

November 20, 2002

MEMORANDUM TO: Robert Gramm, Section Chief
Project Directorate IV-1
Division of Licensing and Project Management
Office of Nuclear Reactor Regulation

FROM: F. Mark Reinhart, Section Chief ~~/RA/~~ M. Caruso for
Probabilistic Safety Assessment Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

SUBJECT: EVALUATION OF THE RISK INFORMATION USED TO SUPPORT THE
RIVER BEND STATION REQUEST TO MODIFY TECHNICAL
SPECIFICATION SURVEILLANCE REQUIREMENTS TO ALLOW
DIVISION 3 EDG TESTING DURING ANY MODE OF PLANT
OPERATION (TAC # MB5093)

The Probabilistic Safety Assessment Branch (SPSB) reviewed the risk assessment information submitted by Entergy Operations, Inc. in support of its request to revise Technical Specification (TS) 3.8.1, "AC Sources - Operating" for River Bend Station (RBS). This change will modify current surveillance requirements (SRs) pertaining to the testing of the Division 3 standby emergency diesel generator (EDG) which is an independent source of onsite AC power dedicated to the high pressure core spray (HPCS) system. The proposed change will allow performance of required surveillance tests for the Division 3 standby HPCS EDG during any mode of plant operation (currently allowed only in modes 4 and 5).

SPSB concludes that the risk information included in the River Bend application supports the proposed change. The SPSB input to the safety evaluation (SE) is attached. Should you have any questions, please contact Nick Saltos at 415-1072.

Attachment: As stated

CONTACT: Nick Saltos NRR/DSSA/SPSB
415-1072

CC: Mike Webb

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SAFETY EVALUATION OF RIVER BEND REQUEST TO MODIFY TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS TO ALLOW DIVISION 3 EDG TESTING DURING ANY MODE OF PLANT OPERATION (TAC# MB5093)

1.0 INTRODUCTION

Entergy Operations, Inc. (Entergy) submitted risk information in support of a proposed change to revise Technical Specification (TS) 3.8.1, "AC Sources - Operating" for River Bend Station (RBS). This change will modify current surveillance requirements (SRs) pertaining to the testing of the Division 3 standby emergency diesel generator (EDG) which is an independent source of onsite AC power dedicated to the high pressure core spray (HPCS) system. The HPCS diesel generator has the capability to restore power quickly to the HPCS bus in case of a loss of offsite power (LOSP) event and to provide all required power for the startup and operation of the HPCS system, one standby service water pump motor and miscellaneous auxiliaries associated with it.

The HPCS system is designed and constructed to allow all active components to be tested during normal plant operations. The system has a full-flow test line to either the suppression pool or the condensate water storage tank which allows testing without injecting into the reactor vessel. These features, along with the fact that the HPCS is a stand-alone system with its dedicated EDG and independent electrical distribution system, support the request to remove current restrictions related to the testing of the HPCS EDG. The proposed change will allow the HPCS EDG and the HPCS system to be almost completely tested during normal plant operation. According to Entergy, this on-line testing will provide significant reductions in outage critical path time by minimizing system manipulations and corresponding intensive operator workload during refueling outages.

2.0 PROPOSED CHANGES

Entergy requested to revise TS 3.8.1, "AC Sources - Operating" to allow performance of the required surveillance tests for the Division 3 standby HPCS EDG during any mode of plant operation (currently allowed only in modes 4 and 5). The proposed changes impact tests performed to meet the following SRs and will apply only to the Division 3 EDG:

- SR 3.8.1.9 --- Demonstrate that the EDG can reject its largest load while maintaining margin to the overspeed trip,
- SR 3.8.1.10 --- Demonstrate that the EDG can reject its full load without tripping or its output voltage exceeding a specified limit,
- SR 3.8.1.11 --- Verify the de-energization of emergency buses and EDG auto-start from standby configuration on an actual or simulated LOSP signal,
- SR 3.8.1.12 --- Verify EDG auto-start from standby configuration on an actual or simulated emergency core cooling system (ECCS) initiation signal,
- SR 3.8.1.13 --- Demonstrate that the EDG automatic trips are bypassed on an actual or simulated ECCS initiation signal,

