



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report No.: 50-416/85-16

Licensee: Mississippi Power and Light Company
Jackson, MS 39205

Docket No.: 50-416

License No.: NPF-29

Facility Name: Grand Gulf

Inspection Conducted: May 20 - 24, 1985

Inspectors:

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W. H. Miller, Jr., Team Leader

8-14-85
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Consultant: Brookhaven National Laboratories
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Approved by:

T. E. Conlon
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8-14-85
Date Signed

SUMMARY

Scope: This special, announced inspection entailed 245 inspector-hours on site in the areas of fire protection and the licensee's actions regarding the implementation of the requirements of 10 CFR 50, Appendix R, Sections III.G, III.J, and III.L. An Enforcement Conference was held at the Region II office on August 8, 1985, to discuss concerns regarding the adequacy of a 10 CFR 50.59 safety evaluation prepared for the revised Appendix R safe shutdown systems at Grand Gulf 1.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *T. Cloninger, Director, Engineering & Construction
- *F. Titus, Manager, Nuclear Plant Engineering
- *G. Cesare, Manager, Nuclear Licensing and Safety
- *S. Hutchins, Principal Electrical Engineer
- *L. Robertson, Operations Superintendent - Senior Reactor Operator (SRO)
- W. Russell, Operations Assistant - SRO
- C. Hicks, Shift Superintendent - SRO
- S. Burris, Shift Supervisor - SRO
- E. Cresap, Shift Supervisor - SRO
- *T. Barnett, Electrical Engineer
- *J. Turner, Civil Engineer
- *R. Wright, Mechanical Engineer - Fire Protection
- *V. Holmberg, Fire Protection Coordinator - Operations
- *K. Black, Mechanical Supervisor - Station Services
- D. Wiles, Electrical Engineer

Other licensee employees contacted included engineers, technicians, and operators.

Other Organizations

Bechtel Corporation

- J. Sundergill, Group Leader - Electrical Systems
- R. Reeder, Electrical Engineer
- L. Stouffer, Design Supervisor - Electrical
- E. Warfield, Mechanical Engineer - Fire Protection
- R. Gabor, Group Supervisor - Plant Facilities

Middle South Services

- *M. Combest, Supervisor - Fire Protection

Impell Corporation

- D. Mosby, Mechanical Engineer Fire Protection

NRC Resident Inspector

- *J. Caldwell

- *Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 24, 1985, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The following new items were identified during this inspection.

- a. Unresolved Item (416/85-16-01), Structural Steel Supports for Cable Raceway Fire Barriers Are Not Provided with a Fire Resistance Rating Equivalent to the Rating of the Barrier - paragraph 5.a(1)(a).
- b. Inspector Followup Item (416/85-16-02), Review of Licensee's Actions to Provide Total Enclosures for Appendix R Safe Shutdown Cable Raceway Fire Barriers - paragraph 5.a(1)(a).
- c. Unresolved Item (416/85-16-03), Licensee's Unreviewed Fire Protection Program - paragraphs 5.a(1)(a) through 5.a(1)(o), 5.b., 5.c., and 7.
- d. Inspector Followup Item (416/85-16-04), Inadequate Number of Eight-Hour Emergency Lighting Units - paragraph 6.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraphs 5.a(1)(a) through 5.a(1)(o), 5.b., 5.c., and 7.

5. Compliance with 10 CFR, Appendix R, Section III.G. and III.L

This inspection was to ascertain the licensee's action towards implementation of the fire protection and plant safe shutdown requirements of 10 CFR 50, Appendix R.

Effective February 17, 1981, the Nuclear Regulatory Commission amended its regulations by adding Section 50.48 and Appendix R to 10 CFR 50 to require certain provisions for fire protection in operating nuclear power plants. This action was taken to resolve certain contested generic issues in Fire Protection Safety Evaluation Reports (SERs) and to require all applicable licensees to upgrade their plants to a level of protection equivalent to the technical requirements of Appendix R, Section III.G.

In a response to a NRC request for additional information regarding Grand Gulf's compliance to Appendix R, the licensee indicated in its letter to the NRC dated August 27, 1981, that Grand Gulf had incorporated the requirements of Sections III.G.2, III.O, and III.J of 10 CFR 50, Appendix R, with exceptions to be justified on a case-by-case basis.

In late 1981, the licensee conducted a comparison of the Grand Gulf station fire protection program to the requirements of Appendix R. This was provided to the NRC in a letter dated October 23, 1981. In November 1981, this information was incorporated into the Grand Gulf FSAR as Table 9A-4.

The Safety Evaluation Report (SER) (NUREG-0831, September 1981) indicated the licensee's commitments to certain provisions of Appendix R. The licensee's safe shutdown analysis was described in SER NUREG-0831, Supplement 1, December 1981.

In 1984, the licensee developed and implemented an Appendix R reanalysis program to determine which plant fire areas met the literal requirements of Appendix R, Sections III.G., J., and L. and which fire areas would require exceptions to these literal requirements. The results of MP&L's reanalysis are contained in two documents:

- a. An updated Grand Gulf Unit 1 Fire Hazards Analysis (FHA)
- b. A 10 CFR 50 Appendix R Fire Protection Review Summary Report.

These documents were submitted to the NRC staff for review by letters dated May 7, 1985 (AECM-85/0129) and May 18, 1985 (AECM-85/0164 and AECM-85/0165). This inspection was limited to that information provided within the licensee's reanalysis noted above. The licensee's previous detailed Fire Protection Program including the FHA and safe shutdown analysis as described in the SER and its Supplements was not reviewed in depth.

The inspection was conducted to determine if the fire protection features provided for structures, systems, and components important to safe shutdown at Grand Gulf Unit 1, were in compliance with 10 CFR 50, Appendix R, Sections III.G. and III.L.

