

LICENSEE EVENT REPORT (LER)

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TITLE (4)
Unsealed Fire Barrier Penetrations

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 NAMES		DOCKET NUMBER (5)
03	01	88	88	009	02	08	26	88			0 5 0 0 0
<p style="text-align: right;">THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)</p>											

OPERATING MODE (9) 1	POWER LEVEL (10) 100	20.402(b)	20.406(e)	90.73(a)(2)(vi)	73.71(b)
		20.406(a)(1)(i)	90.36(e)(1)	90.73(a)(2)(v)	73.71(e)
		20.406(a)(1)(k)	90.36(e)(2)	90.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text: NRC Form 366A)
		20.406(a)(1)(w)	X 90.73(a)(2)(i)	90.73(a)(2)(viii)(A)	
		20.406(a)(1)(iv)	90.73(a)(2)(ii)	90.73(a)(2)(viii)(B)	
		20.406(a)(1)(v)	90.73(a)(2)(iii)	90.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME L.A. England - Director, Nuclear Licensing	TELEPHONE NUMBER 5 1 0 1 4 3 8 1 1 4 1 1 4 5
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC TURE	REPORTABLE TO NRRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC TURE	REPORTABLE TO NRRDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH DAY YEAR
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ABSTRACT (Limit to 1400 spaces (i.e. approximately fifteen single space typewritten lines) (16)

At 1000 hours on 3/1/88 with the unit at 100 percent power (operating condition 1), an unsealed penetration was discovered in a control building fire wall on the 70 foot elevation. A second unsealed penetration was discovered in the 98 foot elevation of the diesel generator building at 0830 hours on 3/11/88. On 3/17/88 at 1100, an unsealed penetration and an uncoated steel beam (forming part of a fire barrier assembly) was discovered in an auxiliary building fire wall in the "D" tunnel on the 70 foot elevation. On 3/24/88 at 1630, inadequately sealed penetrations between the auxiliary building and the annulus were discovered. On 4/12/88 at 1100, an opening between a control building fire door frame and the fire wall was discovered. On 4/14/88 at 0800, engineering identified an open hatchway between fire areas, an open trench between fire areas and an unqualified penetration seal.

Performance of inspections for the implementation of corrective action revealed additional openings in several buildings. Fire watches were imposed in areas not previously covered. Safety analysis performed for all items revealed no adverse safety consequences due to openings found between fire areas.

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TEXT (if more space is required, use additional NRC Form 288A 9/1/77)

REPORTED CONDITION

Reported conditions are as follows:

1. At 1000 hours on 3/1/88 with the unit at full power in operating condition 1, Gulf States Utilities (GSU) Quality Control (QC) personnel found an unsealed penetration (*PEN*) in a control building fire wall.
2. At 0830 hours on 3/11/88, Quality Control personnel reported finding an unsealed conduit penetration in the fire wall between the 1E22*ENGS001 high pressure core spray (HPCS) (*BG*) diesel (*DG*) and 1EGS*EGLB (division II) diesel control rooms.
3. On 3/17/88 at 1100 an unsealed penetration and an uncoated steel beam (forming part of a fire barrier assembly) was discovered in an auxiliary building (*NF*) fire wall in the "D" tunnel on the 70 foot elevation.
4. On 3/24/88 at 1630, inadequately sealed penetrations between the auxiliary building and the annulus were discovered.
5. On 4/12/88 at 1100, gaps between the CB98-21R door frame and wall were discovered. This is a fire door between the chilled water equipment room 1B and the general area in the control building (*NA*), elevation 98 feet.
6. On 4/14/88 at 0800, engineering discovered two areas where plant design allowed communication between fire areas. Installation of a penetration seal in an unqualified configuration was also identified.

The following items (7 through 20) were discovered during inspections from the implementation of a corrective action program addressing items 1 through 6:

7. At 0815 on 6/17/88, unsealed conduits were found in fire walls on the 98 and 116 foot elevations of the control building.
8. At 1100 hours on 6/17/88, openings around floor plugs at the 98 and 116 foot elevations of the control building were discovered, and deficiencies were found in the fire barrier wall around the Division I remote shutdown room, elevation 98 feet, 0 inches.
9. At 1400 hours on 6/21/88, a breached penetration and an opening over a fire door frame were discovered in the 70

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foot elevation of the control building.

10. At 1300 hours on 6/23/88, an incompletely sealed penetration at the 70 foot elevation and unsealed openings into the control building northwest stairwell were discovered.
11. At 1030 hours on 6/24/88, unsealed conduits and a damaged penetration seal were found in fire rated walls in the 70 foot elevation of the control building.
12. At 1300 hours on 6/30/88, an unsealed penetration and a unrepaired concrete blockout were found in the electrical tunnel east of the diesel generator and control buildings.
13. At 1100 hours on 7/7/88, an unsealed penetration was found in the 70 foot elevation of the fuel building.
14. At 7/11/88 a damaged penetration seal was found in the 148 foot elevation of the fuel building.
15. At 1330 on 6/24/88, openings were discovered between the emergency diesel generator rooms and their respective storage tanks. The original condition report (CR) was lost and reinitiated on 7/14/88.
16. At 1400 hours on 7/18/88, an unsealed penetration was found in a fire rated floor in the 95 foot elevation of the auxiliary building.
17. At 1030 hours on 7/19/88, unsealed floor plugs were found on the 114 foot and 141 foot elevations of the auxiliary building in fire rated floors.
18. At 1300 hours on 7/20/88, one breached and one damaged penetration were found in an auxiliary building fire barrier.
19. At 1430 hours on 7/21/88, openings were discovered around the control building northwest stairwell enclosure at elevation 98 feet. The stairwell penetrates a fire rated floor and must be sealed to maintain fire area separation.
20. At 0930 hours on 8/7/88, a gap over a fire door was found at the 148 foot elevation in the Fuel Building.

River Bend Station (RBS) Technical Specification 3/4.7.7 requires all sealing devices in fire rated assembly penetrations be operable at all times.

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CRs were initiated as each opening was discovered. A fire watch was initiated for each opening, if the area was not under an existing fire watch.

EVALUATION AND INITIAL CORRECTIVE ACTION

Evaluation and initial corrective action has been performed for the reported conditions as follows:

1. Unsealed penetration, control building wall, elevation 70 feet:

The opening in the control building fire wall was discovered during repair of a nearby penetration, breached as required by Modification Request (MR) 87-0414, which is a plant modification for the installation of security communication cable. Personnel performing the repair noted the opening and informed GSU Quality Control. The opening is at elevation 91 feet - 6 inches, 7 feet - 4 inches west of CA-line, in the wall 1 foot - 3 inches south of 2-line. This wall separates cable (*CBL*) area C from heating ventilation and air conditioning (HVAC) (*VI*) room 1A. The opening itself is approximately 6 inches in diameter with a 3 inch fire protection line passing through the opening.

2. Unsealed penetration, diesel generator building wall, elevation 98 feet:

The opening between the HPCS and division II diesel control rooms was discovered during the performance of MR 87-0414. Inspection of this penetration noted the absence of fire seal (*SEAL*) material in penetration 1WS911N11, approximately 20 inches west at the same elevation. Maintenance Work Order (MWO) 116710 and a Limiting Condition of Operation (LCO) were initiated to track sealing of the open penetration.

3. Unsealed penetration and uncoated steel beam, auxiliary building "D" tunnel, elevation 70 feet:

The opening in the auxiliary building is located in the northeast corner of "D" Tunnel where a small room is located containing division II cable. The remainder of "D" tunnel cable is division I, although division II motor operated valves (MOVs) are located in this same area. The opening is in the southwest corner of the division II room, at the ceiling. The rectangular opening is formed by the area between the web and flanges of the W36X182 beam, which comprises the top three feet of the division II room south

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wall. The opening was found by QC personnel during sealing of penetration seals breached under MR 87-0414. MWO 116737 was initiated to seal the opening and track its closure on the firewatch LCO.

