

September 12, 1994

U. S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, DC. 20555

Attention: Document Control Desk

Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Response to Generic Letter 94-02, "Long-Term Solutions and Upgrade of
Interim Operating Recommendations for Thermal-Hydraulic Instabilities in
Boiling Water Reactors"

File No.: G9.5, G9.33.4

RBFI-94-0032
RBG-40869

Gentlemen:

This submittal provides the River Bend Station (RBS) response to Generic Letter (GL) 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors." The Nuclear Regulatory Commission (NRC) issued GL 94-02 on July 11, 1994 requesting licensees of Boiling Water Reactors (BWRs) to take appropriate actions to augment respective procedures and training programs for preventing or responding to thermal-hydraulic instabilities in their reactors. This generic letter also requested BWR licensees to submit to the NRC, a plan describing the selected long-term stability solution option and a proposed implementation schedule for modifying plant protection systems to ensure compliance with 10 CFR 50 Appendix A, General Design Criteria 10 and 12. GL 94-02 permitted generic BWR Owners' Group (BWROG) documents or planned submittals to be referenced in this plan.

Prior regulatory documents issued by the NRC which address reactor power oscillations include NRC Bulletin (NRCB) 88-07, "Power Oscillations in Boiling Water Reactors," and NRCB 88-07, Supplement 1, dated June 15, 1988 and December 30, 1988, respectively. NRCB 88-07 requested BWR licensees to ensure that adequate operating procedures and instrumentation are

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available and adequate operator training is provided to prevent occurrence of uncontrolled power oscillations during all modes of operation. NRCB 88-07 requested licensees of BWRs NRCB 88-07, Supplement 1 provided additional information concerning power oscillations in BWRs and clarified the actions specified by the initial bulletin. Included in the supplement were initial interim corrective action (ICA) recommendations developed by General Electric (GE) and endorsed by the NRC. Supplement 1 also requested licensees to take actions to ensure that the safety limit for the plant minimum critical power ratio (MCPR) is not violated.

NRCB 88-07 and NRCB 88-07, Supplement 1 were evaluated for applicability to RBS. Appropriate revisions have been incorporated into station training programs, procedures, and the Technical Specifications. RBS submitted responses to NRCB 88-07 and NRCB 88-07, Supplement 1 via letters RBG-28772 and RBG-30243, dated September 8, 1988 and March 3, 1989, respectively.

RBS has supported the BWROG initiative to develop and refine ICA guidelines since its inception. The ICAs published by the BWROG in March 1992 and June 1994 have been evaluated for applicability to RBS and implemented, where applicable.

With the administrative provisions specified in NRCB 88-07, Supplement 1 and applicable BWROG ICA recommendations in place, RBS is confident that power oscillations can be avoided and adequate guidance is available to detect and suppress power oscillations should they occur. These administrative provisions will remain in place until the long-term stability solution is implemented at RBS.

Also, a review of RBS procedures and plant-specific analysis has uncovered a problem with implementing the BWROG guidelines pertaining to boiling boundary restrictions. Resolving this problem will involve a Technical Specification change submittal. Because of the importance of this issue, RBS has developed this request and expects to submit it to the NRC 9/12/94. The plant is currently shutdown and the identified problem will result in RBS power output being limited to < 35 % of RBS licensed power level under current Technical Specifications.

GL 94-02 required BWR licensees to inform the NRC, in writing and under oath or affirmation within 60 days from the date of the letter, of the plans and status with respect to the requested actions. The attachment to this letter delineates the response to Reporting Requirement Item 1.a of GL 94-02 for RBS. Reporting Requirements Item 1.b requested information on changes necessary to upgrade instrumentation for core monitoring. No changes are required to this capability at RBS. Changes are necessary to the technical specifications to allow operations above 35 % power and are discussed in the attachment.

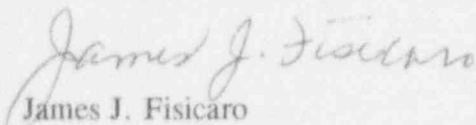
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RBS has elected to implement Enhanced Option I-A as the long-term stability option. Enhanced Option I-A is fully described in NEDO-32339, "Reactor Stability Long-Term Solution: Enhanced Option I-A." The proposed plans and schedule information is also provided in the attachment.

As requested by Reporting Requirements Item 2, RBS will inform the NRC, in writing and under oath or affirmation, within 30 days after completing the requested actions of GL 94-02.

Should you have any questions or require additional information regarding this matter, please contact Otto P. Bulich of my staff at 504-381-6125.

