolant-accident (LOCA) (reference 1) has been revised. The primary reason for the revision was to increase the positive pressure period (PPP) to account for a phenomenon which was not considered prior to NRC Information Notice (IN) 88-76. The new revision (Revision 1) of the calculation also uses an updated and more conservative value for the suppression pool volume. Additionally, Revision 1 of the calculation conservatively adds an additional unfiltered liquid leakage term of 50 gpm for 30 minutes to conservatively provide margin to account for any post-LOCA radiological liquid leakage outside areas subject to engineered safety feature (ESF) filtration, as described in NRC Information Notice (IN) 91-56. A change to Sections 6.2.3 and 15.6.5 of the USAR is required in order to reflect the new PPP and revised LOCA calculation. It has been determined that the proposed changes to the USAR constitute an unreviewed safety question (USQ). The USQ is being submitted to the NRC for review and approval.

DESCRIPTION OF PROPOSED CHANGE

The changes to the USAR, required to incorporate the revised LOCA dose values, are the result of four distinct modifications to the calculation. These four modifications are described below:

1. **Revision of the Positive Pressure Period (PPP):** The primary reason for the revision of the USAR was to account for an increased PPP. The PPP is that time during which secondary containment pressure exceeds -0.25 " w.g. with respect to the atmosphere (**Note** that in the following discussion, "positive" pressure refers to pressures ≥ -0.25 " w.g. unless otherwise stated). During the PPP, no credit is taken for holdup and/or emergency filtration of secondary containment in accordance with the Standard Review Plan (SRP) Section 15.6.5, Appendix B.

NRC IN 88-76 identified a concern where inside/outside differential pressures could cause localized areas of secondary containment to become positive during normal operation. The PPP assumed in the previous DBA-LOCA dose calculation was 189 seconds (the annulus becomes "positive" beginning at 24 seconds and returns "negative" at 213 seconds following a LOCA). When potential temperature-induced effects are accounted for, the PPP increases to 195.5 seconds (from 20.5 seconds to 216 seconds following a LOCA). This effect had been analyzed previously and it was determined that post-LOCA doses remained within 10 CFR 100 limits. However, RBS

did not update the USAR at that time to reflect the analysis. Revision 1 of the post-LOCA radiological dose calculation conservatively assumes a PPP from 0 to 216 seconds following a LOCA. Section 6.2 of the USAR will be updated to incorporate the revised information regarding the PPP. (See USAR pages 6.2-67, 6.2-68, 15.6-9, 15.6-10, Table 15.6.5, "LOCA Parameters Tabulated for Postulated Accident Analysis," and Figure 6.2-61a, "Pressure in Shield Building Annulus vs. Time"). USAR Table 6.2-32, "Secondary Containment," is also revised to account for the modified temperature assumptions.

Minor clarifications and corrections to SAR discussions on this topic are also being implemented. Review of USAR Section 6.2 in support of the revised LOCA analysis revealed that some information concerning the PPP analyses for these buildings was not previously included. Specifically, the heat loads assumed for the Auxiliary Building were actually sequenced at 18 seconds. The USAR presently lists the long-term value (after 18 sec). The heat load from 0 to 18 seconds will be added to USAR Table 6.2-32, "Secondary Containment," to provide additional clarification. The revision to the PPP calculation also resulted in the modification of the auxiliary building free air volume assumption found in USAR Tables 6.2-32, "Secondary Containment," and 6.2-34, "Secondary Containment Operation Following a Design Basis Accident." Finally, an editorial change reflecting the standby gas treatment system exhaust fan full-flow time interval appears on USAR page 6.2-63 and in USAR Table 6.2-34, "Secondary Containment Operation Following a Design Basis Accident."