- Inadequately sealed penetrations, reactor building shield wall, elevations 114 and 141 feet:

Penetration 1WX513N28, between the annulus and the auxiliary building (1RCP*TCA9) was found open during an effort to replace missing hardware on the termination cabinets. Initial corrective action was to verify annulus pressure, which was acceptable at -3.9 inches water gage (W.G.). To reduce inleakage, the identified penetration was temporarily sealed. All other penetrations behind termination cabinets that penetrate the annulus from secondary containment were inspected by GSU engineering. One other breach was found in 1RCP*TCA12, auxiliary building elevation 141 feet, penetration 1WX510R22. This penetration was also sealed to reduce inleakage. These openings were added to the fire watch LCO already existing in these areas.

- Inadequate seal around control building door frame, elevation 98 feet:

Door CB98-21R is a removable frame fire door located on the south side of chilled water equipment room 1B. The opening discovered is the space between the door frame and the south wall itself. This gap varies slightly around the door, but averages approximately 1/4 inch. MWO 113670 was initiated to seal this perimeter opening and track closure against the LCO.

- Communication between fire areas, open hatchway and improperly installed penetration seal:

Plant walkdowns performed by engineering and QC personnel revealed that an open hatchway exists between elevation 98 feet and elevation 70 feet of the auxiliary building, east side in a fire rated floor. Likewise, a drainage trench was found that communicates between division I and division II fire areas in 'B' tunnel, east of the fuel building. This trench penetrates fire rated walls. Examination of the division I safe shutdown room shows cable tray and conduit entering the gypsum board walls. These walls have a three hour fire rating. Openings in the walls are sealed with B&B Promatec silicone elastomer. All qualification testing available shows these sealants to be qualified in concrete walls. Due to the

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difference in fire behavior, performance of these seals in a metal stud/gypsum board wall may be different than a concrete wall.

The following items (7 through 20) were discovered during inspections from the implementation of a corrective action program addressing items 1 through 6.

7. Unsealed conduits through fire barrier walls:

Conduits 1CK004HE, 1CL004NB, 1CL004NE and 1CK004NH were found to be unsealed between the division II switchgear room and the cable area, elevation 98 foot of the control building. These conduits are from 1 1/2 inches to 4 inches in diameter and are non divisional power and control raceway. All four conduits were in one sealed blockout. The ends of the conduit in the division II switchgear room were sealed with duxseal, a non rated sealant. Closure of these conduits will be performed under MWO 113680. The unscheduled 3/4" conduit is found in penetration 1C3W39, on the 116 foot elevation of the control building. This conduit runs from the division I battery room to the recharger room. Initiation of MWO 113681 will provide the method to seal the conduit.

8. Unsealed floor plugs and division I remote shutdown room:

Floor plugs in fire rated floors in the 98 and 116 foot elevations of the control building were found with perimeter gaps open to the area below. These gaps range in size from 1/2 inch to one inch and are present on two sides of the floor plugs. Detailed inspection of the division remote shutdown room revealed unsealed conduit penetrations, missing gypsum board and inset electrical boxes, all of which degrade the surrounding 3 hour rated fire barrier. All defects result from initial construction of the enclosure. Repair of the enclosure will be accomplished via MWO.

9. Inadequate seal around fire door frame and breached penetration seal:

Fire door C70-09 was found with a gap of 1/4 inch, between the wall and the top of the door frame. This door is between cable areas A & B at the 70 foot elevation of the control building. MWO 115651 was initiated to seal this opening. Electrical blockout 1C1W08 is located in the wall between cable chase I and HVAC room 1B on the 70 foot elevation of the control building. The penetration seal is breached by a 1 inch unscheduled conduit which

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terminates in these respective areas. The conduit contains no cables. Repair of the penetration will be accomplished by MWO 115652.

10. Incompletely sealed penetration and openings into the northwest stairwell:

Control building penetration #253, elevation 81 foot 6 inches, is in the fire rated wall between fire areas C-5 and C-6. This penetration was originally sealed by grouting, but a 1" opening was left at the top of the penetration. MWO 113682 has been initiated to close the opening. The northwest stair tower penetrates the control room at elevation 136 foot and is surrounded by an enclosure of masonry and steel plate. The stairway must be separated from the main control room to prevent a fire on the 116 foot elevation below from having an effect in the control room. As provided, the top of the stair tower has openings for conduit and a seam where the roof plates are joined. The south wall of the enclosure has a open louver to provide equalization in the control room pressure envelope. Modifications to the enclosure structure will be added under modification request (MR) 88-0220.

11. Missing internal conduit seals and damaged penetration seals:

Conduit 1CX152BB was found unsealed at the fire barrier wall between B tunnel east and B tunnel west at the 70 foot elevation. This conduit is a 1 1/2 inch blue division power raceway. MWO 113685 has been initiated to provide a fire seal. Conduit 1CX940SC is similar, passing from the control building cable area to B tunnel east, above the 70 foot elevation. This conduit passes through the penetration 1C1W73, the damaged penetration. The control building face of the penetration seal is missing a portion of the permanent damming. The conduit passes entirely through the control building fire area, but an open pull box exists in the area exposing the adjacent fire areas. Two MWOs have been initiated, 113686 to rework the penetration and 113687 to seal the conduit. The unscheduled conduit breaching penetration 1C1W08 was also found to have no internal seal. This conduit will be sealed under MWO 113688.

12. Breached penetration and unrepaired blackout:

Penetration 1WC009N85 is located in the dividing wall between B tunnel east and B tunnel west at elevation 80 foot 10 inches, and is 4 inches in diameter. The pene-

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tration was breached by a 1 inch conduit after being initially sealed. MWO 113691 has been written to repair the penetration. Also in the wall separating B tunnel east and west, a concrete blockout was found measuring approximately 12 by 14 inches. This opening remained from passing the B tunnel roof framing steel through this wall. The concrete wall will be sealed under MWO 133490.

13. Unsealed penetration in the fuel building:

A 4 inch pipe sleeve was found unsealed in the west wall of the fuel building at elevation 78 feet 7 inches. This fire rated wall separates the fuel building from the pipe tunnel. This penetration is located behind platform framing steel installed at elevation 80 feet. MWO 113692 was initiated to seal this opening.

14. Damaged penetration in the fuel building:

Penetration 1WS680N01 was found with the permanent damming on the east face improperly installed. The east side dam had moved during seal installation, allowing a small amount of material to flow out past the dam. This penetration occurs in the wall between the stairwell and the general area at elevation 148 feet. MWO 113693 was initiated to repair the penetration.

15. Openings between the diesel generator rooms and fuel storage tanks:

Each diesel generator room contains an access opening to a flanged cover of the 50,000 gallon diesel fuel storage tank, buried in sand below grade. This access opening is provided for inspection of the tank and its contents and is covered by a unrated steel plate. Design documents call for a three hour rated barrier between each diesel and its respective storage tank. This opening could expose the storage tank to a diesel generator fire or vice versa.

16. Unsealed penetration in an auxiliary building floor:

Penetration 6CD, located on the 95 foot elevation of the east side of the auxiliary building, was found unsealed. This penetration contains instrument lines feeding instruments on 1JPB*RAK2. This opening is in the floor separating D tunnel and the LPCS pump removal area on elevation 95 feet of the auxiliary building. MWO 113694 was initiated to seal the penetration.

17. Unsealed auxiliary building floor plugs:

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Floor plugs are provided in fire rated floors on the 95, 114 and 141 foot elevations of the auxiliary building. These plugs are either singular or multiple blocks. Drawings call for a 1/2 inch clearance around the perimeter of each block to allow for construction and installation tolerances. Unlike the control building floor plugs, the plugs in the auxiliary building are stepped on the perimeter.

18. Breached penetration and damaged penetration in auxiliary building D tunnel:

Penetration 1WC828010, is in the wall between D tunnel and the HPCS pump room, elevation 91 feet. The organization responsible for breaching the seal cannot be determined. WO 112957 was initiated to seal the opening. Damaged penetration 1X1W06 has a small piece of permanent damming material missing from the west face of the seal. The penetration is located in the east wall of D tunnel, elevation 90 feet, separating D tunnel and E tunnel. Loss of damming board may occur due to maintenance activities, moisture, or poor original placement. It is not known which of these is responsible or when the damming was lost.

