

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: 50.6 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNRR 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) 05000 458 PAGE (3) 1 OF 14

TITLE (4) FIRE HAZARDS ANALYSIS DEFICIENCIES INCLUDING LACK OF FIRE WRAP/INADEQUATE FIRE BARRIER

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	15	91	91	008	05	09	30	93		05000
										05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 4: (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 365A)
		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 L.A. ENGLAND, DIRECTOR - NUCLEAR LICENSING TELEPHONE NUMBER (include Area Code) (504) 381-4145

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		11	30	93

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

At 1345 hours on 4/15/91, with the reactor at full power in Operational Condition 1, it was discovered that electrical cables located in fire area ET-2, which may cause spurious operation of valves 1E51*MOV063 (RCIC inboard steam isolation valve) and 1E51*MOV078 (RCIC vacuum breaker valve), did not have fire wrap contrary to Fire Hazards Analysis (FHA) requirements. At 1300 on 4/23/91, additional cables, which could cause the same problem were found in fire areas AB-2, C-2 and C-6. RCIC is required by the FHA for safe shutdown in these fire areas. Since these valves are required not to change position for operation of RCIC and fire damage to these cables may cause loss of RCIC, the cables would require wrapping in these fire areas.

Upon discovery of this condition, the affected cables were treated as having missing fire barriers and the action statement prescribed in Technical Specification 3/4.7.7, "Fire Rated Assemblies", was implemented for areas containing these cables. Errors made during the original development of the FHA were the cause for the identified cables not being wrapped in the identified fire areas. Additional deficiencies were discovered and addressed as a result of the FHA review (Supplement 4, dated February 5, 1993) and a recent reverification of the FHA.

REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 -- FACILITY NAME 8 TOTAL -- DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

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		05000 458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 2 14
				91	008	05	

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

REPORTED CONDITION

At 1345 hours on 4/15/91, with the reactor at full power in Operational Condition 1, it was reported to the shift supervisor that certain electrical cables associated with valves 1E51*MOV063 (*ISV*) (RCIC inboard steam isolation valve) and 1E51*MOV078 (*VTV*) (RCIC vacuum breaker valve) located in fire area ET-2 (Electrical Tunnel "B" West), did not have fire wrap. This discovered condition is contrary to requirements contained in the FHA. While working on resolution of this issue, additional cables which could cause the same problem were found in fire areas AB-2, C-2 and C-6. At 1300 hours on 4/23/91, these additional areas of concern were reported to the shift supervisor. The FHA lists Method 1 as the analyzed method of shutdown for fire areas AB-2, C-2, C-6 and ET-2. Method 1 shutdown is identified as using 3 safety relief valves (SRVs) (*RV*) for reactor pressure vessel (RPV) (*JE*) pressure control, RCIC for RPV level control, and RHR-A for suppression pool cooling and shutdown cooling. The FHA lists these valves as "Passive Valves" required for Method 1 shutdown which means the valves must not change position due to fire damage on their cables. The FHA states the identified cables for these valves should be wrapped in these fire areas.

The affected cables did not have the required fire wrap (fire barrier) since plant startup; therefore, the fire barrier is considered inoperable per Technical Specification 3/4.7.7 and this report is submitted pursuant to 10CFR50.73(a)(2)(i)(B) as operation prohibited by the Technical Specification.

Additional reportable conditions were discovered as a result of the FHA review. These conditions concerned Appendix R separation, the discovery of a previously unidentified fire area, and safe shutdown equipment omitted from the main control room fire analysis.

As a follow-up to the resolution of the deficiencies in the Fire Hazards Analysis, a safety system functional inspection (SSFI) was performed. During the SSFI, an area was identified in which cable separation was such that a single fire could have disabled both methods of monitoring spent fuel pool temperature. In this case, Thermo-Lag fire barrier material was not installed.

Additional verification of the FHA being performed in response to issues identified in NRC inspection report 93-09 has resulted in identification of three additional reportable conditions as described below:

Seven cables were identified as not having adequate electrical protection and as being routed in a common raceway with cables credited for safe shutdown method 1E which

NRC FORM 366A <small>(5-82)</small>		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 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	05000 458	YEAR 91	SEQUENTIAL NUMBER - 008 -	REVISION NUMBER 05	3 OF 14

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

is utilized for a fire in the MCR. Subsequently, 5 additional cables of this type were identified. These cables constitute an associated circuits/common enclosure concern.

