ENTERGY

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June 10, 1994

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

SUBJECT: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458/94-010-00
File Nos.: G9.5, G9.25.1.3

RBG - 40644

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is the subject report.

Very truly yours,

James J. Fisicaro

James. J. Fisicaro
Director-Nuclear Safety
enclosure



IE22 1/1

cc: U.S. Nuclear Regulatory Commission
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ATTN: Administrator

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| River Bend Station | 05000-458 | 1 of 6 |

TITLE (4)

## DEFICIENT OVERCURRENT PENETRATION PROTECTION FOR 120VAC HYDROGEN IGNITER CIRCUITS DUE TO INADEQUATE COMMUNICATIONS AND OVERSIGHT DURING CONSTRUCTION

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | N/A | 05000 |
| 05 | 12 | 94 | 94 | 010 | 00 | 06 | 10 | 94 | FACILITY NAME: N/A | DOCKET NUMBER: 05000 |

| OPERATING MODE (9) | 5 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 0 | | 20.402(b) | | 20.405(c) | | 50.73(a)(2)(iv) | | 73.71(b) |
| | | | 20.405(a)(1)(i) | | 50.36(c)(1) | | 50.73(a)(2)(v) | | 73.71(c) |
| | | | 20.405(a)(1)(ii) | | 50.36(c)(2) | | 50.73(a)(2)(vii) | | OTHER |
| | | | 20.405(a)(1)(iii) | X | 50.73(a)(2)(i) | | 50.73(a)(2)(viii)(A) | | (Specify in abstract below and in text, NRC Form 366A) |
| | | | 20.405(a)(1)(iv) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(viii)(B) | | |
| | | | 20.405(a)(1)(v) | | 50.73(a)(2)(iii) | | 50.73(a)(2)(x) | | |

### LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Timothy W. Gates, Supervisor - Nuclear Licensing | 504-381-4866 |

### COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|---|
| X | YES (If yes, complete EXPECTED SUBMISSION DATE) | | NO | | 11 | 01 | 94 |


**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) **(16)**

On May 12, 1994 at 1145, with the plant in Operational Condition 5 (Refueling), Plant Engineering was conducting a review of Calculation E-190 for Minor Modification MM94-0055 when they discovered a condition of inadequate breaker protection for the electrical containment penetration associated with the 120 VAC hydrogen igniter circuits. The investigation also revealed that the hydrogen igniter system breakers should have been tested in accordance with Technical Specification 3/4.8.4.1 "Primary Containment Penetration Conductor Overcurrent Protective Devices."

Based on the information available, the cause of this event is indeterminate. However, there are two causal factors. First, the electrical calculation E-190 specified the correct breaker size required for the containment penetration but a design change document was not initiated. Second, the design engineer modifying the hydrogen igniter system failed to follow through with the necessary design modification document to implement the change in the plant.

Corrective actions include modifying the hydrogen igniter panels to provide proper backup overcurrent protection for the electrical containment penetrations and to revise surveillance test procedure(s) to require periodic testing of the hydrogen igniter breakers in accordance with Technical Specification 4.8.4.1.

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

## REPORTED CONDITION

On May 12, 1994 at 1145, with the plant in Operational Condition 5 (Refueling), Plant Engineering was conducting a review of Calculation E-190 for Minor Modification MM94-0055 when they discovered a condition of inadequate breaker protection for the electrical containment penetration associated with the 120 VAC hydrogen igniter circuits. The investigation also revealed that the hydrogen igniter system breakers should have been tested in accordance with Technical Specification 3/4.8.4.1, "Primary Containment Penetration Conductor Overcurrent Protective Devices." This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B) as operation prohibited by Technical Specifications.

## INVESTIGATION

During the review of a hydrogen igniter cable replacement, minor modification (MM94-0055), Plant Engineering discovered a discrepancy between Calculation E-190, "Electrical Penetration Protection $I^2T$ Coordination Curves," and the Cable Block Diagrams (CBD) associated with the hydrogen igniter circuits. The calculation specified a 30 amp breaker, but the CBD did not show a main panel breaker in any of the hydrogen igniter system panels. Plant Engineering performed a field verification which revealed that an 80 amp breaker was installed in the panel.