Yours truly,



James J. Fisicaro
Director-Nuclear Safety

attachment: Response to Generic Letter 94-02

cc: NRC Resident Inspector
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Mr. Raymond Azua
U. S. Nuclear Regulatory Commission
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U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
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BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

LICENSE NO. NPF-47

DOCKET NO. 50-458

IN THE MATTER OF

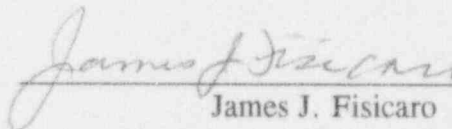
GULF STATES UTILITIES COMPANY

CAJUN ELECTRIC POWER COOPERATIVE AND

ENTERGY OPERATIONS, INC.

AFFIRMATION

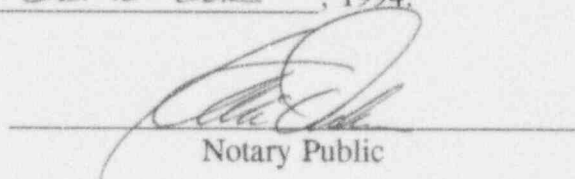
I, James J. Fisicaro, state that I am Director-Nuclear Safety of Entergy Operations, Inc., at River Bend Station; that on behalf of Entergy Operations, Inc., I am authorized by Entergy Operations, Inc. to sign and file with the Nuclear Regulatory Commission, this response to Generic Letter 94-02 for the River Bend Station; that I signed this generic letter response as Director-Nuclear Safety 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.


James J. Fisicaro

STATE OF LOUISIANA
WEST FELICIANA PARISH

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 12TH day of SEPTEMBER, 1994.

(SEAL)


Notary Public

My commission expires: 11/1/97

Attachment

to

RBG-40869

Response to Generic Letter 94-02

"Long-Term Solutions and Upgrade of
Interim Operating Recommendations for Thermal Hydraulic
Instabilities in Boiling Water Reactors"

Requested Actions Applicable to Reporting Requirements

River Bend Station
Response to Generic Letter 94-02

Requested Action 1.a:

Ensure that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip (or there are no pumps operating) with the reactor in the RUN mode, and ensure that operators are aware of the potential for very large power oscillations and the potential for exceeding core thermal safety limits before automatic protection systems function following the trip of all recirculation pumps (the procedural manual scram is not necessary after long-term solutions are approved and implemented for individual plants).

Response to Action Item 1.a:

Abnormal Operating Procedure AOP-0024, "Core Thermal Hydraulic Instability High Power/Low Flow/Flux Oscillations," was revised as part of the actions taken in response to NRCB 88-07, Supplement 1. This procedure was changed to require a manual scram under all operating conditions when both recirculation pumps trip and the reactor is in the RUN mode. This manual scram is not applicable during normal pump upshifts or downshifts to high or low speed, as appropriate (i.e., pump rotation continues to exist during these transitions).

Reactor operator training emphasizes that in the event both recirculation pumps trip with the reactor in RUN mode an immediate reactor scram is required. This training alerts operators to the potential for very large power oscillations and the potential for a safety limit violation should a regional oscillation occur. The training is consistent with a proactive reactivity management philosophy.

Reactor operators are trained to recognize thermal-hydraulic oscillations and to realize that stability regional boundaries are not absolute indicators of the potential for instability under all conditions. As such, operator training emphasizes that time spent operating near the stability region should be minimized. Also, AOP-0024 includes a statement which warns operators of the possibility of violating the Critical Power Ratio (CPR) safety limit during a thermal-hydraulic instability event, even if the peak-to-peak power oscillations are less than 10%.

Requested Action 1.b:

Ensure that factors important to core stability characteristics (e.g., radial and axial peaking, feedwater temperature, and thermal hydraulic comparability of mixed fuel types) are controlled within appropriate limits consistent with the core design, power/flow exclusion boundaries, and core monitoring capabilities of the reactor in

power/flow exclusion boundaries, and core monitoring capabilities of the reactor in question, and that these factors are controlled through procedures governing changes in reactor power, including startup and shutdown, particularly at low flow operating conditions. Each licensee should review its procedures and determine if instability can be avoided by these procedures and if the procedures can be carried out using existing instrument information. If it is concluded that a near-term upgrade of core monitoring capability is called for to ease the burden on operators, determine the need to incorporate on-line stability monitoring or monitors for stability sensitive parameters and inform the NRC of the schedule and technical evaluation for such upgrades found to be necessary. (These procedural operation controls will no longer be necessary for licensees which implement fully automatic long-term solutions, such as Options III or III-A of Reference 2. Licensees should propose for plant-specific review the administrative controls to be retained in conjunction with other long-term solutions).