The standby service water cooling tower fans 1SWP*FN1A,C,E,G,J,L,Q,S and U would not be assured to be available for achieving safe shutdown in the event of a main control room (MCR) fire.

Conduit 1CC003OC containing cables providing control power to 4.16KV circuit breakers associated with Division III incoming line breaker 1E22*ACB04, Division III diesel generator output breaker 1E22*ACB01, and Division III 480 volt supply transformer breaker 1E22*ACB03 was not fire wrapped in fire area C-24 (116' elevation of the control building). The equipment listed above is credited for post fire safe shutdown for a fire in fire area C-24.

INVESTIGATION

The River Bend Station - Unit 1 Appendix R Data Management System lists equipment, raceways, and cables by fire area. A review of this data base found inconsistencies between the data base and the FHA for the identified cables which may cause spurious operation of valves 1E51*MOVF063 and 1E51*MOVF078. The FHA indicates the cables should be wrapped in these fire areas but the data base indicates the cables do not require wrap.

FHA Section V "Fire Hazards Evaluation Conclusions" states that for fire areas AB-2, C-2, C-6 and ET-2 shutdown can be achieved by Method 1. FHA Section I and Tables 1, 2 and 6 identify Method 1 shutdown equipment. Reactor core isolation cooling (RCIC) (*BN*) is used for reactor pressure vessel (RPV) level control in Method 1 shutdown. The RCIC inboard steam isolation valve 1E51*MOVF063 and the RCIC vacuum breaker valve 1E51*MOVF078 are passive valves for Method 1 shutdown which means they must not change position due to fire damage. FHA Table 2 states that cables for these two valves, which may result in spurious signals, are wrapped in these fire areas. Circuit analysis on cables 1ICSABC001 and 1ICSABC004 (*CBL2*) found that fire damage can cause spurious closure of valve 1E51*MOVF063 which would prevent steam from reaching the RCIC turbine (*TBR*). Circuit analysis on cables 1ICSEBC001 and 1ICSEBC003 found that fire damage can cause spurious opening of valve 1E51*MOVF078 which would adversely affect RCIC vacuum breaker capabilities.

Since these valves are required not to change position for operation of RCIC and RCIC is required

NRC FORM 366A <small>(5-92)</small>		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
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)	
RIVER BEND STATION		05000 458		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	PAGE (3)
				91	008
				05	4 OF 14

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

for safe shutdown in the affected fire areas, the valves are correctly classified in the FHA as "Passive - Method 1 Components". Therefore, to comply with the USAR, FHA, and 10CFR50 Appendix R Section III.G, the cables would require wrapping in fire areas AB-2, C-2, C-6 and ET-2. With the exception of FHA Table 8 with regards to fire area AB-2, the FHA correctly indicates these cables require wrapping in these fire areas. The Appendix R data base is incorrect as it indicates the cables are not required to be wrapped.

Additional reportable conditions have been discovered as a result of the FHA review. These conditions concerned Appendix R separation and the discovery of a previously unidentified fire area. The Appendix R separation concerns involve fire area C-25 (main control room), FB-1 (fuel building), and RC-5/Z-13 (containment building). The previously unidentified fire area is a small electrical cable chase room located in the Northeast corner of D Tunnel on elevation 70' in the auxiliary building. These additional concerns are discussed individually below.

Fire Area C-25 (main control room)

The FHA identifies fire area C-25 as an area where alternate shutdown capability is provided. FHA Table 3 (method 1E - main control room fire required items) lists specific spent fuel pool cooling & cleanup (SFC) system and fuel building ventilation (HVF) system equipment as being required and therefore, independent of the fire in the control room. Review of circuits for this equipment determined the circuits are not electrically independent from the control room and potential fire damage could cause loss of the equipment which may result in loss of spent fuel pool cooling.

During a review of safe shutdown equipment which could spuriously actuate during a main control room fire, eight standby service water system solenoid operated valves (SOVs) were identified as having been omitted from the original analysis. These valves are 1SWP*SOV522A, B, C, D, 1SWP*SOV523A, B, C, and D. The design function of these valves was to prevent water hammer by admitting air into the standby service water system when the system automatically starts following a loss of the normal service water system. Prior to the fourth refueling outage, this condition made the system piping vulnerable to a severe water hammer in the event of a loss of offsite power combined with a main control room fire. The main control room fire is assumed to disable the SOVs. In such an event, the water level in the service water system piping would be drained to approximately 139'. Due to the concurrent fire in the main control room, the eight standby service water SOVs could fail to admit air into the system. This would create a vacuum in the piping. A severe water hammer could result upon the automatic start of the standby service water system.