2. **Revision of the Suppression Pool Water Volume:** The RBS corrective action process documented that submerged objects were not sufficiently accounted for when the suppression pool water volume was originally calculated. Revision 1 to the calculation uses a conservative suppression pool water volume; the impact of this revised analysis assumption is minor. The suppression pool volume listed in USAR Table 15.6-5, "LOCA Parameters Tabulated for Postulated Accident Analysis," will be revised.
3. **Addition of IN-91-56 Liquid Leakage Term:** NRC IN 91-56 addressed in-service testing requirements for potential release paths which had not been previously considered and could potentially contribute to off-site doses. Specifically, the IN identifies a concern for unmonitored releases from the Safety Water Injection and Refueling Water Storage Tank (SIRWT) at a PWR (which is analogous to the Condensate Storage Tank [CST] for a BWR) during and following a postulated design basis accident. The IN addresses post-accident ECCS recirculation loop leakage pathways to the environment which: (1) were not considered in the licensee's current DBA-LOCA dose analysis, and (2) provides a post-accident leakage pathway for ESF leakage which may bypass ESF emergency filtration.

The primary concerns at RBS regarding IN 91-56 were the reactor core isolation cooling (RCIC) and high pressure core spray (HPCS) suction and test return lines from/to the CST. Also of concern was piping for the alternate decay heat removal (ADHR) system, installation of which was complete in 1997. The subject piping in these systems have two redundant containment isolation valves that any potentially unfiltered liquid would have to leak past. The design basis leakage rates for the RCIC and HPCS isolation valves were evaluated, and RBS concluded that even if the valves leaked at their design basis leakage rates, 10CFR100 limits would not be exceeded. Note that the design basis leakage rates are 100 ^{cc}/_{hr} for the HPCS test return line and 40 ^{cc}/_{hr} for the RCIC test return line.

Review of the RBS licensing basis determined that the leakage paths evaluated were beyond the current licensing basis of RBS. RBS decided to voluntarily add the leakage as an arbitrary conservatism to the off-site dose analysis to bound any beyond licensing and design basis leakage.

The IN 91-56 leakage term was based on guidance from SRP 15.6.5, Appendix B. This was a conservative action under the industry 50.59 guidelines of NEI 96-07. Specifically, Section III states:

“For a plant that does not provide an ESF filtration system, the dose assessment should include the leakage from a gross failure of a passive component. This leakage should conservatively be assumed to be 50 gallons per minute, starting at 24 hours after the accident and lasting for 30 minutes. For a plant that does provide an ESF filtration system in the areas of potential leakage from a gross failure of passive components, such a dose assessment need not be performed.”

River Bend Station has ESF emergency filtration through the Standby Gas Treatment System (SGTS) and the Fuel Building Ventilation System (HVF); therefore, this term is not required per the SRP. However, the SRP guidance was used to conservatively represent potential IN 91-56 liquid leakage. This change is reflected on USAR page 15.6-10. Note this term had been conservatively added to the post-LOCA dose calculation to conservatively preserve additional margin to the 300 Rem thyroid dose limit of 10CFR100, which, per the industry 50.59 guidance document NEI-96-07, was the acceptance limit for dose consequences. NRC has disagreed with NEI-96-07 and has established the position that increases in consequences are to be determined with respect to the dose values documented in the SAR. Under the NRC position, the conservative "IN 91-56" additional term is not pertinent and does not preserve additional margin to the acceptance limit, since the acceptance limit is determined with respect to the values documented in the SAR instead of the 10CFR100 limits. Although the addition of this term for unfiltered liquid leakage past containment isolation valves is not required, it was decided, based on NEI-96-07, to voluntarily add this conservatism to the off-site dose analysis to bound any beyond licensing and design basis leakage and to preserve additional margin against the 300 Rem thyroid limit of 10CFR100. Because this beyond licensing basis term is not required, and due to the changes to the 10CFR50.59 rule to be effective in 2000 (with associated changes to NEI-96-07), River Bend would anticipate that this term will be removed from the post-LOCA dose analysis in the future, either under 10 CFR 50.59 or in association with a related license amendment.