19. Openings in the northwest stairwell enclosure:

The control building floor at the 98 foot elevation is a three hour rated barrier. The northwest stairwell penetrates this floor. Openings are present above the stair tower door, C93-22, and between the stairwell and the west wall of the control building.

20. Opening over fuel building fire door

The frame of door F148-03 was found with a gap from the wall to the head. This gap varies from 1/8 to 3/8 inches. The opening will be sealed under MWO 112937.

Fire watches will continue as required until each identified open penetration has been sealed, and design changes as required are installed.

FURTHER INVESTIGATION AND CORRECTIVE ACTION

The items will be grouped in their respective buildings to clarify the analyses presented and to eliminate redundant use of terminology. Items presented in each section will be indicated after the heading. More than one opening may

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be associated with each item, some items may pertain to several buildings.

A. Control building (Items 1, 5, 6, 7, 8, 9, 10, 11, 19):

1. Unsealed penetration, control building wall, elevation 70 feet:

A stainless steel sleeve (*SLV*) was found around the pipe in the penetration in the control building fire wall, discovered on 3/1/88. An adhesive sealant had been used to seal the annular space between the pipe and sleeve. A subcontractor work tag was found attached to the wall nearby. Review of design documents shows this penetration was created under Engineering and Design Coordination Report (E&DCR) C-14461A to allow passage of the AS-6C sprinkler system line. The E&DCR provides a 4 inch diameter sleeve. No reseal instructions or penetration number was provided. By inspection of the design documents and the as found condition, it is apparent construction crafts exposed the first rebar layer to allow an opening to be chipped in the wall without rebar damage. The penetration was made, the pipe was put in place, and the subcontractor installed a sleeve and a fire seal. Repair of the wall was never addressed, and each contractor assumed the other would repair the wall. The penetration has been open since the conclusion of construction. The opening will be grouted in accordance with Specification 210.370, the site specification for concrete installation.

5. Inadequate seal around control building door frame, elevation 98 feet:

Examination of door CB98-21R which was discovered to be inadequately sealed around its frame on 4/12/88 indicates that it was originally sealed to the concrete wall, removed and reinstalled without sealing the perimeter opening. This door forms part of the fire rated boundary between fire areas C-13 and C-16. Area C-13 contains HVAC equipment for both divisions, separated by a one hour rated wall. Division II equipment is closest to door CB98-21R. Area C-16 contains division I and II cables with the division II cables protected. Wet pipe sprinklers are provided in area C-13, while area C-16 has smoke detection only.

6. Unqualified penetration seal in Division I remote shutdown room:

The Division I safe shutdown room, fire area C-28, is

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enclosed by a three hour rated wall. Wall construction is of multiple layers of gypsum board on metal studs in accordance with Underwriters Laboratories (UL) Standards. Design drawings require electrical openings to be sealed in accordance with the penetration sealing specification 229.180. Review of this specification and qualification data show all testing was performed in concrete walls or floors. The seal as installed in the gypsum board wall is not substantiated by test data.

7. Unsealed conduits through fire barrier walls:

None of the conduits found open had previously been sealed. The four conduits at the 98 foot elevation pass through the 4 line wall, bending upwards to within approximately 12 inches of the floor slab above. This wall separates the division II switchgear room from the general area at the 98 foot elevation. The 3/4 inch conduit passes through the wall separating the Division I battery and battery charger rooms.

8. Unsealed floor plugs and division I shutdown room:

Review of design drawings for the control building floor plugs show that plugs are supported on all four sides by floor framing steel at both EL 98' and EL 116'. Apart from localized irregularities, the concrete plug would bear on the steel beam underneath, preventing any transmission of smoke or combustion products from one area to another. However, both floor plugs consist of more than one unit, leaving a space between adjacent fire gases to the area above.

The construction of the division I remote shutdown room and the surrounding area is discussed in item 6. This area is utilized only in the event of an evacuation of the main control room. Omission of gypsum board is not permitted by the design drawings. Openings or electrical boxes tend to degrade the fire barrier, as discussed in the UL "Building Materials Directory", 1988.

9. Inadequate seal around door frame and breached penetration seal:

Door CB70-09 is in a three hour fire wall between fire areas C-6 and C-7 at the 70' EL of the control building. Area C-6 is a method I area; Area C-7 is method II. Both areas utilize smoke detection and water spray on cable trays.

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Penetration 1C1W0B on the CA-Line wall, 1 foot north of 2-line. This wall separates fire areas C-1A and C-4. Both areas are provided with wet pipe sprinklers, and area C-4 also has smoke detection. Fire area C-1A is the blue (division II) cable chase in the northeast corner of the control building. Area C-4 is the HVAC room for the switchgear areas. Both divisional fans are located in this area, separated by a one hour fire wall.

- Incompletely sealed penetrations and openings between the main control room and Northwest stair tower:

Penetration 253 was created by E&DCR C4748 in order to route line 1-IAS-001-116-4 through 3-line wall at elevation 81' - 6". This cored opening was sealed by drypack grout incompletely, leaving a 1" opening between cable areas B and C.

The stairwell enclosure was created by E&DCR C-7349, in response to security concerns over main control room access. The original stairway penetration was completely unprotected, so the E&DCR did not consider fire protection requirements.

Inspection of the Northwest stairway by engineering personnel indicates the enclosure as erected at elevation 136' in the main control room is of substantial, but not fire rated construction. This enclosure has an open louver to allow pressure equalization throughout the control room envelope, and openings exist between the plates making up the roof and around conduit penetrations. The door is not fire rated. The fire hazards analysis assumes that the control room is separated from other areas by a three hour rated barrier.

- Missing internal conduit seals and damaged penetration seals:

Internal conduit seals were found missing in two conduits in different areas of the control building, neither had been previously sealed. The unscheduled conduit is the conduit found breaching penetration 1C1W08 and has no cabling installed. Conduit 1CX940SC is open at a pull box in the control building passageway at the 70 foot elevation. This conduit passes through penetration 1C1W73, which is missing part of its permanent damming on the east side. Inspection records show the penetration was previously acceptable. Damming board may have been lost due to moisture or mechanical damage.

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B. Auxiliary building (Items 3, 4, 6, 16, 17, and 18)

- 3. Unsealed penetration and uncoated steel beam, auxiliary building "D" tunnel, elevation 70 feet:

Design of the Division II room in "D" tunnel utilized the Auxiliary Building elevation 95 foot floor framing as the top portion of the south wall of the room. The west wall of the room was poured up to the edge of the beam flanges, leaving open the rectangular area between the flanges which was discovered on 3/17/88. This penetration never appeared on any design drawings, and the fire seal subcontractor was never alerted to its presence. Consequently, the opening was never sealed. Additionally, the structural steel member, which comprises the top three feet of the south fire-rated wall, is not qualified as a three hour barrier. Typical firewalls at RBS are 8 inches of reinforced concrete, minimum, similar to rated construction shown in the Underwriters Laboratories (UL) Fire Resistance Directory.

Fire area AB-7 encompasses all of "D" tunnel, with the exception of this division II room in the northeast corner. Figure 9A.2-1 of the RBS Updated Safety Analysis Report (USAR) shows this room is not included in any fire area. Cables in this room are division II cables, feeding from fire area ET-2 to area AB-2/Zone 2. Safe shutdown method 1 (division I) is used for a fire in either area ET-2, or AB-2, while fire area AB-7 utilizes shutdown method 2 (division II). No reference to this division II room can be found in the fire hazards analysis, indicating the original analysis assumed it a part of an existing fire area, rather than a separate one.

- 4. Inadequately sealed penetrations, reactor building shield wall, elevations 114 and 141 feet:

Investigation of the unsealed annulus penetrations discovered on 3/24/88 shows that both had been previously sealed. It is not known when the breaches were made.