NRC FORM 366A <small>(5-92)</small>		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION					
FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)	
RIVER BEND STATION		05000 458		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	PAGE (3)
				91	- 008 - 05
				5	OF 14

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

Associated circuits/common enclosure concerns were cited during NRC Inspection 93-09 in April 1993. The potential for a short circuit on a non-safe shutdown cable causing the cable to heat to the point where it causes failure of a safe shutdown circuit was identified. The short circuit is initiated by a fire damaging the non-safe shutdown cable and causing a short. In order to respond to this concern, GSU expanded the scope of work to revalidate RBS compliance with licensing commitments related to post-fire safe shutdown capability.

During the review of this expanded scope of work, twelve cables were found which have the potential to damage cables required for safe shutdown Method 1E when Method 1E is needed for post-fire safe shutdown. These cables do not have adequate overcurrent protection and share a raceway with a cable required for safe shutdown Method 1E. In the event of an MCR fire, these twelve cables could be damaged due to overcurrent and may cause damage to safe shutdown cables in a raceway remote from the MCR.

Analysis of the control circuits for the Division I standby cooling tower (SCT) fans identified the potential loss of the ability to start the Division I SCT fans from their local motor control center (MCC) following an MCR fire. The River Bend FHA takes credit for starting the SCT fans from the MCC during a MCR fire. In the event of an MCR fire, the control circuits for the SCT fans could short and blow the 3 amp fuse protecting the circuit. The circuit is not isolated from the MCR, therefore, after repositioning the local remote selector switch at the MCC, fan starting would not occur due to the short circuit. Replacement of the fuse, as stated in the FHA, will not solve the problem since this does not remove the short from the circuit.

Fire Area C-24 (Elevation 116' Control Building)

The cables in conduit 1CC003OC associated with Division III safe shutdown equipment found to be unprotected were incorrectly shown as spared in the Electrical Cable Scheduling and Information System. If a fire damaged safe shutdown cables in the noted conduit, Division III power could be unavailable to Standby Service Water components served by Division III power.

Fire Area FB-1 (fuel building)

Fuel building ventilation dampers 1HVF*AOD037A, 102 and 122 are identified in the FHA as equipment required for spent fuel pool cooling. Potential fire damage to electrical cables, located in fire area FB-1, for these dampers may cause spurious operation of the dampers which could potentially cause loss of the spent fuel pool cooling pump and thus loss of spent fuel pool cooling.

NRC FORM 366A <small>(5-92)</small>		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
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	05000 458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 6 14
		91	-- 008 --	05	

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

Pre-fire strategies for this area stated these dampers must be verified to be in their proper position and if not, remove power so they fail to the correct position. Removing power to these dampers may not cause the dampers to go to the correct position since a potential hot short could cause the damper to remain in the incorrect position.

Cables for temperature monitoring instruments 1SFC*RTD7A and 1SFC*RTD7B which monitor spent fuel pool temperature, are located within the rooms containing 1SFC*P1A & 1SFC*E1A. The conduits containing these cables are routed approximately 13 feet from each other without a 3-hour rated fire barrier protecting the method 2 cables. Note that the minimum separation is 20 feet. A single fire could disable both methods of monitoring the spent fuel pool temperature.

Fire Area RC-5/Z-13 (containment building)

USAR Section 9A.2.2.1 states "Safe shutdown Method 1 and 2 equipment, instrumentation and electrical cables are well separated in the Containment. The east (Division II - blue) side of containment is separated from the west (Division I - red) side by the main steam tunnel on the south and by an area free of combustibles on the north. Safe shutdown by either Method 1 or 2 can be used, depending on the actual location of the fire in the containment." With a fire in the west side (Division I), safe shutdown could be achieved using Method 2 equipment (Division II).

The FHA identifies the fact that containment unit cooler 1HVR*UC1B and related valves 1SWP*MOV502B & 503B (Method 2 equipment) are located on the west side of containment on elevation 162'-3" in Fire Area RC-5/Z-13. Valves 1SWP*MOV502B & 503B are inlet and outlet valves controlling cooling water to the unit cooler heat exchanger. The FHA states that this equipment is separated from its alternate counterpart by 24 ft. In addition, a 10 ft. missile barrier serves as a radiant energy shield and intervening combustibles are wrapped with a 3-hour rated product.

