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October 25, 1999

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

Subject: River Bend Station - Unit I  
Docket No. 50-458  
License No. NPF-47  
License Amendment Request (LAR) 99-22, "Request for a Revision to the  
Reactor Vessel Material Surveillance Program Capsule Withdrawal Schedule"

File Nos.: G9.5, G15.4.1

RBEXEC-99-034  
RBF1-99-0280  
RBG-45151

Gentlemen:

Entergy Operations, Inc. is requesting a revision to the River Bend Station (RBS) reactor vessel material surveillance program schedule as required by 10CFR50, Appendix H, Section IIIB.3. Administrative Letter (AL) 97-04 was issued on September 30, 1997. AL 97-04 was issued to "... inform licensees that changes to facilities' reactor vessel surveillance specimen capsule withdrawal schedules as specified in Appendix H to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR) that do not conform to the required ASTM standard referenced in Appendix H will be treated as license amendments requiring public notice and opportunity for a hearing."

This License Amendment Request proposes a change to Table 3.4.11-1, page TR 3.4-10 of the Technical Requirements Manual (TRM). Along with other information, this table provides the withdrawal schedule for Reactor Pressure Vessel Material Surveillance Program Capsules. This amendment request proposes a change to the withdrawal time of Table 3.4.11-1 for the first surveillance capsule withdrawal. The TRM is a licensee-controlled document.

Attachment 2 provides a description of the proposed change and associated justification (including a No Significant Hazards Consideration). A marked-up copy of the affected table of the RBS TRM is provided in Attachment 3. In addition, a letter from the Boiling Water Reactor Vessel and Internals Project (BWRVIP) to the BWRVIP Executive Committee is included as Enclosure 1. The letter reflects activities on this subject by the BWRVIP as well as the NRC.

POW ADOCK

A001

License Amendment Request (LAR) 99-22

October 25, 1999

RBEXEC-99-034

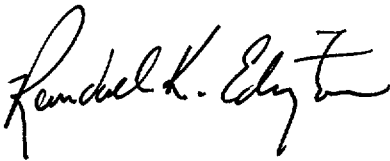
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This request has been reviewed and approved by the RBS Facility Review Committee and the Safety Review Committee.

RBS is requesting NRC review of this request as soon as practicable. Under the existing surveillance capsule specimen withdrawal schedule, RBS must withdraw the first specimen during the ninth refueling outage, scheduled to begin March 4, 2000. If you have any questions regarding this request or require additional information, please contact Mr. Bill Fountain at (225) 381-4625.



RKE/RJK/WJF/  
attachments  
enclosure

cc: U. S. Nuclear Regulatory Commission  
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NRC Senior Resident Inspector  
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Mr. Robert J. Fretz  
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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) 99-22, "Request for a Revision to the Reactor Vessel Material Surveillance Program Capsule Withdrawal Schedule"; 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 25<sup>th</sup> day of October, 1999.

(SEAL)



  
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Claudia F. Hurst  
Notary Public

**RIVER BEND STATION  
DOCKET 50-458/LICENSE NO. NPF-47  
LICENSE AMENDMENT REQUEST 99-22**

**LICENSING DOCUMENT INVOLVED**

This License Amendment Request proposes a change to Table 3.4.11-1, page TR 3.4-10 of the River Bend Station (RBS) Technical Requirements Manual (TRM). Along with other information, this table provides the withdrawal schedule for reactor pressure vessel material surveillance program capsules. This amendment request proposes a change to the withdrawal time of Table 3.4.11-1 for the first surveillance capsule withdrawal. The TRM is a licensee-controlled document.

**BACKGROUND**

Standard Review Plan 5.3.1, and 10CFR50, Appendix H, require that reactor pressure vessels shall have their beltline regions monitored by a surveillance program which complies with American Society for Testing & Materials (ASTM) E-185, except as modified by Appendix H. ASTM E-185 provides guidelines for designing a minimum surveillance program, selecting materials, and evaluating test results for light-water cooled nuclear power reactor vessels. It also provides recommendations for minimum number of surveillance capsules and their withdrawal schedules. 10CFR50, Appendix H, requires that the proposed withdrawal schedule be submitted with a technical justification and the proposed withdrawal schedule approved prior to implementation.