RBS Response to Action Item 1.b:

The factors important to core stability are identified in the interim corrective action (ICA) guidance specified in NRCB 88-07, Supplement 1. RBS has implemented this guidance. RBS has also supported the BWROG effort to develop improved guidelines for the ICAs to better address startup and low power maneuvering conditions. RBS has been involved with investigating this issue and developing the BWROG ICAs. RBS believes implementing the guidance will enhance reactor thermal-hydraulic stability.

The BWR Owners' Group Guidelines (Reference 5) are consistent with, but more restrictive than, the ICAs which were previously implemented and incorporated into RBS Technical Specifications as a result of the NRC Bulletin 88-07, Supplement 1 requirements. This guidance has been incorporated into Technical Specification 3.4.1.1, Recirculation System - Limiting Condition for Operation. The original regions defined in the 1988 BWROG ICAs and included in NRC Bulletin 88-07, Supplement 1, were based on stability tests and events known at the time. Subsequent work has identified a sensitivity to reactor power shape and/or feedwater temperature conditions. Because of this sensitivity, the BWROG guidelines incorporated an expanded stability region and power distribution control definition to strengthen the oscillation prevention feature. The expanded stability region and power distribution control definition, in conjunction with the detection and suppression provision of the guidelines, provide a higher degree of protection against unacceptable power oscillations.

RBS will modify, where necessary, its operating procedures and operator training such that they are consistent with, or more conservative than, the BWROG guidelines. RBS will also incorporate into procedures the operating regions and the applicable actions that are currently recommended in Reference 1. These actions will be completed prior to the first quarter of 1995, except the boiling boundary guidance. A review of RBS procedures and plant-specific analysis has uncovered a problem with implementing the

BWROG guidelines concerning boiling boundary restrictions. Compliance with Technical Specification 3.4.1.1 during a plant startup will result in T-factor conflicting with the boiling boundary guidance. T-factor is defined in Technical Specification 3/4.2.2, APRM Setpoints, as the ratio of Fraction of Rated Thermal Power (FRTTP) divided by the Core Maximum Fraction of Limiting Power Density (CMFLPD). T-factor applies restrictions to the APRM setpoint values during low recirculation flow condition (i.e., startup and low power operation prior to recirculation pump upshift to fast speed).

RBS has developed and submitted a license amendment Technical Specification request to revise the T-factor requirements. This change will allow implementing the boiling boundary controls. We believe the safety margin can be preserved and the stability recommendations implemented with this license amendment. Also, because T-factor applies restrictions to the APRM setpoint values during low recirculation flow condition, as discussed above, with the plant currently shutdown RBS will not be able to increase its output power above 35 % of the licensed power level under the present Technical Specification.

Boiling boundary controls will be fully implemented after receiving the associated license amendment concerning T-factor discussed below. Additionally, RBS intends to maintain further conservatism to the BWROG recommended stability regions by increasing the size of the Exit and Controlled Entry Regions.

The guidance issued by NRCB 88-07, Supplement 1, GL 94-02, and the BWROG is intended for use until replaced by a long-term stability solution. The BWROG guidelines (Reference 1) and the resulting plant operating procedure revisions and operator training modifications are intended for use only until the long-term stability solution is implemented. Beyond this, appropriate Technical Specification changes, procedure revisions, and training program changes are to be evaluated and determined by the long-term solution implemented at RBS.

The Fraction of Core Boiling Boundary (FCBB) limit ensures parameters important to stability are controlled in the Controlled Entry Region. RBS will incorporate the FCBB limit into plant operating procedures upon receiving the associated license amendment. In addition to the procedure changes, the calculation to demonstrate conformance to the FCBB limit will be incorporated into the core monitoring software and will be available each time a core monitor calculation is performed.

Requested Action 2:

All licensees of BWRs, except for Big Rock Point, are requested to develop and submit to the NRC, a plan for long-term stability corrective actions, including design specifications for any hardware modifications or additions to facilitate manual or automatic protective response needed to ensure that the plant is in compliance with

General Design Criteria 10 and 12. An acceptable plan could provide for implementing one of the long-term stability solution options described in Reference 2 or in subsequent documentation. The plan should include a description of the action proposed and a schedule of any submittal requiring plant-specific design review and approval by the NRC and an installation schedule (if applicable). The plan should also address the need for near-term and long-term Technical Specification modifications. Generic BWROG documents or planned submittal may be referenced in the plan.

