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November 1, 1994

U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555

SUBJECT: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458/94-010-01
File Nos. G9.5, G9.25.1.3

RBG- 41032
RBF1-94-0080

Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject report.

Sincerely,

James J. Fisicaro

JJF/kvm
Enclosure

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 7

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	01	11	01	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)
T.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
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

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." A subsequent detailed evaluation has been performed which verified the design adequacy of all identified circuits which require penetration protective devices. However, additional examples of these circuits not being included in the Technical Specifications were identified.

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 engineering 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 (*BKR*) protection for the electrical containment penetration (*PEN*) associated with the 120 VAC hydrogen igniter (*BB*) 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." Subsequent to this initial finding, a detailed review of electrical penetration protection circuits was conducted. While no additional design deficiencies were identified, this review did identify several circuits that had not been properly included in the Technical Specifications and as such were not being tested in accordance with the intent of the Technical Specifications. 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 (*PL*). 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.

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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. Since no documentation has been identified, it is believed that a design change was never initiated after the purchase of these breakers. Therefore, the breakers were never 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.

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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 personnel containment 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.

As part of the corrective actions for this condition, a detailed review of other electrical penetration protection was conducted to verify the plant's compliance with its design basis. The first phase of this review evaluated the circuit protection provided in the design of the other circuits that penetrated the containment. This review concluded that all identified circuits were properly protected and satisfied the design requirements. The second phase of the review evaluated the completeness of the Technical Specifications regarding circuit protective devices or administrative controls which ensure proper penetration protection. This phase of the review discovered additional examples of circuits/protective devices being excluded from the Technical Specifications and consequently not being included in the surveillance test program. Sixteen protective breakers associated with some heat trace (*FD*) circuits were not included in Technical Specification Table 3.8.4 1-1 as required to support the plant's design. In addition, one circuit that is normally de-energized during power operations was not included in Technical Specification LCO 3.8.4.4 as required. This circuit is associated with the Inclined Fuel Transfer System (IFTS).

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:

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- 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.

The root cause for the omission of certain circuits from the Technical Specifcations is also indeterminate. A review of the development process of the Technical Specifications was conducted; however, the origin of this oversight could not be determined.

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 94-0047 were sufficient to correct the identified containment penetration protection deficiencies. Because the root cause determination was limited to the containment airlock penetration and other qualified mechanical containment penetration equipment that could have integral electrical penetrations, the associated corrective actions would not have revealed the discrepancies described in this LER. 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 failed 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.

Detailed 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.

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CORRECTIVE ACTION

The hydrogen igniter panels were modified to provide proper backup overcurrent protection for the electrical containment penetrations (Minor Modification 94-0058). The surveillance test procedure(s) was revised to require periodic testing of the hydrogen igniter breakers in accordance with Technical Specification 4.8.4.1.

A change to Technical Specification Table 3.8.4.1-1 is necessary to add the hydrogen igniter breakers. However, an RBS proposed change to this table has been submitted (LAR 91-11, RBG-39894) and is currently under review by the Nuciear 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.

As part of the corrective action for this condition, a detailed review of the electrical penetration protection circuits was conducted to verify the plant's compliance with its design basis. This review has determined that all identified circuits are properly protected and satisfy the design requirements. While no additional design problems were identified, additional examples of circuits/protective devices being excluded from the Technical Specifications and consequently not being included in the surveillance test program were identified. Immediate actions were taken to verify the operability of the protection devices associated with these circuits and all were found to be operable. To ensure continued compliance with the primary containment penetration requirements of the Technical Specifications, these circuits and/or protection devices will be added to the appropriate STPs. These newly identified circuits/protective devices will also be added to the Technical Requirements Manual, pending NRC's approval of LAR 91-011.

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.

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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.

Note that no additional design deficiencies were identified in the detailed analysis that was performed as part of the corrective action for this condition. The operability of the protective devices that had been excluded from the Technical Specifications was verified, thus proving that they would have been capable of performing their design function if challenged. While not verified by an STP in the past, a requirement to de-energize the identified IFTS circuit when IFTS is not in use is included in FHP-0005, "Fuel Transfer Tube Operations." This requirement provides reasonable confidence that this circuit was de-energized as appropriate during power operation.

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.

Note: Energy Industry Identification Codes are indicated in the text as (*XX*)