The River Bend reactor pressure vessel material surveillance program was designed in accordance with 10CFR50, Appendix H and the 1973 edition of ASTM E-185. River Bend's original Final Safety Analysis Report (FSAR) surveillance capsule withdrawal schedule was established in accordance with ASTM E-185-73 and later revised (Amendment 21) to be in accordance with the ASTM E-185-82. The ASTM E-185-82 recommended minimum number of surveillance capsules and their withdrawal schedule is given as follows:

First capsule -- 6 EFPY (effective full power years), or at the time when the accumulated neutron fluences of the capsule exceeds  $5 \times 10^{18}$  n/cm<sup>2</sup>, or at the time when the highest predicted  $\Delta RT_{NDT}$  of all encapsulated materials is approximately 50° Fahrenheit (F), whichever comes first.

Second capsule -- 15 EFPY, or at the time when the accumulated fluence of the capsule corresponds to the approximate end-of-life fluence at the reactor vessel inner wall location, whichever comes first.

Third capsule -- End-of-life but not less than once or greater than twice the peak end-of-life vessel fluence. This may be modified on the basis of previous tests. This capsule may be held without testing following withdrawal.

ASTM E-185-82 also states "The first capsule is scheduled for withdrawal early in the vessel life to verify the initial predictions of the surveillance material response to the actual radiation environment. It is removed when the predicted shift exceeds the expected scatter by sufficient margin to be measurable."

The withdrawal time for the first RBS capsule was changed from 6 EFPY to 10.4 EFPY in a license amendment approved by the NRC in early 1997 (see Reference #1, Amendment No. 92 to License NPF-47). The current withdrawal schedule (10.4 EFPY for the first capsule, 15 EFPY for the second capsule, and a third capsule designated as "Standby") is provided in RBS TRM Table 3.4.11-1 and in Section 5.3.2.1 of the RBS Updated Safety Analysis Report (USAR).

### **DESCRIPTION OF THE PROPOSED CHANGES**

This amendment request proposes a revision of the required withdrawal time for the first surveillance capsule removal given in Table 3.4.11-1 from 10.4 EFPY to 13.4 EFPY. The proposed change is being submitted under 10CFR50.4 as required by 10CFR50, Appendix H, paragraph III.B.3.

### **JUSTIFICATION FOR PROPOSED CHANGES**

Removal and testing at the revised withdrawal time will permit obtaining more credible data for fracture toughness predictions. Data normally provided by early testing can be obtained from the Boiling Water Reactor (BWR) Owners' Group Supplemental Surveillance Program (SSP) of which EOI is a participant. Furthermore, EOI is participating in a BWR Vessel and Internals Project (BWRVIP) effort, initiated to develop an Integrated Surveillance Program (ISP) to incorporate existing capsules along with Owner's Group supplemental capsules. The BWRVIP has committed to submit an ISP plan to the NRC by the end of 1999 for NRC approval. Also, the cost of specimen testing is significant - approximately \$300,000 to \$350,000.

Early withdrawal of the first capsule at 10.4 EFPY is not essential for continued safe RBS operation for the following reasons:

1. Data from other BWR surveillance capsules shows that the RBS first cycle flux wire calculations fall within expected data scatter. Based on this data, the fluence used for the adjusted reference temperature (ART) calculations for RBS is considered accurate. A review of copper levels present in BWR beltline materials, conducted in response to Generic Letter 92-01, Supplement 1, and in response to the NRC's April 28, 1998, request for additional information (see Reference #2), determined that RBS beltline copper values were consistent with reported values with no significant variation. Therefore based on industry practice, the RBS fluence values calculated from first cycle flux wire measurements are appropriate for use in Regulatory Guide 1.99, Revision 2 (Rev 2) predictions.
2. Review of predicted  $RT_{NDT}$  shifts and measured  $RT_{NDT}$  shifts from other BWR surveillance capsules shows that the predicted shifts plus margin bound the measured results. Figures 2-1 and 2-2 of the previously submitted General Electric (GE) report (see Reference #3,

RBG-43042, dated 8/29/96) are plots of actual shift measurements versus RG 1.99, Rev 2, predicted shifts for base material and weld material, respectively. These figures show that the predicted shift plus margin conservatively bound the actual shifts measured from BWR surveillance specimen data.