Unit coolers 1HVR*UC1A & 1B are separated from each other by a minimum distance of approximately 11'-2" (not 24' as reported in the FHA). A 10' high, 18" thick reinforced concrete missile barrier, which acts as a radiant energy shield, is located between the redundant unit coolers and related SWP valves. However, electrical cables for the redundant unit coolers and valves are routed such that the missile barrier is not located between redundant cables. Electrical cables for 1HVR*UC1B are in conduit # 1CL540BB and are routed along the containment liner. One portion of this conduit that is located within 20' of the redundant conduit # 1CL540RC (electric cables for 1HVR*UC1A) is wrapped with a three hour rated Thermo-lag conduit fire wrap material. The 20'

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 (MNB 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	05000 458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 7 14
		91	008	05	

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

dimension used was taken along the direct line between the two conduits, not horizontal distance as required by Appendix R. Since both conduits are routed along the containment liner but at different elevations, this application of the 20' rule allowed one of these redundant cables to be located directly over the other (separated by a minimum distance of 20' vertical but 0' horizontal) and not provided with the fire wrap material. Cables associated with the SWP valves also do not meet the 20 ft. horizontal separation criteria as identified in 10CFR50 Appendix R, Section III.G.

Valve 1SWP*MOV5A is listed as a component required for Method 2 safe shutdown in the FHA. This valve isolates Division II from Division 1 standby service water and is also located on the west side of the containment. This valve is located on elevation 153'-9" and is separated from its counterpart by a horizontal distance of 20'-2", however; this distance is not free of intervening combustibles. The intervening combustibles consist of electrical cables located in two 18" wide cable trays. A review of the cable routing for the 5A valve found that the cables do not meet the 20 ft. horizontal separation criteria as identified in 10CFR50 Appendix R, Section III.G.

Fire Area AB-18 (previously unidentified)

During the final FHA review, all fire areas except one were found to have a fire hazards analysis and 58 of 62 fire areas were found to have administrative controls identified in the FHA included in their pre-fire strategies. A fire hazards analysis for the new fire area, not previously identified in the FHA, was performed to determine potential impact on safe shutdown capability. The analysis determined that safe shutdown for this new fire area is provided utilizing Method 1 shutdown equipment and by initiating high pressure core spray (HPCS) in lieu of reactor core isolation cooling (RCIC) for level control during a fire. Also, administrative controls to align valve 1SFC*MOV120 to supply cooling to the upper fuel pools were necessary. Modification request (MR) 92-0013 was initiated on January 27, 1992, to make necessary document changes to the FHA and USAR for the new fire area. A new pre-fire strategy was prepared to identify this information to reactor operators and the fire brigade. Pre-fire strategies for the four fire areas were revised to include the omitted administrative controls identified in the FHA.

CORRECTIVE ACTIONS

A detailed review and verification of the FHA by an independent contractor was initiated as a result of NRC Inspection Report No. 50-458/90-02. The conditions as described in this report were identified by the independent contractor during resolution of questions identified in the review and verification process. Evaluations of all questions arising from the final review of the FHA by the

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		05000 458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	8	OF 14
				91	-- 008 --	05		

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

independent contractor were incorrectly thought to be complete in January 1992. Subsequently, NRC inspection report 93-09 identified concerns related to the completeness of the FHA review performed by the independent contractor and GSU's understanding of the basis of the FHA.

Upon discovery of the condition identified on 4/15/91, the affected cables were treated as having missing fire barriers and the action statement prescribed in Technical Specification 3/4.7.7, "Fire Rated Assemblies", was implemented for areas containing these cables. With the exception of the Division II electrical room located in the northeast corner of "D" tunnel on elevation 70', fire watches had been previously in place for the affected areas due to operability questions associated with penetration seal. However, there is no assurance that fire watches had been in place for the entire time period since startup.

For the affected fire areas, an analysis has been performed to determine what alternate system for RCIC is available (free of fire damage). The analysis determined that low pressure core spray (LPCS) (*BM*) is free of fire damage in Fire Areas AB-2, C-2, & C-6 and high pressure core spray (HPCS) (*BJ*) is free of fire damage in Fire Area ET-2.