- 4. Enhancement of ESF Liquid Leakage:** ESF leakage is liquid leakage from ESF systems (through valve stems, pump seals, etc.) outside of primary containment. This leakage is modeled as a 1 gpm leak into the auxiliary building; therefore, it is treated by SGTS. In Revision 0 of the post-LOCA radiological dose calculation, the radioactivity which becomes airborne is assumed to be held up in the auxiliary building during the PPP, and then released through SGTS once the filtration system becomes fully operational. This was changed in Revision 1 of the calculation to be consistent with the other leakage terms. Specifically, during the PPP the activity is conservatively assumed to be released directly to the environment rather than held up until sufficient negative pressure is attained. This change is reflected on USAR page 15.6-10.

The aggregate of these modifications is reflected in a revision to USAR Table 15.6-6, "LOCA Activity Release to Environment (Curies)," and USAR Table 15.6-7, "LOCA Radiological Effects."

JUSTIFICATION FOR PROPOSED CHANGE

Off-site and control room doses must meet the dose limits of 10CFR100 and operator dose limits of 10CFR50, Appendix A, GDC19. NUREG-0989, RBS Safety Evaluation Report (SER), states that the two paths considered by the NRC were (1) the leakage of contaminated air from the primary containment atmosphere and (2) the leakage of water containing dissolved and suspended contamination from pipes and ESF equipment within the secondary containment. No other contributors were considered by the NRC in the initial licensing of the plant. In the Amendment 98 SER (reference 2), the NRC also considered additional unfiltered leakage through secondary containment bypass lines, corresponding to the removal of the penetration valve leakage control system (PVLCS). The Amendment 98 SER states:

“Based on the above evaluation and the calculated radiological consequences shown in Tables 1 and 3, the staff concludes that the proposed deletion of the PVLCS is acceptable. The staff further concludes that the existing distances to the exclusion area and to the low population zone boundaries of the River Bend Station, in conjunction with the engineered safety features provided in the River Bend Station, Unit 1, are still sufficient to provide reasonable assurance that the radiological consequences of a postulated LOCA will be within the dose guidelines set forth in 10 CFR Part 100 and the control room operator acceptance criteria specified in GDC-19 of Appendix A to 10 CFR Part 50.”

The Amendment 98 SER also states that

“the staff finds that the licensee’s calculational methods used for the offsite and control room operator radiological consequence assessment are also acceptable.”

Based on these two statements it is clear that (1) the NRC reviewed and approved of the methodology used in the PVLCS deletion submittal (which was the methodology used in reference 1 and its Addenda A), and (2) the NRC’s acceptance criteria for the removal of PVLCS were 10CFR100 and GDC 19, not the specific values calculated by either the NRC or RBS.

The revision to the post-LOCA dose calculation does not constitute a change to any ESF at RBS. The increase in PPP represents a phenomena not previously considered (prior to IN 88-76 evaluations) rather than a physical change to SGTS or the plant. Likewise, use of a lower suppression pool volume is indicative of slight nonconservatism from original design, and is not a physical change to the plant. The additional liquid leakage assumption is voluntary and does not represent an additional failure of an ESF such that other assumptions in the calculation would be invalidated. The change to the ESF liquid leakage modeling was conservative in nature and, thus, inherently leads to higher calculated doses than the previous modeling even though there was no change (either physical or procedural) to plant equipment. The Amendment 98 (PVLCS deletion) unfiltered leakage term is modeled consistent with what RBS previously submitted to the NRC, as well as what is presently described in the USAR.

The results of the revised analysis, as well as the results of the previous analysis and the regulatory limits, are presented in Table 1. Contributions to the results include the following:

- A *containment* contribution, the result of an evaluation of the releases from primary and secondary containment.
- An *Amendment 98* contribution, the result of an evaluation of the secondary containment bypass leakage.
- A *liquid* contribution, the result of an evaluation of the liquid leakage through ESF systems.
- An *IN 91-56* contribution, the additional liquid leakage term which was voluntarily added.