The scope of this inspection determined if the fire protection features provided for the Reactor Coolant Makeup, Reactor Pressure Control, Decay Heat Removal, Suppression Pool Cooling, Process Monitoring, and support systems were capable of limiting potential fire damage so that one train of these systems, if required to, could achieve and maintain hot shutdown from either the control room or emergency control stations are free from fire damage.

- a. Safe Shutdown Capabilities

In order to ensure safe shutdown capabilities, where cables or equipment of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside

the primary containment, 10 CFR 50, Appendix R, Section III.G.2 requires that one train of hot shutdown systems be maintained free of fire damage by providing fire protection features which meet the requirements of either III.G.2.a, III.G.2.b., or III.G.2.c.

On the basis of the above Appendix R criteria, the inspectors made an inspection of cabling and components identified by the licensee in their recent Appendix R reanalysis as items which can not or must not fail. These items are associated with the Residual Heat Removal System, Standby Service Water System, Nuclear Boiler System Containment and Drywell Instrumentation and Control System, Onsite Standby Diesel Generator System and Support Ventilation Systems. The inspection was to determine the adequacy of the fire protection features and the separation afforded for these essential safe shutdown systems.

(1) Fire Protection for Safe Shutdown Systems/Components

Grand Gulf Unit 1 is divided into 61 Fire Areas designated 1 through 65. These fire areas are further subdivided into fire zones.

An inspection was made to determine if redundant cabling for the Unit 1 safe shutdown systems, required to achieve and maintain hot and cold shutdown conditions have been provided with adequate separation or protected in accordance with Appendix R, Section III.G.2.

Included in the review was an evaluation of the acceptability of the barrier or enclosure construction configuration as a fire rated barrier as used in the plant. Also, the review verified the adequacy of the installed penetration sealing systems, and fire dampers/fire doors with respect to installation completeness, physical condition, and fire test documentation.

Within the following fire areas and their associated fire zones, the cable routings for redundant safe shutdown and the fire protection features afforded for these areas were inspected to verify compliance with Appendix R, Section III.G.2:

- (a) Fire Area 1 - Auxiliary Building - Elevation 93' and 103',
Fire Zones 1A101 and 1A117

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
RHR Pump Discharge to Suppression pool, 1E12F064.	1AATWG37/1ABDE12A	1ABRW310/1B9DE12R

Fuel oil transfer pump, 1P75C002. 1AATMG37/1AB51106B 1ABTMG21/1BB61103B

Standby Service Water inlet to diesel generator water cooler, 1P41F018. 1AATMG37/1AB51115A 1ABTDT52/1BB61108C & 1AB51115C

ESF Switchgear Room Cooler-119' elevation, IT46B002. 1AATMG37/1AB51131A 1ABTDT52/1BB61138A

RHR Room Fan Coil Unit, 1T51B003 1AATNT02/1AB51129A *NA & 1AB51129B

Note: *Division II cables are not installed within these fire zones.

Fire zones 1A101 and 1A117 adjoin and are in open communication at the northeast corner of the auxiliary building. Division I and II cabling also interact at this location. All Division I safe shutdown cabling north of column line 11.0 and east of column line G.4 is installed within a nominal one hour fire barrier. However, the structural steel cable raceway supports are not provided with a barrier which has a one hour fire resistance rating. This could result in degradation of the barriers in the event of fire. The licensee stated that, based on their analysis, this steel did not require protection due to the low fire loading in the area. The licensee committed to submit this analysis to NRC/NRR for review. Pending this review and resolution by NRC/NRR, this item is identified as Unresolved Item 416/85-16-01, Structural Steel Supports for Cable Raceway Fire Barriers Are Not Provided With A Barrier Having A Fire Resistance Rating Equivalent to the Rating of the Barrier. It appears that a fire within this area could damage cables for both redundant shutdown divisions. Also, the installed raceway barriers are inadequate in that the barriers do not extend across the interface points between the raceways and raceway supports. This discrepancy was identified by the licensee and reported to the NRC by letter dated May 18, 1985 (AECM-85/0165). The fire watch compensatory measures of the Technical Specifications have been implemented and are to be maintained until modifications to correct this fire barrier

deficiency have been completed. This inadequate barrier condition was identified by the licensee, reported to the NRC and corrective action was taken which meets the guidelines of 10 CFR 2, Appendix C, Section IV.A, for licensee identified problems. Therefore, no violation is being issued. The corrective actions proposed to upgrade the barriers enclosures will be reviewed during future NRC inspections. Therefore, this is identified as Inspector Followup Item 416/85-16-02, Review of Licensee's Actions to Provide Total Enclosures for Appendix R Safe Shutdown Cable Raceway Fire Barriers.

Fire Zones 1A101 and 1A117 are provided with an automatic fire detection system and the area between column lines 11.0 and J.5 is provided with automatic sprinkler protection. This protection was previously reviewed and found acceptable by the NRC as documented by SER dated September 1981.

Fire Zone 1A117 is adjoining and in open communication with Fire Zone 1A114. Zone 1A114 contains redundant trains of safe shutdown cables. The redundant trains are separated by approximately 106 feet but contain intervening combustibles consisting of safety and non-safety-related cables in ventilated cable trays. An automatic fire suppression system is not provided for this area. This discrepancy is identified in Section 4, of the licensee's letter dated May 7, 1985, as an exception (E.2 for Fire Area 1) to the Appendix R requirements.

Redundant trains of shutdown cables in fire zone 1A101 are separated by approximately 35 feet with automatic fire detection and suppression systems provided. However, this distance contains intervening combustibles consisting of cables in a ventilated cable trays. This discrepancy was reported to the NRC by the licensee's letter dated May 7, 1985 and is identified as an exception to the Appendix R requirements, in Section 4.0 (Item E.1 for Fire Area 2) of the Fire Protection Summary Report.