Errors made during the original development of the FHA were the cause of inconsistencies found within the FHA and between the FHA and the Appendix R data base. These inconsistencies resulted in the identified circuits not being protected in accordance with 10CFR50, Appendix R, Section III.G. A contributing factor involving these errors appears to be the fact that the affected components are Division II and are required for Method 1 shutdown, which primarily uses Division I and III components. Review of this condition has determined there are also Division I cables/equipment which are required for Method 2 shutdown, which primarily uses Division II components. The cables for this type of equipment are considered "Appendix R Crossover Cables". Analysis has determined that there are approximately 80 of these crossover cables. A review of these crossover cables was performed and with one exception no similar deficiencies exist. The exception is the Division II cable chase area located in the northeast corner of D-Tunnel. In this area, RCIC may be lost due to fire damage on crossover cables. As previously stated in the investigation, it was found that this area had not been previously identified or evaluated in the FHA. Analysis for this new fire area (AB-18) demonstrates safe shutdown capability is provided. Since the area contains only Division II cabling, safe shutdown can be achieved utilizing Method 1 shutdown methodology and substituting HPCS for RCIC for RPV level control. The corrective actions to address the new fire area included the identification of the proper safe shutdown method, implementation of administrative controls to align valve 1SFC*MOV120 to provide cooling to the

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	05000 458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 9 14	
		91	- 008 -	05		

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

upper fuel pools, documentation changes to the FHA and USAR, and the preparation of a pre-fire strategy for this area.

Fire Area C-25 (Main Control Room)

Immediate actions were taken and administrative controls implemented to address the concerns with spent fuel pool cooling until permanent corrective actions could be identified and implemented. Engineering analysis determined that the time required for the spent fuel pool temperature to reach the cooling system design limit of 155.6 degrees F with the existing fuel load conditions prior to RF-4 was approximately 5.3 days. Administrative controls were implemented and AOP-0031 ("Shutdown From Outside Main Control Room") was revised to provide the necessary manual actions to restore spent fuel pool cooling with a fire in the main control room. The entire reactor core was offloaded to the fuel building spent fuel pool for RF-4. With the increased heat load in the fuel pool, the minimum time required to reach the cooling system design limit of 155.6 degrees F was approximately 4 hours. This is sufficient time to take the manual actions identified in AOP-0031.

The corrective action for addressing the concerns with spent fuel pool cooling is to complete an analysis which demonstrates a design which allows a higher spent fuel pool temperature and still allows sufficient time to restore spent fuel pool cooling. With this revised design bases, the spent fuel pool cooling equipment presently identified as required by the FHA would not be immediately required. This analysis is scheduled to be completed by July 10, 1992. Any modifications found necessary will be scheduled during Fuel Cycle 5. MR 92-0038 has been approved to complete analysis of long term corrective actions. The administrative controls and manual actions discussed above will be maintained until long term corrective actions are implemented.

The corrective action for addressing the omission of safe shutdown equipment from the main control room fire analysis is as follows. During the ongoing refueling outage, the open loop service water system has been in the process of conversion to a closed loop service water system. This modification is being implemented to improve the service water system chemistry and minimize corrosion. The new design will provide a solid system with a pressurized surge tank containing nitrogen. Thus, the potential for a severe water hammer occurring upon the automatic start of the standby service water pumps in the event of a loss of offsite power combined with a fire in the main control room no longer exists.

Fire Area FB-1 (Fuel 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 (IMRB 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	05000 458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 10 14
		91	- 008 -	05	

TEXT (If more space is required, use additional copies of NRC Form 365A) (17)

The immediate action taken was to treat the electrical cables as having missing fire barriers and initiate a continuous fire watch per RBS Technical Specification. After actions identified above for the main control room was implemented and pre-fire strategies for Fire Area FB-1 were revised to identify the manual actions required to place the dampers in the correct position, the continuous fire watch was removed. The permanent corrective action for this condition will be addressed with completion of the analysis and modifications, if required, as discussed above for the main control room.

Monitoring spent fuel pool temperature is not required for safe shutdown. A method to manually monitor the spent fuel pool temperature is already included in Abnormal Operating Procedure (AOP)-0052, "Fire Outside The Main Control Room". Attachment 3, "Available Safe Shutdown Methods and Potential Operator Actions", of AOP-0052, will be revised to include the manual monitoring instructions contained in Attachment 6 of the AOP. This corrective action will be implemented by March 1, 1993.