The increase in PPP affected the *containment* and *Amendment 98* contributions, but had a relatively minor impact on calculated doses. The addition of the IN 91-56 leakage term had an impact on calculated doses, especially for the low population zone (LPZ) thyroid calculated dose. However, inclusion of this term was a reasonable and prudent measure and does not represent any physical change to the plant. Even considering the increases, the revised calculations for dose are within the guidelines of 10 CFR 100 and 10 CFR 50, Appendix A, Criterion 19. Substantial dose margin is still available to the regulatory limits.

Table 1 - Comparison of Doses				
Dose (REM)	Previous Calculation	Revised Calculation	Regulatory Limit	
EAB = Exclusion Area Boundary	EAB Whole Body	4.61	4.63	25
	EAB Thyroid	32.8	37.8	300
LPZ = Low Population Zone	LPZ Whole Body	2.77	2.81	25
	LPZ Thyroid	50.4	115.1 *	300
CR = Control Room	CR Whole Body	0.42	0.42	5
	CR Skin	8.82	8.82	30
	CR Thyroid	5.57	6.33 **	30

* 51.1 without the voluntary addition of the "IN 91-56" unfiltered leakage term

** 5.91 without the voluntary addition of the "IN 91-56" unfiltered leakage term

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Entergy Operations, Inc. (EOI) proposes to change the River Bend Station (RBS) Updated Safety Analysis Report (USAR) to incorporate revisions to the post-Loss of Coolant Accident (LOCA) dose calculations. This proposed change to the USAR has been determined to represent an unreviewed safety question. In accordance with 10 CFR 50.59(c), EOI is submitting an application for amendment of the license, pursuant to 10 CFR 50.90, to request NRC review and approval of the proposed change.

The Commission has provided standards for determining whether an amendment involves no significant hazards consideration, which are stated in 10 CFR 50.92(c). A proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. EOI has evaluated the proposed license amendment in accordance with 10 CFR 50.91(a), and is providing its analysis of the issue of no significant hazards consideration using the three standards in 10 CFR 50.92(c).

1. The proposed changes do not significantly increase the probability or consequences of an accident previously evaluated.

The analysis changes described by this proposed change to the USAR are not initiators to events, and therefore do not involve the probability of an accident. These modifications reflect a revision to the post-LOCA dose calculation. USAR Section 15.6.5.1.1 states that "There are no realistic, identifiable events which would result in a pipe break inside of containment of the magnitude required to cause an accident LOCA... However, since such an accident provides an upper limit estimate to the resultant effects for this category of pipe breaks, it is evaluated without the causes being identified." The analysis itself does not identify an initiator, nor is it the initiator, of a LOCA. There was no physical change to the plant. The increase to the positive pressure period (PPP) was the result of inclusion of phenomena not previously included in the analysis documented in the SAR, and does not have any impact on accident probability. The inclusion of an NRC Information Notice (IN) 91-56 unfiltered liquid leakage term is voluntary and conservative in nature and does not represent an additional failure that could be construed as an initiator to the event. Therefore, this change does not increase the probability of occurrence of an accident evaluated previously in the safety analysis report (SAR).