Otherwise, the cables inspected in these areas appeared to be in conformance with the separation and protection requirements of 10 CFR 50, Appendix R, Section III.G.2.

- (b) Fire Area 2 - Auxiliary Building - Elevations 93', 108', 119', 115', 128', 139, 166'; Fire Zones 1A105, 1A124, 1A204, 1A303, 1A305

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
RHR/LPCI Injection Valves, Q1E12F042	(Fire Zone 1A204) 1AATMH64/A /AOCE12E	(Fire Zone 1A105) *1ABRMH66/1B2CE12M *1ABTMH43/1B2CE12D
RHR Jockey Pump Discharge Isolation Valves	(Fire Zone 1A305) *1AARM228/1AB531101 *1ABRM147/1BB61113C *1AARM396/1AB53114C	(Fire Zone 1A305) *1ABRM335/1BB61113C *Valve/Q1E38F001B-B

Note: *The inspectors were unable to walk down cabling in these areas due to inaccessability during plant power operation. A review of the computer cable raceway schedules was performed for these areas. These areas will be reviewed during a subsequent NRC inspection.

The licensee has stated that the closest redundant Division I and Division II safe shutdown cabling not protected with fire barriers are located in Fire Zones 1A204 and 1A105. These redundant trains of safe shutdown cable are not separated by a continuous three-hour rated fire barrier. The licensee has identified the lack of fire barrier separation between these zones and provided justification for this exception by letter dated May 7, 1985. This is identified in Section 4.0 (Item E.1 for Fire Area 2) of the Fire Protection Summary Report.

The redundant trains are separated by nonrated barriers consisting of pressure relief panels at three elevations along the wall of Fire Zone 1A124, (Blowout Shaft). These panels interface with both Zones 1A105 and 1A204 through the blowout shaft. The only identified intervening combustibles within the area consist of the seismic gap Rodofam II joint sealant. The inspectors reviewed construction installation detail drawings C-1342 and C-0204 for the Rodofam II sealant. In addition, the Fire Test Report to Bechtel Power Corporation performed by Construction Technology Laboratories of Skokie, Illinois dated August 15, 1979 was reviewed. Based on this review, it appears that the seismic gap sealant, as installed, can be considered an acceptable fire barrier sealant and a limited combustible material.

Fire Zone 1A305, Main Steam Tunnel, Elevation 140', contains both Division I and Division II redundant safe shutdown equipment and cabling. At the time of the inspection, fire barrier separation was not provided for one division of

redundant safe shutdown equipment or cabling within this fire area.

Cabling for one divisional shutdown train, and valve Q1E38F001B-B within this division are to be protected by three hour rated fire barriers. The licensee's letter of May 7, 1985, identified in Section 3.2, the raceways which are to be enclosed with fire barriers. Compensatory measures consisting of a fire watch have been implemented as required by the Technical Specifications for the area.

An automatic fire detection system is installed but an automatic fire suppression system is not provided for this fire zone. This was previously reviewed and found acceptable by the NRC as documented by SER dated September 1981.

- (c) Fire Area 6 - Auxiliary Building, Elevation 119'-0", Fire Zones 1A211 and 1A222 - Unit 1.

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Onsite Emergency Diesel Generators Fuel Oil Transfer Pump - Q1P75C002	1AATMT02/1AB51106B	1ABTOT52/1BB61103B
	1AATMT03/1AB51106B	1ABTOT53/1BB61103B
	1AATM04/1AB51106B	1ABTOT54/1BB61103B
Standby Diesel Generator Room Outside Air Fans- Q1X77C001	1AARMH71/1AB5106C & 1AB5106D 1AATMM73/1AB5106C & 1AB6106D	1ABTNH13/1BB6104C 1ABTMH20/1BB6104C 1ABTMH22/1BB6104C
480 V Load Control Center	1AATDH03/1AA5072	1ABTDH05/1BA6042
480 V Load Control Center	1AATMH04/1AA507C	1BTMH05/1BA604C

Fire Area 6, Fire Zone 1A211, contains both Division I and II cabling for the onsite emergency diesel generator safe shutdown components.

Redundant trains of safe shutdown cables in Fire Zone 1A211 not protected with fire barriers are separated by a distance of 28 Feet. Division I and II safe shutdown cabling located within the 28-foot intervening space protected with a nominal one hour fire barrier. However, this distance contains intervening combustibles consisting of IEEE 383 cable. Therefore, a postulated exposure fire in this area of the plant could jeopardize the emergency diesel generator capabilities. This discrepancy was identified by the licensee and reported to the NRC by letter dated May 7, 1985. This condition is identified in Section 4.0, (Item E.1 for Fire Area 6) of the Fire Protection Summary Report.

In Fire Zone 1A222, the separation between the redundant cables for the 480V Load Control Centers was more than 28 feet. This meets the requirements of Appendix R, Section III.G.2.

The inspectors performed a walkdown and verified that early warning fire detectors were provided in the area. The inspectors also made a walkdown of the partial coverage sprinkler system provided in the intervening separation distance of Fire Zones 1A211 and 1A201 from Column line 13.0 to Column Line J.5. and for fire zone 1A222. The inspectors verified that manual hose stations were provided to reach this area and that portable extinguishers were located within the fire area.