Fire Area RC-5/Z-13 (Containment Building)

The immediate action taken was to treat the cables as having missing fire barriers and initiate an hourly fire watch per RBS Technical Specification.

The permanent corrective action for this condition will be to provide an analysis which demonstrates the unit coolers are not required or install noncombustible radiant energy shields to provided separation in accordance with Appendix R, Section III.G.2.f. Modification request (MR) 92-0037 has been approved to install the required radiant energy shields if needed. The analysis to demonstrate the unit coolers are not required and the preparation of MR 92-0037 will proceed concurrently. This approach will allow the analysis and/or installation of the radiant energy shields to be completed prior to startup from RF-4.

Similar events have been reported in LERs 87-005, 89-009, 89-036, and 90-003. LERs 87-005, 89-009 and 90-003 reported instrumentation-related deficiencies in Thermo-Lag fire barriers. 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. New issues identified during the FHA review have revealed FHA deficiencies concerning spent fuel pool cooling and a previously unidentified fire area.

Those circuits that form an associated circuit/common enclosure concern are scheduled to be

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	05000 458	91	- 008 -	05	OF 11 14

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

modified before the end of RF-5. In the interim, compensatory action is in effect. This compensatory action includes treating the affected cables as having a missing fire barrier and entering Technical Specification 3/4.7.7 "Fire Rated Assemblies" to maintain a roving fire watch in the MCR and areas of the plant containing the affected raceway.

Corrective actions for the standby cooling tower fans was to implement modification request (MR) 93-0056. This MR provided fuses to isolate portions of the affected circuits which enter the MCR from the portions of the circuit required for remote shutdown functions. The additional fuses ensure that the standby cooling tower fans will be available following a fire in the MCR. The modification was installed on or before 8/25/93, prior to entering Operational Condition 2.

Conduit 1CC003OC which was not wrapped in Fire Area C-24 was treated as having a missing fire barrier. The action statement prescribed by Technical Specification 3/4.4.7.7 "Fire Rated Assemblies" was verified to be in effect for this fire area. Final corrective action will require installing a fire rated assembly on the conduit. This will be accomplished via MR 91-0075. The schedule for implementation is dependent on industry resolution of Thermo-Lag fire barrier issues.

SAFETY ASSESSMENT

The FHA states safe shutdown can be achieved in fire areas AB-2, C-2, C-6 and ET-2 using Method 1 shutdown. Method 1 is identified as using 3 SRVs for RPV pressure control, RCIC for RPV level control, and RHR-A for suppression pool cooling and shutdown cooling. Since the affected cables were not wrapped in these fire areas, fire damage could cause loss of RCIC. With the loss of RCIC, a review was made to determine what alternate method of RPV level control was available in these fire areas. Analysis has demonstrated that for Fire Areas AB-2, C-2 & C-6, LPCS is free of fire damage and for ET-2 & the new fire area (AB-18), HPCS is free of fire damage. This demonstrates that with a fire in any of these fire areas, at least one method of safe shutdown is unaffected.

Fire Areas C-25 (main control room) and FB-1 (fuel bldg.) were identified as areas where potential fire damage could cause a loss of spent fuel pool cooling. Calculation No. G13.18.14.0*46-0 was developed which demonstrates the time required for the spent fuel pool temperature to reach the design limit of 155.6 degrees F with the present fuel load is approximately 5.3 days. Abnormal Operating Procedure (AOP)-0031 "Shutdown From Outside Main Control Room" and pre-fire strategies for fire area FB-1 have been revised to address manual actions which may be required to

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	05000 458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	OF 12 14
		91	- 008 -	05	

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

restore spent fuel pool cooling with a fire in these areas. These corrective actions and administrative controls have been implemented to address these concerns under present fuel pool load conditions until permanent corrective actions are identified and implemented.

Spent Fuel Pool cooling is not required for safe shutdown. Conduits containing cables required for both methods of monitoring spent fuel pool temperature were discovered in fire area FB-1 without adequate separation or protection. The consequences of losing both methods of spent fuel pool temperature monitoring was previously evaluated for other areas in the fuel building. A manual method for temperature monitoring had been established prior to discovery of the unprotected conduit. Loss of spent fuel pool temperature monitoring has no impact on the safe shutdown ability of River Bend Station. The additional corrective actions will serve to guide Operations personnel to Attachment 6 of AOP-0052 in the event that the loss of both methods of spent fuel pool temperature monitoring should occur.