3. BWR Owners' Group SSP specimens will provide early representative test data about the RBS weld material (which is the limiting RBS beltline material). This program supplements the RBS surveillance program by providing timely detection of unusual  $RT_{NDT}$  shifts. The fluences on the SSP capsules are comparable to the fluence for the RBS vessel wall in the time frame of interest. Although RBS plate specimens are not in the SSP, some of the materials used have chemistries similar to RBS, as well as others with higher copper contents, which result in a larger predicted shift.

Justification for changing the first RBS capsule withdrawal time from 10.4 EFPY to 13.4 EFPY is based on the following reasons:

- As described above, RG 1.99, Rev 2, predicted  $RT_{NDT}$  shifts bound the actual BWR industry surveillance results. Application of Rev 2 techniques for RBS vessel material and first cycle flux wire data show that the RBS vessel will not experience a large shift over vessel life. Review of base metal results for a significant number of BWR surveillance capsules (Reference #3 Table 3-1, GE report) shows that, for a range of material chemistries and fluences, the expected shift is bounded by the calculated Rev 2 shift plus margin. For BWR's with fluence levels near that of RBS at 10.4 EFPY, the measured shifts are less than the predicted Rev 2 shift plus margin values by an average of 54° F.

Similarly, Table 3-2 of the GE report shows that measured shifts for weld material are bounded by the predicted shift plus margin values. BWR weld data shows the predicted shift plus margin to exceed the measured value by an average of 38° F. Based on this data, the measured shift for River Bend is expected to be conservatively bounded by the RG 1.99, Rev 2, calculation.

- BWR P/T curve calculations are inherently conservative. The reference fracture toughness ( $K_{IR}$ ) is part of the calculations of P/T curves performed in accordance with American Society of Mechanical Engineers (ASME) Code, Section III, Appendix G. The  $K_{IR}$  correlation was developed from multiple sets of material data for pressure vessel steel. The  $K_{IR}$  curve was drawn to bound the available data; thus, the correlation has inherent conservatism.

Operation of RBS follows the steam saturation curve; therefore, operating temperatures are expected to be well in excess of the minimum required temperature limits for nuclear (core critical) operating conditions. During normal and accident conditions, the RBS vessel maintains more than adequate margins. The limiting case for RBS is the pressure test.

The P/T curve associated with the pressure test is calculated using the crack arrest fracture toughness,  $K_{IR}$  ( $K_{Ia}$ ). The static crack initiation fracture toughness,  $K_{IC}$ , is significantly higher than  $K_{IR}$  in the temperature range of interest; thus, use of  $K_{IR}$  conservatively bounds

the fracture toughness of the vessel. As shown in Figure 4-1 of the GE report (see Reference #3), the  $K_{Ia}$  curve is lower than the  $K_{Ic}$  curve, conservatively bounding the fracture toughness. The combination of lower bound fracture toughness, the RBS operating characteristics, and the conservative fracture toughness values indicate that RBS vessel fracture toughness is not a concern over the life of the plant.

Additionally, the P/T limit curves prepared and submitted for RBS's planned increase in thermal power operations ("Power Uprate") are conservative (see Reference #4, RBG-45070, dated 7/30/99). For these curves, adjusted reference temperatures were calculated in accordance with RG 1.99, Rev 2, using a higher fluence to account for the higher neutron flux at Uprate conditions. Therefore, these curves are conservative and deferral of capsule withdrawal and testing will not significantly affect the understanding of irradiation effects on RBS vessel beltline materials.