- (d) Fire Area 11 - Auxiliary Building - Elevation 139, Fire Zones 1A316 and 1A322

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Diesel Generator	1AAIWI58/1AONX77A	1ABTW115/1BNI77A
Building Fans		
RHR System	1AATWI58/1ABDE12C	1ABTWI15/1B9DE12C
Flow Control	1AATWT07/1A8DE12C	1ABTWI19/1B9DE12C
Valves	1AATMI58/1AOCE12F	*1BBAOT31/1B2CE12I
Onsite Emergency	1AATWI11/1AONP75A	1ABTMI03/1BB611031
Diesel Generator	1AATMI11/1AB51106A	1ABTMI03/1BB61103A
Fuel Oil Transfer	& 1AB511061	
Pump - Q1P75C002	1AATMT04/1AB51106B	*1BBAOT25/1BR61103B

Note: *Raceways to be enclosed by a fire barrier.

Redundant trains of safe shutdown cables identified above in Fire Zone 1A31f are separated by a minimum of 25 feet. Automatic fire detection system and a partial automatic suppression system is provided in the area. However, the 25 feet separation distance is not free of intervening combustibles. These intervening combustibles consist of five non-safety-related trays and one safety-related tray which contain IEEE 383 cables. Eight raceways containing shutdown cabling are to be enclosed within one hour fire rated barriers. Until this modification is complete, the licensee has implemented and is to maintain the fire watch compensatory measures of the Technical Specifications.

The licensee's letter of May 7, 1985, Section 3.2 of the Fire Protection Summary Report identifies the raceways to be enclosed within the fire barriers. The licensee also has identified the intervening combustible cabling as a discrepancy and provided justification for this exception in Section 4.0 (Item E.1 of Fire Area 11) of the Fire Protection Summary Report.

The separation between the above redundant divisional cables within Fire Zone 1A322 is 23 feet but there are intervening combustibles consisting of two cable trays that traverse from Division I to Division II. Also, there are two centrifugal chillers Units each containing 12.2 gallons of lube oil located beneath these divisional cables. The licensee has identified the lube oil intervening combustible as a discrepancy and provided justification for this exception by letter dated May 7, 1985. This condition is identified in Section 4.0 (Item E.2 of Fire Area 11) of the Fire Protection Summary Report.

The two cable trays which traverse between Divisions I and II cable trays are to be enclosed within a one hour fire barrier and fire break. These modifications are in support of the justification for the above noted exception and are identified in Section 3.5 of the Fire Protection Summary Report submitted by letter dated May 7, 1985.

The inspectors verified that automatic sprinkler protection, smoke detectors and accessibility to fire hose stations and portable extinguishers were provided for this fire zone.

(e) Fire Area 19, Fire Zone 1A428, Elevation 166, Passage Area

This area was not reviewed during this inspection. However, the licensee has identified in Section 4.0 (Item E.1 of Fire Area 19) of the Fire Protection Summary Report that intervening combustibles are present within the separation space between redundant safe shutdown crains cable in Fire Zone

1A428 and an exception is taken to the requirements of Section III.G.2.

- (f) Fire Area 22 - Auxiliary Building - 185' Elevation, Fire Zone 1A539

The inspectors made an inspection of Fire Zone 1A539 and verified that this zone was separated from the remainder of the plant by three hour fire resistant construction. A review of the following shutdown cables indicated that although redundant component cabling was not provided in the fire zone, shutdown related cabling for both divisions is located in the zone.

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>*Division II Raceway/Cable</u>
Suppression pool temperature 1M71TRR605	Note**	1AXRW203/1X2UM71C
Suppression pool temperature	Note**	1BXAWT01/1XBTM71C

Note: *Raceways to be enclosed by a three hour fire barrier.

**Division I cabling for the suppression pool temperature device is not installed in this zone.

Fire Zone 1A539 is provided with an automatic fire detection system and all of the Division II shutdown cabling is to be enclosed within a three hour fire barrier. Until this modification is complete, the licensee has implemented and is to maintain the fire watch compensatory measures of the Technical Specifications. Also, additional suppression pool temperature indication is provided on the remote shutdown panels.

The licensee's letter dated May 7, 1985, in Section 3.2 of Protection Summary Report, identifies this discrepancy and required modifications. The licensee is maintaining interim compensatory fire watch measures until the three hour fire barrier modifications are completed, and redundant suppression pool temperature remote panel instrumentation is provided.

When the above three hour fire barriers are installed, it appears that the cabling within this fire zone will meet the provisions of Appendix R, Section III.G.2.

(g) Fire Area 25 - Containment

The licensee has not completed the Appendix R, Section III.G analysis for the containment. Refer to below paragraph 5.b for additional information.

(h) Fire Area 26 - Control Building - Elevations 93' and 111', Fire Zone OC217.

Fire Area 26 consists of 25 fire zones, of Unit 1 and several Unit 2 common areas located on elevation 93' of the control building and a single area, Fire Zone OC217, which is located on Elevation 111' of the control building. Only Unit 1 Division I safe shutdown components are located within Fire Area 26. Fire Area 26 is separated from other fire areas by three hour rated fire barriers except for an unrated penetration located within the wall of the Heating, Ventilating, and Air Conditioning (HVAC) Chase on elevation 111' (Fire Zone OC217) which separates this area from Fire Area 30. Fire Area 30 contains unprotected Unit 1 Division II safe shutdown cabling. Thus, a postulated fire affecting Division I safe shutdown components could indirectly affect Division II safe shutdown cabling in Fire Area 30.

The licensee's letter of May 7, 1985, Section 3.3 of the Fire Protection Summary Report, identifies this discrepancy and indicates that Design Change Package (DCP 83/4526, Revision 1) will be implemented to upgrade this penetration closure to meet the 3 hour fire barrier separation rating.

Following the completion of the modification within Fire Zone OC217, identified above, it appears that the fire protection separation for Fire Area 26 will conform to the requirements of Appendix R, Section III.G.