The FHA indicates safe shutdown can be achieved in Fire Area RC-5/Z-13 (reactor containment bldg.) using Method 1 or 2 depending on the location of the fire. The FHA states containment unit cooler 1HVR*UC1B is separated from its alternate counterpart by 24 ft. and a 10 ft. radiant energy shield and is being protected from intervening combustibles by wrapping the intervening combustibles with a 3-hour rated barrier. Since the cables for this unit cooler were not wrapped in accordance with Appendix R, Section III.G requirements, fire damage could cause a loss of containment cooling. The affected cables were treated as having missing fire barriers and fire watch requirements specified in Technical Specification 3/4.7.7, "Fire Rated Assemblies" have been implemented.

To evaluate the safety implications of the omission of the eight service water system SOVs from the FHA, the impact before, during and after the fourth refueling outage was reviewed, as follows.

Prior to RF-4, as described in the Investigation section, this event could have resulted in a severe water hammer in the service water system. GSU has calculated the frequency of the loss of offsite power concurrent with a main control room fire. This event has not occurred and has a frequency of occurrence of 2.4E-5 per year. Therefore, GSU concludes that this is a low probability event.

In addition, a review of the piping runs was performed. The piping in the auxiliary building above elevation 139' is the piping associated with the auxiliary building unit coolers. This piping, if damaged during a water hammer event, could be isolated from the essential loads. The piping in the containment above elevation 139' that is open to the normal service water system is the non-

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	05000 458	91	- 008 -	05	13 OF 14

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

safety-related piping associated with the drywell unit coolers. The safety related containment unit coolers are normally operated on the turbine building chilled water system which is a closed loop system which is not subject to the drain down. The drywell unit cooler piping, if damaged by a water hammer event, could be isolated before the containment unit cooler portion was valved in to the service water system. The remaining undamaged portion of the system would perform its required safety function in safely shutting the plant down.

During RF-4, the plant was shutdown for refueling purposes with the entire core off-loaded. The service water system has been chemically cleaned and modification to a closed-loop system is in progress. The chemical cleaning was performed one division at a time. The other division of standby service water was operated to provide cooling to required loads, principally the offloaded fuel in the spent fuel pool. The minimum elevation that water would drain to is elevation 182' due to the higher elevation of suction and return to the standby cooling tower. All safety related piping in the service water system is below elevation 165', therefore no vacuum would be created and the severe water hammer would not have occurred. Cooling was assured to the spent fuel cooling system at all times while the core was off-loaded.

As described in the Corrective Action section, the modification of the service water system from an open loop to a closed loop will be completed prior to startup from RF-4. Following RF-4, in the event of a main control fire concurrent with a loss of offsite power, the eight SOV's could be rendered inoperable. However, the new closed loop design of the service water system assures that the safety related portions of the system will remain solid. The possibility of severe water hammer no longer exists.

The associated circuits/common enclosure issue resulted in the potential for credited safe shutdown components to be unavailable following a fire in the main control room or fire area C-24. One hour roving fire watches have been in effect for all normally accessible safety related areas of the plant since 1991 due to potentially degraded penetration seals. Additionally, a roving fire watch has been in effect since November 1989 in fire area C-24 due to potentially degraded Thermo-Lag barriers. Fire watches serve as a significant compensatory measure for reduced levels of fire protection in that they serve to identify potential fire hazards and would be expected to identify any fire in its incipient stage so that it may be rapidly extinguished prior to causing significant damage or loss of safe shutdown capability.

GSU's review of this event indicates that the apparent root cause is that the scope of compliance with Sections III.G and III. L of 10CFR50, Appendix R concerning separation criteria, associated

(5-92)

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		05000 458		91	008	05	14	OF 14

TEXT (If more space is required, use additional copies of NRC Form 365A) (17)

circuits, and alternate shutdown capability was not fully understood during the development of the FHA. GSU is performing a formalized and comprehensive root cause analysis of this event involving the assistance of the architect/engineering firm for RBS along with the independent contractor performing the reverification of the FHA. GSU expects to complete the root cause evaluation by 11/11/93. This date coincides with a commitment made in response to NRC inspection report 93-09 to fully implement the revised and reformatted FHA.

NOTE: Energy Industry Identification System Codes are identified in the text as (*XX*).