- 6. Open hatchway between fire areas:

The floor at elevation 95 foot on the west side of the auxiliary building is a three hour rated barrier that separates D tunnel (fire area AB-7) from the HPCS pump removal area (fire area AB-2/Zone 2). As discussed above, area AB-7 utilizes method 2 shutdown, while AB-2 uses method 1. Both areas have smoke detection, and area AB-7 has a deluge system on the cable trays. The hatchway is

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TEXT (if more space is required, use additional NRC Form 388A's) (17)

for a vertical ladder providing access to D tunnel. The west side hatchway is enclosed by a rated barrier, but no separation consideration was given to the east side.

16. Unsealed floor penetration:

Research of plant documents indicate this penetration had not previously been sealed. This opening exposes fire area AB-2/Zone 2, on the 95 foot elevation, to the division II room in D tunnel elevation 70 feet. The sleeve resembles a standard drain hub, commonly located near instrument racks for blowdown considerations. It is believed for this reason the opening was never sealed or previously discovered. Smoke detection is provided in AB-2/Zone 2, while the area below has a smoke detector actuated deluge system on the cable trays.

17. Unsealed floor plugs:

Floor plugs are provided in eleven places in fire rated floors on both the east and west sides of the auxiliary building at the 95 foot, 114 foot and 141 foot elevations. All plugs are of similar construction, metal pans filled with reinforced concrete. The perimeter of both the floor opening and each floor plug is stepped and tapered to eliminate radiation streaming and to provide a more secure fit.

18. Breached and damaged penetration in Auxiliary building D tunnel:

Penetration 1WC82801 is located in the wall separating the HPCS pump room from D tunnel. The HPCS pump room, fire area AB-2/Zone 1, is provided with smoke detection, while D tunnel, fire area AB-7, has a smoke detector - actuated deluge system on the cable trays. B&B/Promatec QC-3A #8786 shows this penetration was sealed 10/13/85. Breaching of this penetration was performed by unknown personnel.

Electrical blackout 1X1W06 was installed under QC-3A 8226. This penetration is in the wall separating the electrical tunnel, fire area, ET-1, from D tunnel. Cable trays in area ET-1 are also provided with a water spray system. Areas ET-1 and AB-7 are method 2 shutdown areas; area AB2 utilizes method 1.

C. B Tunnel (Items 6, 11, and 12)

6. Open drainage trench:

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TEXT (if more space is required, use additional NRC Form 388A) (17)

Designs drawings show two drainage trenches extending the length of B tunnel. One trench is dedicated to the east side (fire area ET-1) and one to the west side (fire area ET-2). The west side trench is exposed in the ET-1 fire area where the west tunnel is dissected by the east tunnel, between the 2 and 3 column lines of the diesel generator building, at elevation 67 feet 6 inches. The trench runs through the end walls of B tunnel west, leaving an opening 8 inches by 111 inches in each wall.

11. Unsealed conduit:

Conduit 1CX152BB passes from traverses both sides of B tunnel. This conduit was never provided with an internal seal. Both fire areas, ET-1 and ET-2, utilize smoke detectors actuating cable tray deluge system. This raceway is extensive in area ET-1 and extends approximately 8 feet into area ET-2.

12. Breached penetration and unrepaired blockout:

Wall sleeve 1WS009N85 was cored through the wall under E&DCR C-26,837, and subsequently sealed using QC-3A 12815. This penetration was later breached by unknown personnel for installation of a 1 inch conduit.

The concrete blockout found at 4 line is a result of construction practice. The roof framing steel is continuous across the B tunnel dividing wall, and blockouts were constructed to allow the beams to pass through. The remaining blockouts were repaired. This blockout, approximately 12 inches by 14 inches in size, remained open. No reason is readily apparent.

D. Fuel building (Items 13 and 14):

13. Unsealed penetration at elevation 70 feet:

The open pipe sleeve was originally poured in the west fuel building wall. This sleeve was originally penetration 22k, provided for instrument lines. The fuel building platform installed at elevation 80 feet blocked access to the east side of the penetration. Instrument lines were routed through a cored opening above the platform, renumbered 22k. As the original sleeve number was shifted to another penetration, the original sleeve was never sealed.

14. Damaged penetration in the fuel building:

Penetration 1WS680N01 was sealed using B&B Promatec QC-3A #751. Inspections show damming was acceptable. Typical

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TEXT (if more space is required, use additional NRC Form 288A's) (17)

installations used one permanent and one temporary dam to install sealant. After curing, the temporary dam is removed, the seal inspected, and permanent damming is installed. the west dam of the penetration is acceptable. It is believed the west dam was used for the penetration inspection.

E. Diesel generator building (Items 2 and 15):

2. Unsealed penetration, diesel generator building wall, elevation 98 feet:

Penetration IWS911N11 between the HPCS diesel generator control room and the division II diesel generator control room, discovered on 3/11/88, was installed by E&DCR C26873. The 2-inch diameter sleeve contains a 1 and 1/2-inch diameter communications conduit (*CND*). Review of subcontractor records revealed that this penetration was shown as a spare, with no seal required. Remaining penetrations in this fire wall are shown as receiving fire-rated seals. Inspection results of all penetrations installed under E&DCR C26873 (11 total) show the remainder have fire seals installed. There is no apparent explanation for the absence of the required fire seal at this penetration, except for human error.

15. Openings between the diesel rooms and the storage tanks:

This opening is designed to allow for access to the stored diesel fuel and for tank inspection. The storage tanks are buried in sand below grade. The hatch cover is a square piece of steel plate, and is not rated. Design documents call for a three hour rated barrier between the storage tank and the diesel room. Each emergency diesel generator room has the same opening. The original condition report describing the finding was never found. No log entries are noted for this condition or similar situations on this date.

Corrective action has/for consisted of the following:

1. STP-000-3602, "Fire Barrier Visual Inspection", has been reviewed to ensure it adequately represents plant design.
2. Detailed training has been provided to individuals performing this STP.
3. The STP has been performed using qualified personnel with appropriate levels of supervision.
4. Qualified fire watches are established and will be maintained and a plan for required sealing of any penetrations which may be found by the performance of the STP will be implemented.

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TEXT (if more space is required, use additional NRC Form 3054's) (17)

- All site personnel have been informed by memorandum to be aware of any openings in floors or walls during performance of their routine activities.

STP-000-3602, "Fire Barrier Visual Inspection", was completed 8/9/88. Performance of this STP is responsible for finding Items 7 through 20. High radiation areas inaccessible during operation, which consist of portions of the drywell wall, will be inspected during the next planned outage. The STP was conducted with supervision from both Quality Control and Engineering Departments.

This performance is the third performance of this STP. Previous inspections have failed to detect the openings found during this examination. Some of the openings found are examples of breached penetration seals which could have occurred between inspections. The majority, however, constitute original construction defects. Corrective action for this procedure is as outlined above - procedure conformance to design drawings, personnel training and adequate supervision.

Additional corrective action will involve design changes to protect the structural steel on the south side of the division II room in D tunnel; to correct the open hatchway into D tunnel; and the control building stairwell enclosure. The fire hazards analysis and USAR will be revised, as required, to incorporate the revised areas.

A review of previously submitted LERs from River Bend Station revealed a similar condition of two unsealed penetrations in cubicle 'B' for the spent fuel pooling cooling (*DA*) pump (*P*) reported in LER 87-021. These penetrations were not in a "typical" wall. The penetration seal contractor, utilizing "typical" penetration drawings, was unaware of them and failed to seal them.

River Bend Station's LER 86-038 reported a similar condition of omitted fire seals. These were the result of the proper deletion of the radiation sealing requirements causing the sealing contractor to additionally delete the fire sealing requirements. Fifty-six additional unsealed conduits were sealed as a result of corrective action reported in LER 86-038.

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TEXT (if more space is required, use additional NRC Form 305A's) (17)

An earlier report, LER 86-036, described improperly installed "one-shot" conduit seals. These "one-shot" seals were not installed per configurations that were fire tested by the installation subcontractor.