(i) Fire Area 30 - Division I Switchgear Area, Unit 2, Elevation 111', Fire Zone OC 214

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Standby Service	1BARNR36/1AB55118C	*1BBRWQ36/1B3NY47A
Water System		
Pumphouse Ventilation		
Q1Y47F003B-B		*2BBRY604/1B3NY47A
Q1Y47F002A-A		
Standby Service		
Water System		*2BBRY605/1B3NP41B
IP41URR606B		

Note: *Raceways to be enclosed by a three hour fire barrier.

Fire Area 30 consists of several Fire Zones on Elevation 111' of the Control Building. Of these fire zones, only Fire Zone OC214 contains both Division I and Division II cables. This zone contains Division I safe shutdown components and cabling which are related to the Standby Service Water and SSW Pumphouse Ventilation Systems. At the time of the inspection, none of the divisional cabling for these systems was provided with fire barrier separation.

All Division II shutdown cabling related to these systems in this area is to be enclosed within three hour fire barriers. Until this modification is complete, the licensee has implemented and is to maintain the fire watch compensatory measures of the Technical Specifications.

The licensee's letter of May 7, 1985, Section 3.2 of the Fire Protection Summary Report, identifies the raceways which are to be enclosed within the fire barriers.

It appears that when the three hour barriers are installed, the cabling within this area will meet the provisions of Appendix R, Section III.G.2.

- (j) Fire Area 42 - Control Building - Elevations 133', 148' and 177'; Fire Zones OC302, OC303, OC308 and OC402

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
ESF Switchgear & Battery Room Supply for temperature element, 1277C001	ARWQ02/1A0N277A	BRWQ01/1B1N277A
ESF Switchgear & Battery Exhaust Room Fan Power, 1277C001	1BARNQ31/1AE561202	*1BBNR32/1BB661112
ESF Switchgear & Room - Air Handling unit, 1277B001	*1BARN630/1AB521422	*1BBTNR60/1BB641612
ESF Switchgear & Battery Room - Speed Control for damper F036	1BATWQ21/1A0N277A	1BBRW507/1B1NZ77A

Note: *Raceway to be enclosed by a three hour fire barrier.

The above zones contain both Division I and Division II redundant safe shutdown equipment and cabling. An automatic fire detection system is provided for each zone but, an automatic fire suppression system is only provided for zone OC402.

Cabling for one divisional shutdown train in Zones OC302, OC303 and OC308 is to be separated from the redundant train by three hour fire barriers and by one hour fire barriers in zone OC402. The licensee's letter of May 7, 1985 identifies in Section 3.2 of the Fire Protection Summary Report, the raceways which are to be enclosed within these barriers. Also, the fire watch compensatory measures required by the Technical Specification have been implemented. A continuous fire watch is provided for Zones OC302, OC303 and OC308 and an hourly fire watch is provided for zone OC402.

The fire barrier walls between these zones are fire rated for two hours in lieu of the required three hours fire separation. The licensee has identified the separation discrepancy between each of these zones and provided justification for this exception by letter dated May 7, 1985. This condition is described in Section 4.0 (Item E.1 of Fire Area 42) of the Fire Protection Summary Report.

The inspectors reviewed the installation closure details and fire test reports of the fire barrier seals for the following penetrations which separate Fire Zones OC302 and OC402 from other plant areas:

<u>Penetrations No.</u>	<u>Closure No.</u>	<u>Fire Test Reports</u>
CE-269D	34 (35)	FMR Test J. I. 1A5Q6.AC or J. I. 4C3Q9.AC
CE-200D	34 (31 ALT)	FMR Test J. I. 1A5Q6.AC or Tech-Sil #TS-TP-0018
CE-104D	32	FMR Test J. I. 4C3Q9.AC
CE-110D	32	FMR Test J. I. 4C3Q9.AC
CE-75C	33	FMR Test J. I. 1A5Q6.AC
CE-76C	33	FMR Test J. I. 1A5Q6.AC
CE-77C	33	FMR Test J. I. 1A5Q6.AC
CE-81C	33	FMR Test J. I. 1A5Q6.AC

The electrical penetration closure detail drawing, Bechtel Drawing M0800D, Revision 15, indicates that the installed seal configurations are of an approved fire resistive construction.

The Factory Mutual Research and Tech-Sil Fire Tests Reports as noted above were reviewed. These reports substantiate the fire rating of the fire penetration seals used. Based on

this review, the fire penetration seals design and installation are acceptable.

In addition, the inspector visually inspected fire damper penetrations Numbers CV-108C and CV-109C in the fire barrier wall of Zone OC302. The inspectors verified that approved labeled fire dampers were installed within the ventilation openings. The inspectors reviewed the damper installation detail drawing M-0210A, which indicates that the dampers are installed in accordance with the approved manufacturer's recommended installation instructions. Based on this review, it appears that fire dampers installation within fire wall ventilation penetrations are acceptable.

Zones OC302, OC303 and OC308 contain redundant exhaust and ventilation equipment and components for the safeguards switchgear and battery rooms. A fire in either Zone OC302 or OC303 would damage the ventilation equipment in that zone, but the equipment in the other zone would still be available. The logic associated with the safeguard switchgear area battery room ventilation systems would permit manual operation using the undamaged equipment, cables and raceways located in the other fire zone. Two complete sets of equipment are available in each fire zone and the equipment from one zone should provide sufficient ventilation if the equipment from the other zone was damaged by fire. The existing arrangement is satisfactory; however, additional protection for this equipment will be required when Unit 2 becomes operational.

Other than indicated above, it appears that the fire protection separation and protection of the redundant cables and equipment within Fire Area 42 will conform to the requirements of Appendix R, Section III.G.2 following installation of the required cable raceway fire barriers.