This proposed change to the USAR does increase the consequences of an accident, but the increase is not significant. While the calculated off-site and control room doses of a LOCA did increase in Revision 1 to the post-LOCA dose calculation (reference 1), the dose consequences remain below the regulatory limits of 10 CFR 100 and 10 CFR 50, Appendix A, General Design Criteria (GDC) 19 as approved per NUREG-0989 and License Amendment 98. This change first accounts for the potential effect that differential temperature has on the PPP assumed in the off-site dose analysis. It also conservatively includes an additional liquid leakage term to account for concerns documented in NRC IN 91-56. Neither of these changes has an appreciable affect on vital area access doses. Vital area access dose calculations were not revised since they still conservatively reflect the expected doses discussed in USAR Section 12.3.2.4. There is no impact on equipment qualification associated with the proposed change since other gross conservatisms exist in those calculations (e.g., not crediting suppression pool scrubbing) compared to the post-LOCA dose calculations. Reanalysis of the off-site dose calculation demonstrates that the revised doses are increased only slightly and remain significantly less than the regulatory limits. With the IN 91-56 term excluded, the increases are within the criteria of less than 10% of the remaining margin, which is the criteria to be applied in the revised 10 CFR 50.59 rule for minimal increases in consequences. With the IN 91-56 term included, only the 30 day LPZ thyroid dose exceeds the "minimal increase" criterion. Note the doses documented in Table 1, above, are less than the values which had been documented in the SAR prior to the implementation and NRC approval of TS Amendment 98. Therefore, this change does not significantly increase the consequences of an accident previously evaluated in the SAR.

2. The proposed changes would not create the possibility of a new or different kind of accident from any previous analyzed.

This change does not represent a physical change to the plant. It does not involve initiators to any events in the SAR, nor does the activity create the possibility for any new accidents. Rather, this change is a result of the evaluation of the most limiting LOCA which can occur at River Bend. Therefore, this change involves no new system interactions and does not create the possibility of an accident of a different type than those presently evaluated in the SAR.

3. The proposed changes do not involve a significant reduction in a margin of safety.

The off-site dose consequences are calculated in accordance with regulatory guidance found in Regulatory Guide 1.3 and the SRP, consistent with the analyses submitted to and approved by the NRC in support of Technical Specification Amendment 98. It is conservatively assumed that 100% fuel failure occurs instantaneously upon a recirculation pipe break, thus 2 of the 3 fission product barriers are immediately eliminated. These assumptions are made without any causes for the failures being identified. Containment is assumed to leak at its maximum allowable leakage rate (0.26 % per day) for the duration of the event. Other leakage terms, such as engineered safety feature (ESF) leakage, are assumed to be equal to the Technical Specification limit. Since assumptions are made in accordance with Technical Specification allowable values and regulatory guidance, this change does not reduce the margin of safety as defined in the basis for any RBS Technical Specification.

The commission has provided guidance concerning the application of the standards of 10 CFR 50.92 by providing certain examples (51FR7751, March 6, 1986) of amendments that are not considered likely to involve a significant hazards consideration. This proposed amendment is very similar to example (vi):

(vi) A change which either may result in some increase to the probability or consequences of a previously-analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan: for example, a change resulting from the application of a small refinement of a previously used calculational model or design method.

As we have shown in the preceding discussion, this refinement to the post-LOCA dose calculation results in a small increase to the consequences of a previously analyzed accident, but the results of the change remain clearly within the guidelines of 10 CFR 100 and GDC 19, without reducing a margin of safety.

ENVIRONMENTAL IMPACT CONSIDERATION

EOI has reviewed this request against the criteria of 10CFR51.22 for environmental considerations. As discussed above, the proposed change does not involve a significant hazards consideration. Also, the type of effluent released from RBS is not changed, and the amount of effluent (post-LOCA, as described herein) is considered to be not significant. Further, the amount of individual or cumulative occupational dose is not considered to increase significantly, since the doses themselves are not considered to increase significantly. Therefore, based on the foregoing, EOI concludes that the proposed change meets the criteria given in 10CFR51.22 (c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

CONCLUSION

As discussed above, this proposed change to the RBS Operating License is safe, and has been determined to not involve a significant hazards consideration. Furthermore, the revised post-LOCA calculated doses remain within the guidelines of 10 CFR 100 and 10 CFR 50, Appendix A, Criterion 19.

REFERENCES

1. River Bend Station Calculation G13.18.9.5*051, "LOCA Doses for USAR Chapter 15"
2. NRC Safety Evaluation for River Bend Station License Amendment 98, dated August 26, 1997