Of the three LER's presented above, only LER 86-038 is applicable. Corrective action for LER 87-021 was to examine block walls for other, un-numbered, penetrations. No openings in block walls were found during this inspection. LER 87-036 dealt with misplaced, not missing internal conduit seals. The corrective action was to examine seals documented to be installed in a similar fashion. Missing internal conduit seals found during this STP had never been installed. LER 86-038 documented an open penetration found in a auxiliary building fire wall. The corrective action was to inspect for missing penetration seals while examining conduit seals deleted from radiation sealing requirements. No additional open penetrations were found, but several unsealed conduits in fire barriers were documented. This inspection was not a complete inspection of the auxiliary building, but limited to the area around the conduits in question. The limited scope of the inspection was justified by what at the time was an isolated case of an open penetration. Although this inspection found several open auxiliary building penetrations, no open conduits were found.

SAFETY CONSEQUENCES

A. Control building:

1. 70 foot elevation (Items 1, 9, 10 and 11):

The HVAC room, fire area C-4, at the 70 foot elevation has openings in the east and south walls. The east wall separates area C-4 from area C-1A, cable chase I. The south wall is the dividing wall between area C-4 and cable area B, fire area C-5.

Area C-1A contains primarily division II cables and is provided with a wet pipe sprinkler system. Area C-4 contains unit coolers (*AHU*) 1HVC*ACU2A and 1HVC*ACU2B while area C-5 contains divisional and non-divisional cable in cable trays (*TY*). A water spray (deluge) system is

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TEXT (if more space is required, use additional NRC Form 888A's) (17)

provided on cable trays in area C-5, and area wide wet pipe automatic sprinkler system in area C-4. The 'A' and 'B' unit coolers serve the standby switchgear rooms and cable chase areas and each is sized for 100 percent of the required capacity. The redundant unit coolers are further protected from fire damage by a one hour firewall between the A and B divisions. The open penetrations are in the area occupied by 1HVC*ACU2B. The fire load presented by the unit coolers is negligible, so a fire in the area of 1HVC*ACU2B would have no effect on the cabling in fire area C-1A or C-5.

A fire in area C-5 could admit smoke and hot gases to the area around unit cooler 1HVC*ACU2B. Deluge system actuation in area C-5 would greatly limit any heat or combustion products and smoke alone would not be sufficient to disable the unit cooler. However, conservatively assuming 1HVC*ACU2B was lost due to the effects of a fire in area C-5, the redundant unit cooler 1HVC*ACU2A would be available if required. Likewise, a fire in area C-1A would be of a large magnitude, considering the combustible loading of 7.8 hours. This fire would tend to climb upward, introducing air into the area through this penetration and unsealed conduit. This would produce no detrimental effect in area C-4. If sufficient heat was introduced, sprinklers in area C-4 would initiate, protecting at least one divisional, probably both, air handling unit. The one hour wall between the division I and II air handlers would ensure that the division I component remains undamaged. Fire could not be conducted across area C-4 spreading from C-1A to C-5, or vice versa, due to the area sprinkler coverage.

Penetration #253 is in the wall separating fire areas C-5 and C-6. Both fire areas have primarily division II components, and both areas are provided with an automatic water spray deluge system on exposed cable trays. division I and division II components in area C-6 are protected by one hour barriers, while the division I components in area C-5 are not a part of a shutdown path. If a fire occurred in either area, some combustion products could be transmitted to the adjacent area. Due to the location of the wall sleeve, away from combustibles and the ceiling, passage of smoke would be

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TEXT (if more space is required, use additional NRC Form 288A-1 (17))

minimal. Regardless, as both areas employ the same safe shutdown method in case of fire, division I, no impact to plant safe shutdown can be postulated.

Penetration 1C1W73 separates fire areas C-10A and ET-1. Seal depth as indicated on the inspection documents, is 5 1/2 inches. Testing performed by B&B Promatec in Construction Test Procedure (CTP) 1142 demonstrates a 5 inch deep seal using the same material with no permanent damming is qualified as a three hour rated seal. This test was performed as a floor penetration. Performance in a wall is much less demanding, so existing seal depth is judged to be sufficient to provide a three hour barrier. The seal conduit penetrating this seal provides an opening between fire area ET-1 and C-10A. Both areas utilize Method 2 (division II) for safe shutdown, so one undamaged path of safe shutdown would always exist. Additionally, migration of smoke and hot gases through conduits of this size (1 1/2 inches) is nonexistent under certain conditions. Testing performed on internal conduit seals for Perry Nuclear Plant, docketed under 50-440 and 50-441, demonstrate that in the absence of internal seals) in certain instances conduit will not pass fire, smoke or hot gases. Conduits 3 inches or less in diameter were shown to condense out products of combustion within the first 10 feet of conduit past the fire barrier. Conduit 1CX940SC is extensive in area ET-1, so a fire in the control building represents no hazard. A fire in the ET-1 area, if it penetrated this steel conduit, would discharge smoke into area C-10A, which contains only cabling. No effect would be felt.

The opening represented by this crevice over door CB70-09 is less than the permissible opening from the door to the floor (3/4 inches per NFPA 80). Smoke is transmitted past fire doors in a fire test or actual fire situation due to the tolerance between mating parts. No significant additional smoking would occur due to this opening. Fire testing does not reflect the suppression systems available on both sides of the door. Also, frame integrity remains intact as frame anchorages are unaffected and the frames are grout filled.

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TEXT (If more space is required, use additional NRC Form 3884's) (17)

No impact on safe shutdown. Transmission of smoke is considered in use of fire doors, and the doorframe assembly remains intact to prevent the spread of fire. For additional discussion on fire door performance, see Item 5 below.

2. 98 foot elevation (Items 5, 6, 7, 8):

Review of applicable fire door specifications - NFPA 252; UL10B; ASTM E-152; NFPA 80 - show that fire doors are permitted to have substantial gaps between the frame and the door, or the door and the sill. Allowable gaps range from 1/8 inches to 3/4 inches. Fire door testing allows these gaps along with the attendant passage of combustion products and periods of flaming outside the fire test furnace, on the door itself. The acceptance criteria requires that the door remains closed during the test and deflects no more than 1 door thickness during the fire and hose stream tests. Door frames shall not permit through openings. Considering the low fire loading in these areas-area C-16 has a 17 minute design base fire while area C-13 has a 6 minute design base fire and with the suppression available in area C-13, no effect would be felt due to this perimeter crevice. The door would remain closed. Structurally, the integrity of the door is not at risk as the door anchorage would equilibrate in temperature over the time of the test or fire exposure. Passage of combustion products would not substantially differ from that permitted in acceptable fire door installations.

The division I remote room, fire area C-28, is enclosed by a three hour rated wall. No instructions are given for sealing of wall penetrations on this drawing series, however drawing EE-37C is invoked by reference and requires electrical openings to be sealed in accordance with Spec. 229.180. Review of this specification and qualification data show all testing was performed in concrete walls or floors. The seal as installed in the gypsum board wall is not substantiated by test data.

However, the seal provided is a qualified three hour seal based on Test CTP-1063, performed in a concrete slab with a lined penetration. The test as performed subjected a seal of

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TEXT (if more space is required, use additional NRC Form 3884's) (17)

4" of LDSE plus 1" damming each side to the proscribed ASTM E-119 fire. Two trays were tested in a penetration that was lined with steel for half of its perimeter. One tray was placed in the corner junction of the liner, 0" spacing, while the other was 4" off. The sides of the liner were exposed to the fire, resulting in maximum heat transmission to the seal and the cable tray. The as installed condition in the wall of the remote shutdown panel, penetration 1C2W93, has 6 1/2 inches of LDSE with one dam, inside face. This seal will provide fire resistance equivalent to the three hour rated wall. First, the penetration is horizontal which is much less severe than a floor test. Second, seal thickness is over 150% of that required by test. Third, although the opening is steel framed, that steel is not exposed to the potential fire. Heat would first be transmitted through 2 inches of gypsum board, which is a considerable barrier in itself. Testing as performed in CTP-1063 show that a cable tray in contact with a steel liner can perform adequately in a fire situation. Finally, the maximum fire loading is in area C-16, outside the remote shutdown panel room. This is 22,355 BTU/ft², or approximately a 17 minute fire. Quantity of fixed combustible is insufficient to challenge the installed seal, and transient combustible contribution is not considered significant due to the location of the opening and lack of equipment in the area requiring service using flammable liquids. The division I remote shutdown room is fed by division I cable tray passing through area C-16. As division II cables in this area are protected by a three hour barrier, these cables provide the area combustible loading and are subject to damage from exposure fires. If area C-16 is on fire, access to the remote shutdown panel is very difficult and opening the fire door would negate the utility of the barrier. As a fire in this area would likely damage the cable serving the remote shutdown panel, it would be useless. Remote shutdown is utilized only in the case of main control room evacuations.