- (k) Fire Area 47 - Control Building - Elevation 189', Fire Zone OC702

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Suppression pool temperature device, 1M71TRR605	1BDTNR02/ 1D0DC71D	*1BXAWT01/1XQUM71C
Suppression pool temperature device, 1M71TRR605	1BDTNR03/1D0DC71A	*1BXAWT01/1X2UM71C

Suppression pool 1BWRM607/1W1C71021 *1BXAWT01/1X9TM71C
 temperature device,
 1M71TRR605

Note: *Raceway to be provided with a one hour fire barrier enclosure.

Fire Zone OC702 is provided with a fire detection system and automatic gas suppression (CO2) and automatic sprinkler systems. The above Division I and Division II safe shutdown cables and raceways and other redundant shutdown trains are located in this zone. All of the Division II safe shutdown components and raceways are to be enclosed within a one hour fire barrier. The need for these modifications was identified by the licensee and reported to the NRC by letter dated May 7, 1985. The licensee implemented and is to maintain the fire watch compensatory measures of the Technical Specifications until the fire barriers are installed. This inadequate fire separation condition and the required modifications are identified in Section 3.2 of the Fire Protection Summary Report.

When the above one hour fire barriers are installed, the cabling within this fire zone will meet the provisions of Appendix R, Section III.G.2.

- (1) Fire Area 50 - Control Building, Elevations 148', 166', 174'-6", 177', Fire Zones OC505 and OC504.

The total fire area was not reviewed in depth during this inspection. However, the licensee has identified in Sections 3.2 and 3.3 of the Fire Protection Summary Report that cable raceways 1BXR605 and 1BXR602 located in Fire Zone OC504 are to be enclosed within three hour fire barriers and that fire dampers are to be installed in various HVAC ducts installed in the fire area boundary walls.

The licensee is maintaining interim compensatory fire watch measures until the fire barrier modifications are completed. In addition, the licensee has identified in Section 4.0 (Item E.1 of Fire Area 50) of the Fire Protection Summary Report an exception to Sections III.G.3 and III.L of Appendix R in that no automatic fire suppression system is provided in the Control Room. These areas will be reviewed during a subsequent NRC inspection.

(m) Fire Area 59 - Yard Manhole MH01

Manhole MH01 is a four-compartment manhole with underground cable raceways located west of the Control Building. Two compartments contain Division I cabling and two compartments contain redundant or necessary safe shutdown Division II cabling as noted below:

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Suppression Pool Instrumentation	1UAMM001/1A0NC61A	1UBMM001/1B2NC61A
1C61FIR001		1MBRWX01/1B2NC61B
1C61LIR400		
1C61LTN400		

The inspectors verified that the wall separating Division I and Division II cables in each compartment was solid except for a small 4-inch drain hole that joins the compartments. This condition does not meet the technical requirements for fire barrier separations of Appendix R, Section III.G. This condition was identified by the licensee and reported to the NRC by letter dated May 7, 1985. The details to an exception to the Appendix R requirements for this fire area are included in Section 4.0 (Item D.1 for Fire Area 59) of the Fire Protection Summary Report.

(n) Fire Area 60 - Diesel Generator Building, Elevation 133' - Fire Zone 1D301

<u>Function</u>	<u>Division I Raceway/Cable</u>	<u>Division II Raceway/Cable</u>
Diesel Generator System - Train A & B Local Control Stations	1DATWL58/1AD2481 & 1AD2661	1DBTWL57/1BD12501 & 1BD1361
Diesel Generator Room Ventilation System Dampers	1DATML58/1AP511032	1DBTML57/1BP611002

The inspectors verified that the above Division I raceways are separated from the redundant Division II safe shutdown raceways by a horizontal distance of 22 feet; that Fire Area 60 was separated from other plant areas by three hour rated barriers; that a fire detection systems was installed in the corridor area; and, that an automatic preaction sprinkler system provided full area coverage. It appears that if an

exposure fire were to occur with Fire Zone 1D301, the present sprinkler system design should be capable of controlling the fire. Therefore, the fire protection features provide a level of protection which should maintain one train of systems necessary to achieve and maintain hot shutdown free from fire damage which meets Appendix R, Section III.G.

- (o) Fire Areas 64 and 65 - Standby Service Water Pump Houses and Valve Room, Fire Zones 1M110, 1M112, 2M110 and 2M112

The inspectors made an inspection of Fire Zones 1M110, 1M112, 2M110 and 2M112 to determine if the following equipment and components were separated or protected in accordance with Appendix R, Section III.G.2. criteria:

<u>Function</u>	<u>Division I Component/Location</u>	<u>Division II Component/Location</u>
Standby Service Water Pumps	1P41C001A/ Zone 1M110	1P41C001B/ Zone 2M110
System Discharge Valve	1P41F001A/ Zone 1M110	1P41F001B/ Zone 2M110
System Return Valve From Cooling Tower	1P41F005A Zone 1M112	1P41F005B/ Zone 2M112

Automatic fire detection is provided for each of the above fire zones. Division I components are in one structure, Fire Area 64, Zones 1M110 and 1M112, and Division II components are in another structure, Fire Area 65, Zones 2M110 and 2M112. These structures are separated by a horizontal distance of more than 65 feet with no intervening combustibles. Based on the licensee's analysis, a fire in one structure should not affect or propagate to affect more than one train of safe shutdown equipment. This meets the provisions of Appendix R, Section III.G.2.

Summary

Based on the results of the licensee's recent reanalysis of the Appendix R program and their revised safe shutdown analysis, as documented in the Fire Protection Review Summary Report, the licensee has proposed fire protection modifications to four fire areas to bring these into compliance with the literal requirements of Appendix R, Section III.G. In addition, the licensee has provided in the Fire Protection Review Summary Report their justifications for exceptions to Section III.G of Appendix R in nine plant fire areas.

