

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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.

FACILITY NAME (1)

RIVER BEND STATION

DOCKET NUMBER (2)

05000458

PAGE (3)

1 OF 6

TITLE (4) Fire Barrier Separation Design Analysis Deficiencies in Fire Areas C-17 and C-24

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
01	07	94	94	-- 001 --	02	12	22	94	FACILITY NAME	DOCKET NUMBER 05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100	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  
T. W. GATES, SUPERVISOR - LICENSINGTELEPHONE NUMBER (Include Area Code)  
(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)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
---	---	----	-------------------------------	-------	-----	------

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

Recent work on the control building chillers sensitized engineers to question previous assumptions used in the FHA. Further evaluation by the cognizant engineers led to the discovery that design analysis deficiencies existed for fire barrier separation in fire areas C-17 and C-24. Redundant trains of control building HVAC could be lost during a single exposure fire. This could cause the main control room, standby switchgear room 1B, and mechanical equipment room to heat up. Equipment in these rooms is credited for safe shutdown in the event of a fire in fire area C-17 or C-24.

The original design analysis did not adequately support the ability to ensure post-fire safe shutdown for a fire in fire area C-17 or C-24. This situation existed from initial plant startup until fire watches were established in 1991. Design analysis deficiencies were the root cause of this condition. The architect/engineering firm tasked with developing the RBS FHA and safe shutdown analysis did not have a clear understanding of Section III.G of 10CFR50, Appendix R.

Upon discovery of this condition an hourly fire watch was verified to be in place for fire areas C-17 and C-24. Appropriate changes to AOP-0052 have been made. As long term corrective action for fire area C-24, cable was re-routed for the affected safe shutdown component. For fire area C-17, use of the remote shutdown system will be evaluated. 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.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
RIVER BEND STATION		05000458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 6
				94	-- 001 --	02	

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

**REPORTED CONDITION**

Recent work on the control building chillers sensitized engineers to question previous assumptions used in the Fire Hazards Analysis (FHA). These cognizant engineers discovered that design analysis deficiencies existed for fire barrier separation in fire area C-24. Redundant trains of control building HVAC (\*VI\*) could be lost during a single exposure fire in this fire area due to inadequate fire barrier separation of standby 120 volt AC power transformers 1SCM\*XRC14A1 and 1SCM\*XRC14B1. Further evaluation revealed that redundant trains of control building HVAC could also be lost during a single exposure fire in fire area C-17 due to a lack of adequate fire barrier separation for control room air handling units 1HVC\*ACU1A & 1B. A loss of all control building HVAC could cause the main control room, standby switchgear room 1B, and mechanical equipment room to heat up. Equipment in these rooms is credited for safe shutdown in the event of a fire in fire area C-17 or C-24.

An appropriately placed fire barrier would prevent the potential loss of control building HVAC. Therefore, pursuant to RBS Technical Specification 3.7.7, "Fire-Rated Assemblies," fire areas C-17 and C-24 each have an inoperable fire barrier. This condition is reportable pursuant to 10CFR50.73 (a)(2)(i)(B) as operation prohibited by the Technical Specifications.

**INVESTIGATION**

Investigation indicates that the original FHA acknowledged and justified the separation between the Division I and Division II transformers (approximately 15 feet) in fire area C-24 (RBS USAR 9A.2.5.1). Two shutdown methods were credited for fire area C-24 depending upon the location of a fire within the area. Method 1 was credited for a fire in one side of the fire area while method 2 was credited for a fire in the other side of the fire area.

The original FHA credited either shutdown method 1 or method 2 depending upon the location of the fire within fire area C-17. A fire in fire area C-17 could cause a loss of control building HVAC and possibly result in the loss of main control room (MCR) habitability. If MCR habitability was lost, the operators were directed to shutdown from the remote shutdown panels.

As a revision to the FHA (now the Safe Shutdown Analysis), the credited shutdown method for fire area C-24 was changed to a single shutdown method for the entire fire area. Similarly, the shutdown method for fire area C-17 was changed to a single shutdown method for the entire fire area. The changes made in the credited methods of shutdown for fire areas C-17 and C-24 were considered enhancements to the SSA. The previous methods of shutdown for these areas were based on justifications in the FHA.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
RIVER BEND STATION		05000458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
				94	-- 001 --	02	

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

Recent work on the control building chillers sensitized engineers to question previous assumptions used in the FHA. A review of the 10CFR50.59 evaluation for fire areas C-17 and C-24 indicated it did not adequately address all aspects of regulatory guidance for fire protection. The evaluation for fire area C-24 did not include a discussion of the lack of area wide suppression and partial area detection. The evaluation for fire area C-17 did not include a discussion of the lack of area wide suppression. Further evaluation by the cognizant engineers led to the discovery that a single exposure fire in either fire area C-17 or C-24 could cause a loss of all control building HVAC.

In summary, the original design analysis did not adequately support the ability to ensure post-fire safe shutdown for a fire in fire area C-17 or C-24. This situation existed from initial plant startup until fire watches were established in the control building in 1991 as part of the corrective action for Condition Report 89-1144. The fire watches have provided adequate compensatory measures from that time to the present.

**ROOT CAUSE**

Design analysis deficiencies were the root cause of this condition. The inadequate fire barrier separation of standby 120 volt AC power transformers 1SCM\*XRC14A1 and 1SCM\*XRC14B1 could cause the loss of redundant trains of control building HVAC during a single exposure fire in fire area C-24. Similarly, the lack of adequate fire barrier separation for control room air handling units 1HVC\*ACU1A & 1B could cause the loss of redundant trains of control building HVAC during a single exposure fire in fire area C-17.