The hydrogen igniters are energized from 120 VAC distribution panels 1HCS*PNL1A1, 1HCS*PNL1A2, 1HCS*PNL1B1, and 1HCS*PNL1B2 which are located in the Auxiliary Building. The 120 VAC hydrogen igniter circuits pass through low voltage control electrical penetrations that are part of the containment boundary. Therefore, hydrogen igniter circuits must meet General Design Criterion 50, "Containment Design Basis" of Appendix A, to 10CFR Part 50. General Design Criterion 50 requires that the reactor containment structure, including penetrations, be designed so that the containment structure can accommodate the calculated pressure, temperature, and other environmental conditions resulting from a loss-of-coolant accident (LOCA) without exceeding the design leakage rate. Based on IEEE Standard 308, it is postulated that a fault could occur on the system, the wire insulation could degrade and the redundant breaker could fail causing deterioration of the penetration and resulting in a containment leak path during a LOCA. Degradation of containment integrity requires operation of the hydrogen igniter system concurrent with an electrical fault on the system inside containment and a failure of the upstream circuit breaker to trip (i.e., the circuit breaker must fail closed). The hydrogen igniters are normally de-energized and are manually energized during hydrogen igniter system surveillance testing or following a degraded core accident.

TEXT *(If more space is required, use additional copies of NRC Form 366A) (17)*

A review of the as-found hydrogen igniter circuit configuration revealed that the circuit breaker did not meet the requirements of IEEE Standard 308 for electrical circuits penetrating the primary containment. Electrical penetrations are required to have redundant or backup interrupting devices to ensure mechanical integrity of the containment penetration during electrical fault conditions. The as-found 80 amp breaker does not provide the proper redundant overcurrent protection to the 20 amp branch circuit breaker to ensure that the #12 AWG Conax penetration conductor is not damaged under fault conditions. The 80 amp breaker design has existed since startup. The investigation also revealed that the hydrogen igniter system breakers should have been tested in accordance with Technical Specification 3/4.8.4.1.

The hydrogen igniter system and the associated control panels were added to the plant design in December 1983, prior to fuel load. This system was added in response to issues identified by NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 1980. A purchase order initiated on May 9, 1984 procured four 30 amp breakers to replace the 80 amp breakers for the hydrogen igniter control panels. The investigation revealed no documentation to support that a design change was ever initiated after the purchase of these breakers or that or that these breakers were ever installed in the plant.

Calculation E-190 was initially prepared by the AE on March 15, 1985 and subsequently reviewed on June 10, 1985. The calculation reflected the need for a 30 amp breaker to satisfy the regulatory requirements. The calculation typically references design change documents associated with overcurrent breaker schemes. The investigation revealed no documentation to support that a design change was ever initiated after the development of the calculation.

The hydrogen igniter distribution panels were a part of Boundary Identification Package (BIP) HCS.002. The hydrogen igniter BIP consisted of the hydrogen igniters and all associated cables, transformers, and control panels. The punch list and startup trouble tickets for BIP HCS.002 were reviewed for potential impact on the penetration protection discrepancy. No related items were identified in the BIP review.

A review was also performed on the Design Modification Package (DMP) relating to electrical penetration protection (DMP 025, "Electrical Penetration Protection"). These were modifications with an associated "fuel load" completion date. No related items were identified in the DMP review.

During the investigation and review of calculation E-190 a condition was identified which occurred on February 5, 1991. This condition is addressed in CR 91-0047 and identified a penetration protection nonconformance associated with the personnel containment airlock. The electrical penetration was an integral part of the containment personnel airlock supplied as a unit by a vendor. For this reason, the root cause determination for CR 91-0047 was limited to containment airlock penetrations and other qualified mechanical containment penetration equipment that could have integral electrical penetrations.