Until NRC/NRR review of the revised safe shutdown analysis, FPP-1 and those modifications and exception requests as noted in paragraph 5.a(1)(a) through paragraph 5.a(1)(o), compliance with Appendix R at Grand Gulf Station, is identified as Unresolved Item, (416/85-16-03), Licensee's Unreviewed Fire Protection Program. The following specific issues are identified as part of this unresolved item:

- Inadequate Separation Between Redundant Cables For:
 - a. Fire Zones 1A101, 1A114, and 1A117 - Paragraph 5.a(1)(a)
 - b. Fire Zone 1A211 - paragraph 5.a(1)(c)
 - c. Fire Zone 1A539 - paragraph 5.a(1)(f)
 - d. Fire Zone CC24 - paragraph 5.a(1)(i)
 - e. Fire Zones OC302, OC303, OC308, and OC402 - paragraph 5.a(1)(j)
 - f. Fire Zone OC702 - paragraph 5.a(1)(k)
 - g. Fire Zone OC504 - paragraph 5.a(1)(l)
 - h. Manhole MH01 - paragraph 5.a(1)(m)
- Non-continuous Fire Barriers Between Fire Zones 1A204 and 1A205 - paragraph 5.a(1)(b).
- Fire Barriers Are Not Provided For Redundant Raceways and Equipment in Fire Zone 1A305 - paragraph 5.a(1)(b).
- Inadequate Separation Between Redundant Shutdown Cables Due to Intervening Combustibles in:
 - a. Fire Zones 1A316 and 1A322 - paragraph 5.a(1)(d)
 - b. Fire Zone 1A428 - paragraph 5.a(1)(e)
- Fire Barriers Are Not Provided For:
 - a. Fire Area 26 (Fire Zone OC217) - paragraph 5.a(1)(h)
 - b. Fire Area 50 - paragraph 5.a.(1)(1)
- Automatic Fire Suppression Not Provided for the Main Control Room - paragraph 5.a(1)(1)

- Incomplete Associated Circuits Analysis for Fire Area 25 Fire Zones 1A110C, 1A110D, 1A311, and 1A313 - paragraph 5.b.
- Modifications to Add Isolation to Associated Circuits Between the Control Room and Remote Shutdown Panel - paragraph 5.b.
- Incomplete Analysis and Additional Modifications to Complete Electrical Breaker Coordination For Common Bus Concerns - paragraph 5.b.
- Unreviewed Safe Shutdown Analysis - paragraphs 5.a, 5.b, 5.c.
- Inadequate Suppression Pool Level Indication - paragraph 5.c.
- Fire Barriers Omitted from Safe-Shutdown Related Cables - paragraph 7.

The listing of systems required to achieve safe shutdown (SS/D) for Grand Gulf 1 was submitted by MP&L in response to NRC Question 013.51 and approved by NRC, and incorporated in the FSAR in August 1981 by Amendment 50. The licensee's original safe shutdown analysis that the NRC reviewed is contained in Section 9.5.6 of the Grand Gulf SER issued December 1981 (NUREG-0831, Supplement Nos. 1 and 5).

The current safe shutdown analysis, FPP-1, with Appendix A and B was completed on April 2, 1985. The current safe shutdown analysis and SS/D listing has not been reviewed or approved by the NRC and has two major differences from the original SER:

- 1) The Reactor Core Isolation Cooling (RCIC) System is not protected from all fires.
- 2) The suppression pool level indication, while available on the Remote Shutdown Panel (RSP), is not provided fire separation nor electrically protected from all fires requiring the RSP.

The licensee's original safe shutdown analysis for Grand Gulf 1 was revised in 1984 as part of their Appendix R Review Program. In May 1984, the criteria for the revised safe shutdown systems for fire (SS/D systems) was developed. In November 1984, MP&L updated internal project documentation to reflect the revised SS/D systems. At the time of the inspection, it appeared that the licensee did not meet the requirements of the approved SER.

During the week of the inspection, the licensee was unable to provide documentation to show for a fire in the control room, that the requirements of Appendix R, Section III.L.1 and III.L.2.b. would be satisfied. That is, no analysis was available to show that the plant's alternative shutdown capability could maintain reactor pressure vessel level within that predicted for loss of normal A.C. power, nor was analysis available to show that reactor coolant level would be maintained above the top of the core. The revised SS/D shutdown systems analysis MP&L provided clearly allows uncovering of the reactor core. The inspectors reviewed Bechtel's safety evaluation dated April 30, 1985, which accompanied proposed FSAR Fire protection analysis changes to MP&L. At the time of the inspection, it appeared that this evaluation only addressed the fire protection aspects of the proposed changes to the FSAR. The report did not provide an evaluation of the safety significance of the change in SS/D systems for a fire event to determine whether an unreviewed safety question was involved. The April 1985 evaluation was not perceived to be timely in that the proposed change in the SS/D systems occurred in 1984 and represented the basis for MP&L's recent Appendix R Review Program. The incorporation of the proposed SS/D systems into operating procedures regarding operator actions in response to fire was considered to be at variance with the original SS/D systems described in Section 7.0 of FSAR Appendix 9A. MP&L should have recognized in 1984 during initial phase of their review that utilizing the proposed revised SS/D systems for shutdown violated the literal requirements of Appendix R Section III.L, in that the reactor coolant level could not be maintained above the top of the core. Therefore, MP&L, at that time could have prepared and forwarded to the NRC the required requests for exceptions to the Appendix R Rule. The inspectors' concern regarding the adequacy of the safety evaluation were identified to the licensee at the exit meeting. Subsequently, an Enforcement Conference was held regarding this matter. Section 8 of this report addresses this meeting.

b. Associated Circuits of Concern

General

The separation and protection requirements to 10 CFR 50, Appendix R, apply not only to safe shutdown circuits but also to associated circuits that could prevent operation or cause maloperation of safe shutdown systems and equipment. The identification of these associated circuits of concern was performed for Grand Gulf 1 in accordance with NRC Generic Letter 81-12 and subsequent NRC clarification. Associated circuits of concern are defined as those circuits that have a physical separation less than that required by Section III.G.2 of Appendix R, and have one of the following:

- (1) A common power source (common bus) with the shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices; or

- (2) A connection to circuits of equipment whose spurious operation (spurious signal) would adversely affect the shutdown capability; or
- (3) A common enclosure with the shutdown cables, and

Type (1) are not electrically protected by circuit breakers, fuses or similar devices, or

Type (2) will allow propagation of the fire into the enclosure.