Four unsealed conduits penetrate the fire wall between fire area C-16 and C-14. Fire area C-14 is the division II switchgear room and contains the division II remote shutdown system. Area C-16 contains both division I and II equipment, protecting division II components. Area C-14 requires use of division I components in case of a fire in that area; Area C-16 utilizes division II. Both areas are provided with smoke detectors.

A fire in either area would impart smoke, heat and combustion products into the other fire area. In the event of a fire in area C-14, smoke and hot gases would be conducted upwards

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TEXT (if more space is required, use additional NRC Form 288A's) (17)

towards the bottom of the EL 116' floor slab, as the conduits sweep upward from the wall opening to within 12" of the slab. No division I equipment is in this area, and the closest tray is approximately 8 feet away and feeds the division I remote shutdown room. The remote shutdown room is not required for a fire in either area. The only division I required equipment is six pressure transmitters c- 1JCB*RAK2, more than 20 feet away. This equipment would be unaffected.

Fire in area C-16 would admit some amount of combustion products to area C-14. However, this fire is of such short duration and owing to the placement and orientation of the open conduits, little smoke would be seen in area C-14. Hot gases from these conduits would be exhausted adjacent to tray 1TK002B. Non divisional cable passing through the conduits may ignite as well, passing fire into area C-14. However, this is unlikely as fire would not progress downward, along the conduit. As in floor penetration seal design, heat rises away from the ignition area. Without the heat to drive off the volatiles in the cable insulation, the fire would not progress. Therefore, damage to area C-14 would be limited to small amounts of smoke which would be quickly removed by the smoke removal/air handling system. Note that the cable fires postulated in area C-16 are cable fires, typically show burning and providing rapid detection from the area smoke detection system. No impact to safe shutdown.

Review of design drawings for the control building floor plugs show that plugs are supported on all four sides by floor framing steel at both EL 98' and EL 116'. Apart from localized irregularities, the concrete plug would bear on the steel beam underneath, preventing any transmission of smoke or combustion products from one area to another. However, both floor plugs consist of more than one unit, leaving a space between adjacent plugs of approximately 1/2". This gap would readily conduct fire gases to the area above. Note that transmission of smoke in a downward direction is not considered due to the fact that heat, as well as smoke, rises.

Fire area C-6, control building EL 70', is directly beneath the 98' elevation floor plugs. This area utilizes division I for safe shutdown, while the area directly above, area C-16, uses division II. A fire in area C-6 could produce smoke or hot gases into area C-16, adjacent to division I cable trays. Assuming that a fire in area C-6 fails the division II cabling in this area (blue trays are unprotected by barriers), division II switchgear 1ENS*SWG1A on the 98 foot elevation would be lost. This would require use of division

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TEXT (If more space is required, use additional NRC Form 308A's) (17)

I equipment in area C-16. The division I equipment and cabling are near, and in some cases over the floor plugs. However, area C-6 utilizes water spray protection for cable trays. This suppression system would rapidly control any cable fires, minimizing smoke transmission to the 98 foot elevation. The water spray system would also protect area cabling from exposure fires. Since this suppression system would prevent the spread of smoke or hot gases to the area above, the safe shutdown path would be preserved.

Above fire area C-16 is area C-24 at EL 116 in the control building. Area C-24 is a division II safe shutdown path. The limited fire loading in area C-16 below (12 minutes-reference CR88-0468) could only provide minimal smoke in the area above. No safety-related equipment or exposed cabling is near the opening. There would be no effect on safe shutdown due to a fire below.

Note that a fire in area C-16 could affect areas C-13, C-14 and C-24 simultaneously. These areas have no effect on one another. The bounding event is the effect on area C-14.

3. 116 foot elevation (item 7):

Drawing EE-37B shows penetration 1C3W39 between fire areas C-20 and C-21. Fire area C-20 contains division I batteries, while area C-21 contains the associated charger. Fire loading in area C-20 is 28 minutes; loading in area C-21 is negligible. This missing internal conduit seal could pass small amounts of combustion products to area C-21 in the event of a fire in the battery room. The amount would be quite small due to the conduit size and low fire loading. No effect on plant safe shutdown is postulated as all components are division I, leaving division II equipment undamaged by a fire assumed to occur in either area.

Unsealed floor plugs at this elevation are discussed as part of the 98 foot elevation analysis.

4. 136 Foot elevation (item 10):

As it currently exists, fire in the 116' elevation immediately below the stairwell enclosure could pass smoke and combustion products to the control room. This is unlikely for several reasons. The combustible loading in the corridor area at the 116 foot elevation is negligible. Cable is in conduit and one small ventilation fan exists in the area. This is not a normal path to service equipment. No transient combustibles are found in this area. Also, the control room envelope

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TEXT (if more space is required, use additional NRC Form 365A's) (17)

pressurization would tend to keep combustion products away from the control room, as discussed in section 6.4 of the USAR. Significant combustibles at the 116' elevation, such as cable trays, charcoal filters, and large motors, are separated from the Northwest corridor by three hour rated barriers. In the event of a fire affecting the main control room, evacuation through the south stair tower could proceed and the remote shutdown panels would be unaffected.

B. Auxiliary Building:

1. 70 and 95 foot elevations (items 3, 6, 16, 17, 18)

Several penetrations on the perimeter of D tunnel (fire area AB-7) were found unsealed or damaged. These openings indicate that a fire in area AB-7 could affect the electrical tunnel (fire area ET-1) the HPCS pump room and pump removal room (fire areas AB2/Zones 1 and 2) and the division II cable room in D tunnel at the 70 foot elevation.

The physical layout of the auxiliary building "D" tunnel area has one stack of 7 cable trays 1 foot 9 inches south of the division II room's south wall, 2 foot 3 inches west of the hatchway through the 95 foot elevation floor slab. The top tray elevation is approximately 1 1/2 inches below the bottom of the W36X182 beam. The top tray carries 13.8 KV feeds. The division II room and contents are at risk from two possible fire events. First a fire in the nearby cable tray stack, particularly in the top tray, could impart a significant amount of heat and combustion products in the division II room area, through the structural steel beam on the south side and the attendant opening at the southwest corner. Second, a fire elsewhere in the "D" tunnel area could introduce smoke and hot gases into the room. This effect would also be felt at the 95 foot elevation as heat and fire gases were passed through the open hatchway. The effect at the open penetration 1WC828010 is less due to the location of the sleeve and size of the opening. Penetration 1X1W06 is of sufficient thickness that no degradation barrier performance is postulated. Vendor testing of this seal design is discussed for item #2. A fire inside the division II room would have less effect on the surrounding "D" tunnel area, due to the lower amount of combustibles and the considerably greater distance from the combustibles to the south wall. This fire would pass combustion products to area AB-2/Zone 2, above, through open penetration 6CD. As both areas are method 1 areas, no redundant equipments is involved and one path of safe shutdown remains undamaged. The effect of the most severe event, a fire in the cable tray stack south of the division II room, envelopes the effects of a fire inside the room.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

RBS used IEEE 383-1974 qualified cables exclusively in the power block, except for minor items such as lighting cords. All cables have passed 400,000 BTU/hour test as well as the required 70,000 BTU/hour flame tests and were shown to be self extinguishing. Cable tray separation is in accordance with Reg. Guide 1.75 and IEEE 384-1974, except where otherwise qualified. Testing has shown that for cable trays separated by 9 inches or more, a worst case electrical fault resulting in a fire would have no effect on the adjacent trays. Also, the same testing shows that a faulted cable at 1280 degrees F imparts a temperature of 98 degrees F on a target cable, less than 4 inches away. These test results indicate that a cable tray fire 1 foot 9 inches away from the steel beam would have little effect on the steel temperature and no effect on the tray below. Therefore, heat conducted into the division II room would be minimal, with no effect on the cabling. Smoke admitted to this area through the open penetration would also have no effect on cabling. Smoke and heat originating from a fire in the division II room would be admitted to the AB-7 and the AB-2/Zone 2 fire areas. Heat production in D tunnel would be minimal as the room arrangement has placed most cable trays near the north side of the room, away from the south side steel framing. The majority of equipment in the area AB-7 is at floor level, remote from any potential smoke effect. The nearest MOV is 1E12*MOV068B at elevation 86 feet 9 inches. This valve is also division II equipment. Were it disabled, no effect would be felt at the division I redundant valve, over 50 feet away.