- BWR Owners' Group SSP results will be applicable to River Bend Station and will provide early detection of any anomalous shifts. An SSP capsule containing specimens similar to RBS was withdrawn in 1997 and is currently undergoing testing. Additional SSP capsule withdrawals are planned for 2000 and 2002 and when tested, the SSP capsules will have collected between  $5 \times 10^{17}$  n/cm<sup>2</sup> and  $2 \times 10^{18}$  n/cm<sup>2</sup>. Thus, generically, the SSP results will be from representative reactor conditions on materials representative of all BWRs, including RBS. Although RBS plate specimens are not in the SSP, some of the materials used have chemistries similar to River Bend, as well as others with higher copper contents, which result in a larger predicted shift. However, the limiting RBS beltline material (weld heat/lot #5P6756/0342) is included in four of seven of the SSP capsules including the one currently being tested; and SSP test results for these four capsules will be directly applicable to the RBS surveillance program. Thus, the results of the SSP are complementary to the RBS surveillance program such that postponement of the first capsule withdrawal will have minimal impact on the understanding of irradiation effects on the RBS vessel.
- The BWRVIP is initiating development of an Integrated Surveillance Program (ISP) incorporating existing capsules and the BWR Owners Group Supplemental Surveillance Program capsules. The purpose of the ISP will be to make the most efficient use of existing capsules and supplemental surveillance materials for monitoring and predicting embrittlement in BWR reactor pressure vessels. The BWRVIP has committed to submit a program plan by the end of 1999 for NRC approval (see Enclosure 1, BWRVIP memorandum to its executive committee, dated January 21, 1999). The BWRVIP Executive Committee recommended that nuclear plants scheduled for capsule withdrawal within the next 18 to 24 months postpone withdrawal of surveillance capsules until such time as the ISP has been approved and is ready for implementation. As a result, the BWRVIP is encouraging members to postpone their surveillance capsule withdrawal. Enclosure 1 also reflects the NRC's willingness to entertain requests for deferral of capsule withdrawals until the ISP is approved and ready for implementation. In order to take full advantage of the program, RBS must defer the first capsule withdrawal, which is currently due during the refueling outage RF09 scheduled to start on March 4, 2000.

Implementation of the ISP may result in additional changes to the RBS surveillance withdrawal schedule and may require additional submittals.

## **NO SIGNIFICANT HAZARDS CONSIDERATION**

EOI proposes to change the current RBS Technical Requirements Table 3.4.11-1 to revise the withdrawal time for the first surveillance capsule withdrawal from 10.4 EFPY to 13.4 EFPY.

In accordance with 10CFR50.92, a proposed change to the operating facility involves no "significant hazards" if operation of the facility, in accordance with the proposed change, would not 1) involve a significant increase in the probability or consequences of any accident previously evaluated, 2) create the possibility of a new or different kind of accident from that previously evaluated, or 3) involve a significant reduction in a margin of safety.

EOI has prepared a no significant hazards consideration in its request for this license amendment and has determined that no significant hazards consideration results from the proposed change. The no significant hazards evaluation follows.

- 1. The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.*

Pressure-temperature (P/T) limits (RBS Technical Specifications Figure 3.4.11-1) are imposed on the reactor coolant system to ensure that adequate safety margins against nonductile or rapidly propagating failure exist during normal operation, anticipated operational occurrences, and system hydrostatic tests. The P/T limits are related to the nil-ductility reference temperature,  $RT_{NDT}$ , as described in ASME Section III, Appendix G. Changes in the fracture toughness properties of RPV beltline materials, resulting from the neutron irradiation and the thermal environment, are monitored by a surveillance program in compliance with the requirements of 10CFR50, Appendix H. The effect of neutron fluence on the shift in the nil-ductility reference temperature of pressure vessel steel is predicted by methods given in RG 1.99, Rev 2.

River Bend's current P/T limits, as well as those for the planned increase in reactor thermal power ("Power Uprate"), were established based on adjusted reference temperatures developed in accordance with the procedures prescribed in RG 1.99, Rev 2, Regulatory Position 1. Calculation of adjusted reference temperature by these procedures includes a margin term to ensure conservative, upper-bound values are used for the calculation of the P/T limits. Revision of the first capsule withdrawal schedule will not affect the P/T limits because they will continue to be established in accordance with Regulatory Position 1 or other NRC-approved procedures. When permitted (two or more credible surveillance data sets available), Regulatory Position 2 (or other NRC-approved) methods for determining adjusted reference temperature will be followed.

This change is not related to any accidents previously evaluated. The proposed change is a revision of the first surveillance capsule withdrawal time, identified in TRM Table 3.4.11-1, from 10.4 EFPY to 13.4 EFPY. This change will not affect P/T limits as given in RBS Technical Specifications Figure 3.4.11-1 or USAR Figures 5.3-4a and 5.3-4b. This change will not affect any plant safety limits or limiting conditions of operation. The proposed



change will not affect reactor pressure vessel performance as no physical changes are involved and RBS vessel P/T limits will remain conservative in accordance with RG 1.99, Rev 2 requirements. The proposed change will not cause the reactor pressure vessel or interfacing systems to be operated outside of their design or testing limits. Also, the proposed change will not alter any assumptions previously made in evaluating the radiological consequences of accidents. Therefore, the probability or consequences of accidents previously evaluated will not be increased by the proposed change.