- SR 3.8.1.16 --- Verify EDG synchronization with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power, transfer of all loads to the offsite power, and return to ready-to-load operation,
- SR 3.8.1.17 --- Demonstrate that the EDG automatic switchover from the test mode to the ready-to-load operation is attained upon receipt of an ECCS initiation signal (while maintaining availability of the offsite source),
- SR 3.8.1.18 --- Verify that the load sequence time is within 10% of design, and
- SR 3.8.1.19 --- Verify the de-energization of emergency buses and EDG auto-start from standby configuration on an actual or simulated LOSP signal in conjunction with an actual or simulated ECCS initiation signal.

In addition, Entergy is requesting to revise SR 3.8.1.8, which verifies the manual transfer of the unit power supply from the normal offsite circuit to the required alternate circuit, to allow performance during any mode of plant operation (currently allowed only in modes 4 and 5).

3.0 RISK ASSESSMENT EVALUATION

The proposed on-line surveillance tests have the potential to increase risk by making the HPCS EDG unavailable to respond to an accident during testing. In addition, on-line testing could cause accident initiating events and safety equipment failure. Therefore, in evaluating the risk information submitted by the licensee, guidance provided in Regulatory Guide (RG) 1.174 “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis” and in RG 1.177, “An approach for Plant-Specific, Risk-Informed Decision making: Technical Specifications,” was followed. This guidance includes the assessment of the risk impact of the proposed change to ensure that the Commission’s Safety Goal Policy Statement is satisfied and the plant risk does not increase unacceptably during any periods safety equipment is taken out of service for testing and/or maintenance. In addition, RGs 1.174 and 1.177 provide guidance for identifying and addressing potentially high risk configurations associated with the proposed changes as well as guidance for implementing the proposed changes in accordance with an overall configuration risk management program (CRMP).

3.1 Quality of Risk Assessment

Entergy reviewed the various steps of the procedures, followed in performing the surveillance tests, for each of the SRs impacted by the proposed changes. The objective of this review was to (1) investigate the potential for accident initiating events as a result of the tests during plant operation at power, and (2) investigate the unavailability of equipment to perform its safety function during the proposed on-line testing. Such information, which was used in the assessment of the risk impact of the proposed TS changes, is summarized below:

- The proposed on-line surveillance tests make the HPCS EDG unavailable for responding to an accident only during portions of the testing. It was estimated that the HPCS EDG will be unavailable for a total of 12 hours while surveillance tests are conducted. Since the required frequency of the subject tests is once every 18 months, the unavailability of the HPCS EDG will increase by about eight hours per year.
- Accident initiating events, resulting from the proposed allowance to perform the HPCS EDG surveillance tests while the plant is operating at power, are unlikely as indicated by historical experience of similar tests (e.g., monthly EDG run tests are conducted on line by paralleling the EDG in test with offsite power). The performance of these tests do not cause any significant perturbations to the electrical distribution system due to (1) the configuration of the AC power supply and associated protection features, (2) industry and plant experience with the performance of similar on-line testing, (3) administrative controls that minimize plant risks, and (4) the low probability of a significant voltage perturbation during the very short interval of such tests. In addition, due to the minimal size of the loads associated with the HPCS system, there is not any real potential for the tests to create a perturbation on the grid. Furthermore, completed Division 3 test results have shown that the important bus voltage parameters stay within prescribed limits.