The architect/engineering firm tasked with developing the RBS FHA and safe shutdown analysis did not have a clear understanding of Section III.G of 10CFR50, Appendix R. This was due to the following contributing factors:

- 1) Although regulatory requirements were firmly established at the time, guidance documents, such as Generic Letter 86-10, did not exist.
- 2) Written guidance was not developed to establish the required content and methodology applicable to the project.
- 3) The project was treated as Quality Assurance Category III work. As such, independent design verification was not employed. This resulted in project personnel establishing requirements without obtaining an independent assessment of the methodology employed.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
RIVER BEND STATION	05000458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
		94	-- 001 --	02	

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

In an effort to address the potential for similar concerns, a reverification/reformat of the FHA into a post-fire safe shutdown analysis document by an independent contractor was completed on 11/19/93. The associated licensing change notice, procedure changes, and design document changes were implemented by 11/25/93. The work by the independent contractor in developing the SSA was treated as Quality Assurance Category I work with the required independent design verification.

Similar events have been reported in LER 89-036, "Various System MOVs Found Energized Contrary to Plant FHA Due to Failure to Implement Design Documents," and LER 91-008, "Lack of Fire Wrap/Inadequate Fire Barrier Caused by Inconsistency in Design Bases Documentation." LER 89-036 reported an event in which the fire hazards analysis specified that certain motor-operated valves (MOVs) should be normally de-energized. The actual condition of the valves was that they were energized. LER 91-008 reported conditions discovered as a result of the FHA review concerning Appendix R separation, the discovery of a previously unidentified fire area, and safe shutdown equipment omitted from the main control room fire analysis as well as similar conditions discovered during the revision of the FHA into the SSA.

**CORRECTIVE ACTIONS**

Upon discovery of this condition an hourly fire watch was verified to be in place for fire areas C-17 and C-24. The fire watch provides compensatory measures for the lack of adequate fire barrier separation of the redundant safe shutdown components located in these fire areas. The fire watch will remain in place to ensure adequate compensatory measures until final resolution of the lack of adequate fire barrier separation in these areas. Also, night orders have been established to ensure a heightened awareness of the condition by the operators to monitor the introduction of unattended transient combustibles for these areas. Recent housekeeping initiatives provide added assurance that accumulation of combustible material will not occur.

Procedure changes to Abnormal Operating Procedure (AOP) 0052, "Fire Outside Main Control Room (In Areas Containing Safety Related Equipment)," have been made to identify operator actions to open doors into the affected areas to provide cooling. This will ensure that the best effort is identified for action until the corrective action is completed.

Upon discovering that the SSA contained an assumption which was not properly substantiated, a review of all assumptions made in the SSA was initiated. All of the other stated assumptions were found to be appropriately documented and substantiated.

For fire area C-24, modification request (MR) 94-0064 was initiated to re-route cable so as to provide a Division II power source to the HVC damper circuits which is located in a different fire area, thus preserving Safe Shutdown Method 2 for fire area C-24. This modification requires no additional operator



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
RIVER BEND STATION	05000458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 6
		94	-- 001 --	02	

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

action in the event of a fire in fire area C-24. This modification was completed in November 1994.

For fire area C-17, MR 94-0156 was initiated to provide an evaluation of the use of the remote shutdown system as the method of shutdown for a fire in this area. The evaluation will address the lack of area wide suppression and other aspects not accounted for in the original evaluation. The evaluation will be completed and, if determined necessary, a deviation request will be submitted by 2/17/95.

**SAFETY ASSESSMENT**

This issue resulted in the potential for credited safe shutdown components to be unavailable following a fire in fire area C-17 or C-24. The fixed combustibles in fire area C-17 are relatively low with a 35 minute fire loading while the fixed combustibles in fire area C-24 have a 25 minute fire loading. Based on NUMARC guidance these fire loading values are conservative in that they include heat load values for Thermo-Lag in the fire areas. Realistically, the Thermo-Lag would not be expected to contribute to the heat load based on the actual configurations in these areas. The realistic fire loading of the remaining combustibles would represent a 23 minute fire load for fire area C-17 and a 13 minute fire load for fire area C-24. This low fire load, in combination with fixed automatic fire detection, ensures that a fire would not affect redundant safe shutdown components.

A review of the circuits in both fire areas shows that a fire would not directly result in a loss of offsite power to Division I or Division II safety-related circuits. This indicates that higher heat loads resulting from the availability of offsite power provides the more probable and worst case situation during a fire in either of these fire areas. The HVAC system is the only system required for safe shutdown in Method 2 that is affected by the fire in these areas, thus allowing shutdown to progress provided the areas are cooled sufficiently. In fire area C-17, the eventual use of the remote shutdown system ensures that the required areas are cooled. In fire area C-24, if offsite power is available, the heat loads are higher, but additional equipment is available for achieving both the cooling of the areas and safe shutdown of the plant in the event of a fire. Symptom based training would have led the operators to take actions to mitigate the resultant heat-up within the main control room and the equipment rooms in the control building.

For design basis summer conditions, with offsite power not available, the heat load from the equipment is minimized due to less equipment being energized from the safety busses. Again, symptom based training would have led the operators to take actions to mitigate the resultant heat-up within the main control room and the equipment rooms in the control building.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
RIVER BEND STATION	05000458	94	-- 001 --	02	6 OF 6

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

One hour roving fire watches have been in effect for all normally accessible safety related areas of the plant since 1991. Widespread use of firewatches combined with fixed fire detection systems ensure that incipient fires will not develop without being detected and extinguished. Firewatch personnel are trained to inspect for protection of combustibles, introduction of new combustibles, housekeeping requirements, and evidence of fire. In the event of a fire, firewatch personnel are instructed to notify the control room, attempt to extinguish the fire if safe to do so, and inform the fire brigade leader of the situation.

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 system codes are indicated in the text as (\*XX\*).