The division II room and area AB-7 share a common detection and water spray deluge suppression system. A fire sensed in either area would initiate the suppression system for both. Regardless of where the fire occurred, the redundant division would receive the cooling effect of the water spray system. There is no effect on cabling due to water, as cable at RBS is rated to perform while submerged. The MOVs in area AB-7 are also rated for water spray conditions. Therefore, a fire due to fixed or transient combustibles in either division would be detected and suppressed, while protecting the alternate division. No adverse effect due to water spray on the redundant equipment is postulated.

Fire area AB-2/Zone 2 is located above D tunnel at the 95 foot elevation. This is a method 1 area while area AB-7 is method 2. A fire in AB-2/Zone 2 is unlikely to affect the area below as smoke and heat rise. A fire in area AB-7 would affect the area above, through the open hatchway. The only appendix R equipment on this 95 foot elevation are service water pressure

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TEXT (if more space is required, use additional NRC Form 206A (1/77))

transmitters, found in JPB*RAK1 (division II) and JPB*RAK2 (division I). In the event of fire in area AB-2/Zone 2 standby service water could be manually initiated, according to the River Bend fire hazards analysis. Therefore the division II equipment at risk from a fire in D tunnel below is cabling in trays.

Area AB-2/Zone 2 has division II cable in tray 5 feet from the hatchway, with three black trays between the blue division and the hatchway. In area AB-7, the trays begin 2-3" west of the hatchway. Detection is provided in both areas, with a deluge suppression system on the trays in area AB-7. The closest detectors are 6 feet from the hatchway in AB-2/Zone 2 and 4'-6" away in area AB-7. Detector placement is important, indicating smoke near or passing through the hatchway would be rapidly detected. Examination of HVAC drawings show exhaust for area AB-2/Zone 2 is drawn out through a screened opening in the north wall. Airflow in area AB-7 depends on a small amount of infiltration for makeup air. Smoke products in area AB2/Z-2 would be drawn northward primarily (1500 CFM) while smoke in area AB-7 would naturally rise but not be drawn into the AB-2/Z2 area by the HVAC system.

As discussed above, the primary fire hazard exists in area AB-7. Fixed combustibles total 159,245 BTUs, primarily in cable insulation. The suppression system, WS-8H, is designed for 0.15 GPM/Ft², a total of 1393.3 GPM. This equates to 1,417,237 BTUs per minute of cooling capacity in the suppression system. Assuming a utilization factor of 50%, or half the water applied is raised to 212°F, cooling BTUs added is still 708,618 BTUs per minute, more than 4 times the amount available to burn. Therefore, even assuming an external generated exposure fire more than adequate suppression is available, meaning the effect outside of this fire area is negligible.

Penetration 1WC828010 exposes fire area AB-2/Zone 1 to AB-7. As discussed above, the deluge system in area AB-7 is more than sufficient to contain a fire due to fixed or transient combustibles. Negligible combustibles are present in AB-2/Zone 1, so no effect would be felt in area AB-7, as combustion products would rise out of the open hatchway into area AB-2/Zone 2. The analysis of the open hatchway, presented above, constitutes a more severe event.

Review of auxiliary building concrete drawings show that the floor plugs at the 95, 114 and 141 foot elevations are constructed with a 4" step along the perimeter. The same step, or 'lip', exists between adjoining plugs in the same

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TEXT (if more space is required, use additional NRC Form 288A (1/77))

opening. This is a typical feature employed to inhibit radiation streaming. Except for minor, localized, variations in the mating surfaces between blocks or between a block and the floor, the floor opening is sufficiently sealed to prohibit passage of smoke, hot gases or combustion products. Increases in air pressure underneath a floor plug due to a fire event could not dislodge or raise a block, each of which weighs several thousand pounds. Any fire would be unable to progress past the floor plugs, which are of the same substantial construction as the fire-rated floor.

2. 114 and 141 foot elevations (item 4, :

Technical Specification 1.39(F) (definition for secondary containment integrity - operating) requires all sealing mechanisms associated with annulus penetrations to be operable, i.e. sealed. Technical Specification section 3.6.5.1 requires operating pressures of -3, 0.0, and 0.0 inches W.G. be maintained in the annulus, auxiliary and fuel building respectively; and standby gas treatment and fuel building ventilation subsystem will draw down the secondary containment to the required negative pressures. No reference in Technical Specifications is made of those annulus penetrations without mechanical closures, such as those containing fire/air rated penetration seal material. Technical Specification bases and the applicable USAR sections (6.2; 6.5) require a negative annulus pressure of -3 inches W.G. to be maintained in the annulus for normal operation, assuming a 2000 CFM leakage rate. Upon an accident initiation, an annulus at -3 inches W.G., 2000 CFM leakage can draw down to -0.25 inches W.G. in the required time frame. STP-257-0601, the SGTS operability test, verifies the design base is satisfied. This test was last performed satisfactorily 12/17/87 and is typically done at each outage.

It is not known when these two penetrations were breached. However, with the annulus pressure at -3.9 inches W.G., the design basis is satisfied by providing an initial condition equal to or slightly more conservative than original design assumptions. Presence of these openings has no impact on 10CFR100 offsite releases. Note as well any leakage would be inside the secondary containment. Design basis for secondary containment is satisfied with the penetrations open.

Fire loading on either side of the shield building in these areas is extremely low. No safety equipment is located in the annulus (USAR pg. 6.2-68), so an auxiliary building fire communicating with the annulus would have no effect on safe shutdown. Fires occurring in the annulus would be almost

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unnoticeable in the auxiliary building due to the low fire load and negative annulus pressure. The divisions are located on opposite sides of the containment and auxiliary building, so no single fire event could impact both divisions.

C. B Tunnel (items 6, 11 and 12):

Due to the relative location of the drainage trench no hazard from fixed combustibles could be attributed to these openings. Fixed combustibles in both areas consist of cable insulation. Little, if any, equipment is located in these areas, with the exception of several MOV's. Cable in the areas is either in conduit or trays, and trays are provided with an automatic water spray system. The location of the openings would preclude introduction of any direct flame and only a small amount of smoke, if any. One sprinklers operated, the trench would be partially full of water, further reducing the size of the opening and cooling any combustion products forced through.

The presence of flammable liquids in this area could present a hazard to both divisions if introduced to the trench and ignited. Spillage in B tunnel west, north end, or in the passageway between the tunnels could drain to the trench spillage elsewhere would be confined to a single fire area. Presence of flammable liquids (transient combustibles) in this area is unlikely for several reasons. No major equipment is located in either area which requires large quantities of lubricants. Also, the radiologically controlled area (RCA) is not a major traffic area due to the break at B tunnel east. Where B tunnel west (area ET-2) is in the RCA, B tunnel east is not except for a narrow walkway. There is no equipment in the north end of B tunnel west, and no need for flammable liquids in the area. Fires resulting from combustible liquids would rapidly initiate the cable tray spray system, protecting the cable and flushing the fire away from area ET-1. Little hazard exists to the division I cables in area ET-1 due to a fire in the specific location due to the distance to the division I cable trays. Therefore, a fire in this area has a low probability from one transient combustible liquids. A fire, if it occurred would have to be at the intersection of the two tunnels to have any effect on both divisions. The effect on division I cabling would be insignificant as the trench drains to area ET-2 (division II), the division I trays are some distance away, and the suppression system on the trays would protect the cabling and flush a liquid fire away from the division I area. There is no risk to safe shutdown.