The risk impact of the proposed changes was assessed using the plant's probabilistic risk assessment (PRA) model with an eight-hour yearly increase in the HPCS EDG unavailability. The quality of the RBS PRA has been independently assessed according to the Boiling Water Reactor Owner's Group (BWROG) Peer Certification Program and found adequate for addressing issues associated with similar requests, such as issues associated with extending the Division 1 and 2 EDG completion time (CT) from 72 hours to 14 days. In addition, the dominant risk contribution of the HPCS EDG is associated with a small number of well understood station blackout accident sequences. Therefore, the overall quality of the plant PRA does not have a significant impact on the quality of the submitted risk assessment. Since the assessed risk impact is associated with internal events only, qualitative arguments are made to show that any contributions to risk from external events would not change significantly the results of the risk assessment. The staff finds that the submitted risk assessment is of adequate quality to be used in the risk-informed decision making regarding the proposed TS changes.

3.2 Risk Impact of the Proposed Change

An acceptable approach to risk-informed decision making is to show that the proposed changes to the TS meet several key principles (RG 1.174). One of these principles is to show that the proposed change results in an increase in risk, in terms of core damage frequency (CDF) and large early release frequency (LERF), which is small and consistent with the Commission's Safety Goal Policy Statement. Acceptance guidelines for meeting this principle are presented in RG 1.174.

The licensee used its PRA model of the plant and calculated an increase in CDF associated with the proposed changes of about $1.3E-8$ /year. This increase is significantly smaller than the RG 1.174 guidance of less than $1.0E-6$ /year for very small CDF increases. Consequently, the

increase in LERF was not calculated since it is less than $1.3E-8$ /year (which is significantly smaller than the RG 1.174 guidance of less than $1.0E-7$ /year for very small LERF increases).

In addition to the increases in CDF and LERF, the incremental conditional core damage probability (ICCDP) and the incremental conditional large early release probability (ICLERP) were assessed. These quantities are a measure of the increase in probability of core damage and large early release, respectively, during portions of the test (i.e., 12 hours every 18 months) when the HPCS EDG will be unavailable.

- ICCDP: $\sim 2E-8$
- ICLERP: less than $2E-8$.

These values are smaller than the RG 1.177 guidance of $5E-7$ for ICCDP and $5E-8$ for ICLERP, respectively, outlined in RG 1.177.

3.3 Avoidance of High Risk Plant Configurations

The licensee provides a discussion in its submittal on existing requirements and restrictions, imposed when on-line testing and maintenance activities are performed on the electrical distribution system, which ensure that high risk plant configurations are avoided.

- Required Action B.2 of TS 3.8.1, “AC Sources Operating,” requires identification of inoperable required features that are redundant to required features supported by an inoperable EDG.
- RBS administrative controls require use of a “protected division concept” which, without special considerations, allows work on one division at a time.
- Procedures contain precautions to minimize risk associated with surveillance testing, maintenance activities and degraded grid conditions, when paralleling an EDG with offsite power. Such precautions include the requirement that only one EDG at a time be operated in parallel with offsite power. This configuration provides sufficient independence of the onsite power sources from offsite power since only one EDG can be affected by an unstable offsite power system.

The staff finds that these requirements, restrictions and precautions are adequate for preventing high risk plant configurations.

3.4 Risk-Informed Configuration Risk Management

The intent of the risk-informed configuration risk management is to ensure that plant safety is maintained and monitored when equipment are taken out of service to perform maintenance or testing. A formal commitment to maintain a configuration risk management program (CRPM) is required on the part of a utility prior to implementation of a risk-informed TS whenever such TS is entered and risk-significant components are taken out of service. Licensees have programs

in place to comply with 10 CDF 50.65(a)(4) to assess and manage risk from proposed maintenance activities. These programs can support licensee decision making regarding the appropriate actions to control risk whenever a risk-informed TS is entered.

4.0 CONCLUSION

The proposed changes in tests, performed to meet SRs of the Division 3 EDG (HPCS EDG), will allow the HPCS EDG system to be almost completely tested during normal plant operation (currently allowed only in modes 4 and 5). The staff expects the licensee to implement the proposed changes in accordance with existing requirements and restrictions imposed when on-line testing and maintenance activities are performed on the electrical distribution system (listed in section 3.3 above). The staff concludes that the results and insights of the risk analysis support the proposed changes.