UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 23, 2009

Vice President, Operations
Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61N
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION, UNIT 1 - CORRECTION TO AMENDMENT NO. 163, RE: MAIN TURBINE BYPASS SYSTEM (TAC NO. MD7966)

Dear Sir or Madam:

On June 24, 2009, the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 163 to Facility Operating License No. NPF-47 for the River Bend Station, Unit 1 (RBS). The amendment is at Agencywide Documents Access and Management System (ADAMS) Accession No. ML091540570. The amendment was in response to your application dated January 25, 2008, as supplemented by letters dated April 14 and 29, 2009. The amendment revised Technical Specification (TS) 3.7.5, "Main Turbine Bypass System," to provide an alternative to the existing Limiting Condition for Operation (LCO) for the Main Turbine Bypass System (MTBS). The revised TS requires that the MTBS be operable or that the Average Planar Linear Heat Generation Rate (APLHGR), the Minimum Critical Power Ratio (MCPR), and the Linear Heat Generation Rate (LHGR) limits for the inoperable MTBS be placed in effect as specified in the Core Operating Limits Report (COLR).

By e-mail dated June 29, 2009, Barry Burmeister of your staff notified the NRC staff of discrepancies on two pages of the Safety Evaluation (SE) approving Amendment No. 163. First, page 3 of the SE stated that the "proposed TS changes would avoid a reactor trip with the MTBS being inoperable..." The current LCO for TS 3.7.5 requires a reduction in power to less than 23.8 percent rated thermal power, not a reactor trip. In addition, the paragraph was revised to clarify the implementation of the TS change. The paragraph has been revised to read as follows (changes indicated in boldface print):

> With the MTBS inoperable, the licensee would assess the need to **implement the alternate operating limits of the MCPR, LHGR, and APLHGR in the COLR.** The proposed TS changes would avoid a **power reduction to less than 23.8 percent RATED THERMAL POWER with the MTBS being inoperable**, if the operating MCPR, LHGR, and APLHGR limits are within the ranges specified in the COLR. The changes would increase plant flexibility.

Second, on page 14 of the SE, an incorrect computer code, COTRANSA2 (Reference 8), was referenced as the code used to analyze the slow flow runout to develop the flow-dependent Minimum Critical Power Ratio ($MCPR_F$) values. The licensee noted that the flow-dependent $MCPR_F$ limits for the low flow runout event is analyzed with XCOBRA-T (Reference 6). In addition, there was a typographical error in referencing the computer code for determination of

the flow-depending heat generation rate factor ($LHGRFAC_F$). The NRC staff agrees and has corrected the computer code references on page 14 of the SE to read as follows (changes indicated in boldface print):

> The slow core flow runout event is analyzed .... The computer codes used for the analysis are the NRC-approved **XCOBRA-T (Reference 6)** for determination of the flow-dependent MCPR ($MCPR_F$) limits and **CASMO4**/MICROBURN-B2 (Reference 10) for determination of the flow-dependent heat generation rate factor ($LHGRFAC_F$)....

Based on the above, the NRC staff has enclosed corrected pages 3 and 14 of the SE and indicated corrections with revision bars. Please replace these pages of the June 24, 2009, SE with the enclosed replacement pages.

These corrections do not change the NRC staff's conclusions in Amendment No. 163. If you have any questions, please contact me at 301-415-1445 or via email at alan.wang@nrc.gov.

Sincerely,

Alan Wang

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosure:
As stated

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ENCLOSURE

Amendment No. 163
Safety Evaluation pages 3 and 14

controls the system pressure by opening the bypass valves that vent steam flow to the two main condenser shells.

The MTBS is also required to be operable to limit the reactor pressure and power increases during applicable transients assumed in the accident analysis so that SAFDLs are not exceeded during AOOs. Specifically, the mitigation function of the MTBS is to assure that the safety limits of the MCPR, the LHGR, and the APLHGR are not exceeded.

The MCPR is a ratio of the fuel assembly power that results in the onset of boiling transition to the actual fuel assembly power. Operating limits on the MCPR are specified to assure that no fuel damage occurs during AOOs.

The LHGR is a measure of the heat generation rate of a fuel rod in a fuel assembly at any axial location. Operating limits on the LHGR are specified to assure that the fuel design limits are not exceeded anywhere in the core during AOOs.

The APLHGR is a measure of the average LHGR of all the fuel rods in a fuel assembly at any axial location. Operating limits on the APLHGR are specified to assure that fuel design limits are not exceeded anywhere in the core during AOOs and that the peak cladding temperature during the postulated loss-of-coolant accident (LOCA) does not exceed the limit specified in 10 CFR, Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors."