As discussed under item 11, testing shows that lack of internal conduit seals is not detrimental under certain conditions. Smoke

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passage through conduit 1CX152BB from area ET-2 to ET-1 is not postulated due to the length of conduit in area ET-1. Transmission from ET-1 to ET-2 would require smoke to move horizontally along the conduit and then travel the length in area ET-2 before exiting. This small amount of smoke assumed to pass disregards that both areas utilize water spray deluge systems on all cable trays. No effect would be felt in either area from this conduit.

Penetration 1WS009N85 and the unrepaired blackout on 4-line both expose fire area ET-1 to fire area ET-2, which comprises the east and west sides of B tunnel, respectively. Area ET-1 is a method 2 area (division I equipment) while ET-2 is a method 1 area (division II equipment). Both areas are protected by smoke detection and cable tray deluge systems. In the area of this opening and the blackout the only divisional items are cables in tray and conduit. A fire in either area would impart some amount of smoke into the adjoining area. Penetration 1WS009N85 would pass very little smoke as it is some distance from the ceiling and the roof slopes away towards 4-line. Smoke entry into the adjacent area, if in sufficient quantity, would initiate the cable tray deluge system, providing thermal protection to the cabling of the alternate division. All IEEE cable at RBS is rated for submerged service, so this is not detrimental.

Due to the size and elevation of the blackout, smoke and hot gases from a fire in either area would be rapidly transmitted into the adjoining area, in quantity. Due to the deluge system protection on cable trays in both areas, the net effect would be as described above. A fire in either area would pass combustion products to the adjoining one, initiating that suppression system. Assuming no suppression on the area containing the fire, the non-fire area water spray would supply cooling water to the redundant division. Cable tray runs in both areas are more than three feet from this opening, so no "blowtorch" effect would occur. Equipment, such as MOV's in area ET-1 are operable in a water spray environment (reference MR 85-0548), so the effect of actuating both trains of sprinklers is nil. Note that cable fires are slow burning and generally self-extinguish when power is removed. Smoke in areas away from the actual fire would impede the activities of the fire brigade, and make the finding of the seat of the fire very difficult. However, the sequence of alarms received in the control room would indicate the actual fire area. The fire brigade would then be able to search the indicated area.

These openings have no net effect on safe shutdown. One train of safe shutdown would have been available had a fire occurred in either side of B tunnel.

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

D. Fuel Building:

1. 70 foot elevation (item 13)

The west wall of the fuel building forms the boundary between fire areas FB-1/Zone 1 and PT-1. Area FB-1/Zone 1 is provided with wet pipe sprinklers and smoke detectors, while area PT-1 has smoke detection actuating a cable tray deluge system. Both areas utilize method 1 shutdown. Regardless of smoke passage through the wall, one safe shutdown train remains unaffected.

This penetration is shielded by steel framing in the fuel building and opens into a walkway in the pipe tunnel. The elevation and location of the sleeve place it some distance from locations where smoke from potential fires would gather. No direct flame impingement could occur.

2. 148 foot elevation (items 14 and 20)

Penetration LWS680H01 does not separate safety related fire areas. This wall sleeve protects the stairwell from a fire in area FB-1/Zone 4, the general area at the 148 foot elevation. Design basis fire loading is less than one half hour; this is insufficient to challenge the fire seal in the as-found state. Fire loading in the stairwell is negligible. This stairwell wall is not directly exposed to any fixed combustibles. No effect would be seen due to this damaged seal.

Door F148-03 is part of the barrier between fire areas FB-4 and FB-1/Zone 4. Fire loading in FB-1/Zone 4 is previously discussed, and fire loading in area FB-4 is 46 minutes. Combustible loading in area FB-4 is primarily charcoal in the iodine filter, which is provided with a water spray system. Both fire areas utilize shutdown method 1. Due to the low fire loadings, the suppression system and common shutdown method, safe shutdown is unaffected and one train of equipment is available for fuel related accidents.

The door frame is anchored to the concrete and solidly routed. The top gap will have no effect on the adequacy of the barrier as previously discussed in items 5 and 9.

E. Diesel generator building (items 2 and 19):

The major fire hazard in the diesel generator area is in the diesel fuel and lubrication oil present in and around the engine. A fire in either of the affected diesel rooms would be of the

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same intensity (approximately a 45 minute fire). Fire detection is installed in the diesel rooms for actuation of the preaction sprinkler system and in the control rooms for alarm only. Curbs are provided along the DE-line door openings for fuel oil spill retention.

A diesel generator control room fire alone would be insufficient to cause any significant heat or buildup of combustion products to communicate to the adjacent control room. A fire occurring in the diesel room would cause large amounts of heat and smoke; however the location of the unsealed penetration in relation to the postulated fire and the relative size (1/4 inch annulus) indicate no detrimental effect would be seen in the adjacent control room. Smoke and heat from a diesel fire would emerge from the fresh air vents on the east side of the building and from roof penetrations, which are not fire rated. The small amount of smoke introduced into the adjacent area from penetration between the division II and III diesel control rooms would be far less than that which would occur during manual firefighting activities, such as opening doors, laying hose, and ventilating. There is an effect on safety due to this penetration. Redundant equipment would be unaffected by fires in adjacent areas.

Layout of all three diesel rooms is similar. In each, the diesel fuel storage tank is exposed in the diesel room in two separate locations. One opening is the hatchway provided for fuel sampling and another is for the fuel transfer pump. The fuel transfer pump is found in a separate sump along the east wall of the diesel room.

A review of Reg. Guide 1.137, NUREG 0800, Section 9.5.1, and NFPA-30, Flammable and Combustible Liquids Code, Section 5-3.7 indicates that main fuel tanks inside buildings shall be enclosed in a three hour barrier. These 3 fuel tanks while inside a building are covered with sand and capped with concrete and therefore are essentially buried tanks with the only exposure being where the steel flanges connect to the top of each tank where the valved sample connection and fuel transfer pumps tank flanges. The USAR table 9A.2-9 states that the combustible loading in these tanks is academic since the tanks are buried.

Sprinkler systems PS-2A, 2B&2C which protect the 98' elevation of the diesel generator building are designed per Spec. 214.400 with a design density of .30 GPM/Ft.² and provide adequate protection, over the sumps that penetrate fire zones DG -1, 2 & 3 to DG -4, 5 & 6. A sprinkler system design density of .30 GPM/Ft.² is equivalent to a 3 hour fire barrier, similar to the water curtains provided in the auxiliary building 70 and 141 foot elevations.

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A review of design criterion 240.201 (fire hazard analysis), section U fire hazard evaluation, table 8, and the USAR indicate that train separation requirements divide the diesel generator building into three vertical fire areas with 3 ft. reinforced concrete walls. This, in turn, reflects the physical isolation of these divisional trains and safe shutdown methods 1 and 2. The respective fire zones, paired, for each division are as follows:

<u>Division</u>	<u>Method</u>	<u>Fire Zones</u>
I	1	DG-3, 6/Z-1,2
II	2	DG-2, 5/Z-1,2
III	2	DG-1, 4/Z-1,2

The loss of any essential system items within any division resulting from a fire (electrical, fuel or otherwise) will result in the loss of that division for safe shutdown with the alternate divisions remaining available. Therefore, openings in the three hour fire rated floor separating the storage tanks and the diesels are acceptable. These openings have no effect on plant safe shutdown as only one division is subject to fire damage.

In summary, no fires have occurred in the plant to date. Review of the safety issues raised by these openings indicate that at no time was the safety of the plant at risk. There is no impact to the health and safety of the public.



GULF STATES UTILITIES COMPANY

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Gentlemen:

River Bend Station - Unit 1
Docket No. 50-458

Please find enclosed Licensee Event Report No. 88-009 Revision 2 for River Bend Station - Unit 1. This revision is being submitted pursuant to 10CFR50.73 to provide additional information on corrective actions.

Sincerely,

J. E. Booker by Joe

J. E. Booker
Manager-River Bend Oversight
River Bend Nuclear Group

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