RBS Response to Action Item 2:

The NRC requirements for long-term stability solutions to ensure compliance with General Design Criteria 10 and 12 of Appendix A to 10 CFR Part 50 was presented in NRC Bulletin 88-07, Supplement 1. The bulletin acknowledged that the NRC was working with the BWROG to develop generic approaches to resolve the reactor stability issue. The resulting BWROG efforts have led to the solution concepts and methodology described in NEDO-31960, "BWR Owners Group Long-Term Stability Solutions Licensing Topical Methodology" (Reference 3), NEDO-31960, Supplement 1 (Reference 4), and NEDO-32339 "Reactor Stability Long-Term Solution: Enhanced Option I-A" (Reference 5). RBS has elected to proceed with Enhanced Option I-A. This option introduces new plant hardware/software to mitigate the consequences of reactor coupled neutronic/thermal-hydraulic instabilities should they occur considering reasonably limiting anticipated operating conditions. Enhanced Option I-A is fully described in NEDO-32339 (Reference 5). RBS is participating with other utilities under a BWROG program to conduct initial application activities, and has contracted GE to design and manufacture the hardware/software. Recommendations for conceptual Technical Specification changes are provided as part of this BWROG program. Plant-specific Technical Specification changes for stability will be evaluated against the selection criteria in the NRC Final Policy Statement on Technical Specification Improvements of July 16, 1993. Implementing the Enhanced Option I-A stability long-term solution plan is contingent upon NRC acceptance of the BWROG methodology submittal (Reference 5) and the RBS/GE hardware and software submittals.

The schedule for completing the joint design and licensing activities is delineated in Table 1. Plans for RBS plant-specific activities are delineated Table 2. The implementation schedule is based on an NRC review cycle of six months for plant-specific submittals. Assuming the joint development activities and NRC acceptance are completed as scheduled, it is RBS's objective to have the Enhanced Option I-A stability solution Technical Specifications evaluated against the NRC Final Policy Statement on Technical Specification Improvements of July 16, 1993 and any identified changes submitted for NRC approval by the last quarter of 1996. The long-term stability hardware solution will be installed and operational at RBS three months following startup from the seventh refueling outage.

TABLE 1

ENHANCED OPTION I-A STABILITY PROGRAM
DESIGN & LICENSING ACTIVITIES
NRC/BWROG MILESTONES

Licensing Topical Report on Enhanced Option I-A (NEDO-32339) Submitted	4/94	BWROG
Licensing Topical Report on Enhanced Option I-A (NEDO-32339) Safety Evaluation Report	3rd Quarter 1994*	NRC
Enhanced Option I-A Hardware Licensing Topical Report Submitted	2nd Quarter 1995*	BWROG
Enhanced Option I-A Hardware Licensing Topical Report	3rd Quarter 1995*	NRC
Safety Evaluation Report		

* Planned Dates

TABLE 2

ENHANCED OPTION 1-A STABILITY PROGRAM
RIVER BEND STATION PLANT SPECIFIC ACTIVITIES
NRC/RIVER BEND NUCLEAR STATION MILESTONES

ACTIVITY	DATE	ORGANIZATION
RBS submit license amendment request to resolve T-factor FCBB conflict	September 12, 1994	RBS
NRC approve amendment revising T-factor issue.	4th Quarter 1994	NRC
RBS Stability Region Boundaries Submittal	1st Quart 1996*	RBS
RBS Stability Region Boundaries Safety Evaluation Report	3rd Quarter 1996*	NRC
RBS Stability Technical Specification Submittal, if required based on evaluation	4th Quarter 1996* Note 1	RBS
RBS Stability Technical Specification Safety Evaluation Report, if required.	2nd Quarter 1997* Note 1	NRC
Stability Solution Final Installation	3 months following startup from the 7th Refueling Outage **	RBS

* Planned Dates

** Final installation is expected during the 2nd Quarter of 1997 following the 7th refueling outage as discussed above.

Note 1: Plant-specific Technical Specification changes to address stability will be evaluated against the selection criteria in the NRC Final Policy Statement on Technical Specification Improvements of July 16, 1993.

REFERENCES

1. NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," June 1991
2. NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," March 1992
3. Letter from A. Thadani, NRC to L. A. England, Chairman, BWR Owners' Group, Acceptance for Referencing of Topical Reports NEDO-31960 and NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," dated July 1993
4. NEDO-32339, "Reactor Stability Long-Term Solution: Enhanced Option I-A," April 1994
5. Letter, L. A. England to M. J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Actions," June 6, 1994