ROOT CAUSE

Based on the information available, the cause of this event is indeterminate. The AE failed to adequately communicate the need to initiate a modification to add the 30 amp breakers in the plant. Root cause analysis revealed the following causal factors:

- Electrical calculation E-190 specified the correct breaker size required for the containment penetration but a design document was not initiated.

- The design engineer modifying the hydrogen igniter system failed to follow through with the necessary design modification document to implement the change in the plant.

A review of previously submitted LERs revealed no similar occurrences to the condition described in this report. However, the event described in CR 91-0047 was reviewed during this investigation. The corrective actions provided for in CR 91-0047 were sufficient to correct the identified containment penetration protection deficiencies. Because the root cause determination was limited to the containment airlock penetrations and other qualified mechanical containment penetration equipment that could have integral electrical penetrations, the associated corrective actions would not have revealed the discrepancy with the hydrogen igniter system breakers. The investigation has determined that the condition identified in CR 91-0047 meets the specific reporting criteria pursuant to 10CFR50.73(a)(2)(i)(b).

Inadequate backup penetration protection is not believed to be a generic issue and can be limited to only the hydrogen igniter system. The engineer modifying the hydrogen igniter system design fail to follow through with the necessary modification documents to implement the change in the plant. Since initial startup, coordination of design activities has evolved such that design activities associated with a particular modification are the responsibility of one individual.

Preliminary reviews indicate that existing penetration protection schemes are appropriate. Additionally, containment penetration degradation is identified during the normal containment leak rate tests required by 10CFR Part 50, Appendix J. The electrical penetration local leak rate test was last performed on April 19, 1994. The results of this test would have indicated failure of the electrical penetration.

To provide further assurance a detailed review (described in the Corrective Action Section) of these penetration protection schemes will be performed to ensure that each applicable electrical containment penetration is adequately protected and tested.

CORRECTIVE ACTION

The design will be changed to modify the hydrogen igniter panels to provide proper backup overcurrent protection for the electrical containment penetrations. Minor Modification MM94-0058 has been initiated and field work released. The field work will be completed prior to entering Mode 3 for Cycle-6. The surveillance test procedure(s) will be revised to require periodic testing of the hydrogen igniter breakers in accordance with Technical Specification 4.8.4.1. These actions will be completed prior to entering Mode 3 for Cycle-6.

A detailed review involving electrical design calculation E-190 and DMP.025, associated electrical drawings, and Technical Specification Table 3.8.4.1-1 will be performed to ensure that the existing penetration protection circuits are adequate. This review will be completed by October 1, 1994. Results of this review will be evaluated and reported in a supplemental report by November 1, 1994.

A change to Technical Specification Table 3.8.4.1-1 is necessary to add the hydrogen igniter breakers. However, a RBS proposed change to this table has been submitted (LAR 91-11, RBG-39894) and is currently under review by the Nuclear Regulatory Commission. This proposed change is consistent with Generic Letter 91-08, "Removal of Component Lists from Technical Specifications" and relocates information contained in Table 3.8.4.1-1 to the Technical Requirements Manual. Upon approval of this request, the Technical Requirements Manual will be updated to reflect the hydrogen igniter breakers.

TEXT *(If more space is required, use additional copies of NRC Form 366A) (17)*

## SAFETY ASSESSMENT

The purpose of Technical Specification 3/4.8.4.1 is to provide operability requirements for overcurrent protection devices to ensure pressure boundary integrity of the containment penetration following a LOCA. Degradation of containment integrity requires operation of the hydrogen igniter system concurrent with an electrical fault on the system inside containment and a failure of the upstream circuit breaker to trip (i.e., the circuit breaker must fail closed). The hydrogen igniter system is energized during post-modification testing or surveillance testing of the hydrogen igniter system. In both cases, an electrical fault or circuit breaker failure would have been detected had such an event occurred.

Additionally, containment penetration degradation is identified during the normal containment leak rate tests required by 10CFR Part 50, Appendix J. The electrical penetration local leak rate test was last performed on April 19, 1994. The results of this test would have indicated failure of the electrical penetration.

Therefore, there was no impact on the safe operation of the plant or the health and safety of the public as a result of this event.