With the MTBS inoperable, the licensee would assess the need to implement the alternate operating limits of the MCPR, LHGR, and APLHGR in the COLR. The proposed TS changes would avoid a power reduction to less than 23.8 percent RATED THERMAL POWER with the MTBS being inoperable, if the operating MCPR, LHGR, and APLHGR limits are within the ranges specified in the COLR. The changes would increase plant flexibility.

3.1 Evaluation of AREVA NP Methods

In its supplemental letter dated April 14, 2009, the licensee identified the transient analyses affected by the proposed amendment. The safety analyses for the RBS with the MTBS-out-of-service (MTBS-OOS) were performed in accordance with NRC-approved transient methods. The methods referenced in the safety analysis are provided in Table 1 below.

Table 1: AREVA NP Approved Analysis Methods

Analysis	Methodology	NRC Approval References
Nuclear Design	CASMO4/MICROBURN-B2	10
Transient Reactor Power/Pressure	COTRANSA2	8, 11, and 14
Transient CPR [Critical Power Ratio]	XCOBRA-T	6 and 14
Transient LHGR	XCOBRA-T	6 and 14
LHGR Limits	RODEX2A, RAMPEX, and COLAPX	1, 2, 3, 4, and 5

the required power-dependent LHGRFAC ($LHGRFAC_p$) is either limited by the steady-state HFR limit or the required $LHGRFAC_p$ from another EOOS condition.

The slow core flow runout event is analyzed for determination of flow-dependent thermal limits. The event could result in vessel steam flow exceeding the capacity of the turbine control valves, and thus the turbine bypass valves would open to control reactor pressure. With the MTBS-OOS, the reactor pressure would increase relative to the nominal slow flow runout analysis. The slow core flow runout event with the MTBS-OOS is analyzed using the same methods and computer codes as the base slow core flow runout event in the AOR with the exception that the inoperable MTBS is assumed. The computer codes used for the analysis are the NRC-approved XCOBRA-T (Reference 6) for determination of the flow-dependent MCPR ($MCPR_F$) limits and CASMO4/MICROBURN-B2 (Reference 10) for determination of the flow-dependent heat generation rate factor ($LHGRFAC_F$). The slow core flow runout event was analyzed for Cycle 15 with and without the MTBS-OOS. The results of the analysis show that a maximum increase in the $MCPR_F$ is 0.10. The Cycle 15 $LHGRFAC_F$ limits were established to support base case operation and operation in the EOOS options for all cycle exposures. APLHGR is determined by averaging the LHGR over each fuel rod in a plane. The limit for APLHGR is expressed as the maximum APLHGR (MAPLHGR) for any plane in the fuel assembly. The MAPLHGR is determined to meet the 10 CFR 50.46 criteria that require the peak cladding temperature for design-basis LOCAs not exceed 2200 degrees Fahrenheit (°F). An inoperable MTBS does not result in an increase in severity of results associated with the LOCA analyses (Entergy letter dated April 14, 2009, RAI 4); therefore, the MAPLHGR limits remain unchanged for an inoperable MTBS.

The licensee will perform the cycle-specific analysis (Entergy letter dated April 14, 2009, RAI 3) to address the events discussed above as an EOOS option. Appendix A of the current RBS COLR contains the EOOS thermal limits curves. The licensee will modify it to include the $MCPR_p$, $MCPR_F$, $LHGRFAC_p$, and $LHGRFAC_F$ curves for the inoperable MTBS cases.

The NRC staff finds that that the licensee's analysis uses NRC-approved methodologies and computer codes, and the results of the analysis show that the safety thermal limits in the AOR are not exceeded for the events that are affected by the MTBS-OOS, thus meeting the GDC 10 requirements related to the thermal limits for maintaining integrity of the fuel rods during AOOs. Therefore, the NRC staff concludes that the analysis is acceptable.

3.4 Compliance with Guidance in GL 88-16 and NUREG-1434

NRC GL 88-16 allows licensees to move cycle-specific parameters from the plant-specific TSs to a licensee-controlled document entitled "COLR." The GL states that for plants implementing a COLR process, the analytical methods used to determine the core operating limits shall be those previously reviewed and approved by NRC and shall be included in its TSs. The proposed TS 3.7.5 allows relocation of the MCPR, APLHGR, and LHGR operating limits to the COLR. The NRC staff agrees with the licensee that the operating limits referenced in TS 3.7.5 to be included in the COLR are cycle-specific parameters. Also, the licensee will use (Reference 17) the NRC-approved methods referenced in TS 5.6.5, "Core Operating Limits Report," in analyses to determine cycle-specific parameters including the MCPR, APLHGR, and LHGR operating limits, for each cycle.

the flow-depending heat generation rate factor ($LHGRFAC_F$). The NRC staff agrees and has corrected the computer code references on page 14 of the SE to read as follows (changes indicated in boldface print):

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Sincerely,
/RA/

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosure:
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