2. *The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.*

The proposed change revises the first RPV material surveillance capsule withdrawal time in TRM Table 3.4.11-1 from 10.4 EFPY to 13.4 EFPY. This proposed change does not involve a modification of the design of plant structures, systems, or components. The proposed change will not impact the manner in which the plant is operated as plant operating and testing procedures will not be affected by the change. The proposed change will not degrade the reliability of structures, systems, or components important to safety (ITS) as equipment protection features will not be deleted or modified, equipment redundancy or independence will not be reduced, supporting system performance will not be downgraded, the frequency of operation of ITS equipment will not be increased, and increased or more severe testing of ITS equipment will not be imposed. No new accident types or failure modes will be introduced as a result of the proposed change. Therefore, the proposed change does not create the possibility of a new or different kind of accident from that previously evaluated.

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

As stated in Section 5.3.2 of the River Bend Safety Evaluation Report (NUREG-0989), "Appendices G and H of 10CFR50 describe the conditions that require pressure-temperature limits and provide the general bases for these limits. These appendices specifically require that pressure-temperature limits must provide safety margins at least as great as those recommended in the ASME Code, Section III, Appendix G. .... Until the results from the reactor vessel surveillance program become available, the staff will use Regulatory Guide (RG) 1.99, Revision 1 [now Revision 2], to predict the amount of neutron irradiation damage. .... The use of operating limits based on these criteria--as defined by applicable regulations, codes, and standards--will provide reasonable assurance that nonductile or rapidly propagating failure will not occur, and will constitute an acceptable basis for satisfying the applicable requirements of General Design Criteria (GDC) 31."

Bases for RBS Technical Specification 3.4.11 states: "The P/T limits are not derived from Design Basis Accident (DBA) analyses. They are prescribed during normal operation to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause nonductile failure of the RCPB, a condition that is unanalyzed. .... Since the P/T limits are not derived from any DBA, there are no acceptance limits related to the P/T limits. Rather, the P/T limits are acceptance limits themselves since they preclude operation in an unanalyzed condition."

The proposed change will not affect any safety limits, limiting safety system settings, or limiting conditions of operation. The proposed change does not represent a change in initial conditions, or in a system response time, or in any other parameter affecting the course of an accident analysis supporting the Bases of any Technical Specification. The proposed change does not involve revision of the P/T limits but rather a revision of the withdrawal time for the first surveillance capsule. The current P/T limits (and proposed P/T limits for Power Uprate) were established based on adjusted reference temperatures for vessel beltline materials calculated in accordance with Regulatory Position 1 of RG 1.99, Rev 2. P/T limits will continue to be revised as necessary for changes in adjusted reference temperature due to changes in fluence according to Regulatory Position 1 until two or more credible surveillance data sets become available. When two or more credible surveillance data sets become available, P/T limits will be revised as prescribed by Regulatory Position 2 of RG 1.99, Rev 2, or other NRC-approved guidance. Therefore, the proposed changes do not involve a significant reduction in any margins of safety.

### **ENVIRONMENTAL IMPACT CONSIDERATION**

EOI has reviewed this request against the criteria of 10CFR51.22 for environmental considerations. Since this request involves (i) no significant hazard consideration, (ii) no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (iii) no significant increase in individual or cumulative occupational radiation exposure, EOI has concluded 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.

### **NOTIFICATION OF STATE PERSONNEL**

A copy of this amendment request has been provided to the State of Louisiana, Department of Environmental Quality.

### **REFERENCES**

1. Amendment #92 to NPF-47, dated February 13, 1997 (per RBC-47361)
2. EOI letter RBG-44583, dated August 4, 1998
3. GE report attached to EOI letter RBG-43042, dated August 29, 1996
4. RBS Power Uprate Submittal, per RBG-45070, dated July 30, 1999

**ATTACHMENT 3**

**LAR 99-22**

**TRM TABLE 3.4.11-1 MARK-UP**

Table 3.4.11-1  
REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM  
WITHDRAWAL SCHEDULE

CAPSULE WITHDRAWAL	WITHDRAWAL TIME - EFPY
First	<del>10.4</del> 13.4
Second	15
Third	Standby

**ENCLOSURE 1**

**BWRVIP LETTER  
TO  
BWRVIP EXECUTIVE COMMITTEE**