At Grand Gulf 1, any circuit required directly or indirectly for safe shutdown are considered safe shutdown components.

Except for the items identified by the licensee, associated circuits of concern appeared satisfactory for Appendix R, Sections III.G.2, III.G.3, and III.L. The licensee has identified these associated circuits of concern areas, has taken exceptions and specified modifications to bring these areas into compliance with their current understanding of the literal requirements of Appendix R. These areas are discussed below.

The spurious signal concerns are not completed for fire zones 1A110C-1, -2, -3, 1A110D-1, 1A311, and 1A313, which contain safety relief valves and safe shutdown instruments. These zones are located in Fire Area 25 (Containment). An in-depth analysis has not been performed for this area because of limited accessibility during power ascension testing. Interim fire protection features are specified in the licensee's letter of May 7, 1985. MP&L takes a temporary exception from the requirements of Section III.G.2 of Appendix R for Fire Area 25 until the end of the first refueling outage. This is discussed in Section 3.4 of the Fire Protection Summary Report and is considered a part of Unresolved Item (416/85-16-03).

For the Section III.G.3 and III.L. analysis, a fire in only a single bay of a panel in the control room was postulated. The licensee could have spurious signals from a total control room fire that could adversely affect safe shutdown by the lack of diesel generator controls or other spurious operations in other panels as yet unanalysed. The licensee has identified this item and has assigned Design Change Packages DCP #85-3098, Alternate Shutdown Controls/Isolation Station Additions, and DCP #84-3064, Add Isolation to Associated Circuits in C61 Systems. The latter DCP is identified in MP&L letter of May 7, 1985. This issue is discussed in Section 3.4 of the Fire Protection Summary Report and is considered a part of Unresolved Item (416/85-16-03).

It should be noted that Supplement Number 5 to the Safety Evaluation Report (SER) and subsequent letters accepts the temporary lack of isolation between the control room and remote shutdown panel. MP&L committed to provide this isolation prior to startup from the first refueling outage but maintains their position on the possibility of a control room fire that would disable shutdown systems is not considered a credible event. This position is stated in Section 7.2.2.46 of Appendix 9A to the FSAR as follows, "An exposure fire in the control room which disables both divisions of redundant systems is not considered a credible event. The control room is continuously manned by trained personnel; an automatic Halon fire suppression system is provided for Power Generation Control Complex PGCC floor sections... the floor covering at Grand Gulf is rated per ASTM E-84 as 20-25-110, which classifies it as a Class A material per NFPA 101, due to its very slow flame spread and very low fuel contribution; and multiple hose streams are available. Also, four Halon 1211 type, UL Class 1A10BC portable fire extinguishers are located in the immediate vicinity of the control room."

Additional modifications are needed to have a complete electrical coordination scheme for common bus concerns. These modifications have been designated on DCP #84/5002 and are discussed in the licensee's letter of May 7, 1985. The licensee stated that these modifications would be made as soon as feasible before startup from the first refueling outage. This issue is discussed in Section 3.4 of the Fire Protection Summary Report, and is considered a part of Unresolved Item (416/85-16-03).

Associated Circuits by Common Power Supply (Common Bus)

Circuits and cables associated by common power supply are simply unsafe shutdown cables whose fire-induced failure will cause the loss of a power source (bus, distribution panel, or MCC) that is necessary to support safe shutdown. This problem could exist for power, control, or instrumentation circuits. The problem of associated circuits of concern by common power supply is resolved by ensuring adequate electrical coordination between the safe shutdown power source supply breaker and the component feeder breakers or fuses.

In order to audit for this concern at Grand Gulf 1, a sample selection of circuits was checked. The following are examples of the components that were fed from or controlled by circuits that were reviewed during the inspection:

- RHR pumps A and B - E12 C002A and 2B
- SSW pumps A and B - E12 P41 CoolA-A and 1B-B
- RHR valves F004A-A and F004B-B
- SSW valves F018A-A and F018A B-B
- DC circuits on panels 1DA and 1DB
- AC circuits on panel P-150

For all of the samples, the fuses, circuit breakers and relays the coordination was satisfactory. Grand Gulf 1 also has requirements for reevaluating protective relay settings; this is an ongoing program with a maximum reevaluation interval of three years. This is acceptable.

Associated Circuits Causing Spurious Operation (Spurious Signals)

Circuits associated because of spurious operation are those that can, by fire-induced failures cause safe shutdown equipment or nonsafe shutdown equipment to maloperate in a way that defeats the function of safe shutdown systems or equipment. Examples include the uncontrolled opening or closing of valves, or of circuit breakers, due to fire-induced damage to nonsafe shutdown instrument and control circuits that affect the control circuit interlocks of the safe shutdown components.

The analysis of spurious operations considered equipment (safe shutdown and nonsafe shutdown) that could affect safe shutdown of the plant. The potential effects of associated circuits of concern were considered in the spurious operations analysis.

An audit of spurious signal concerns was made in the following areas:

- Current Transformer Secondaries

For diesel generator (D.G.) differential relays for the redundant diesel generators, the circuits routings were determined to assure that there was no common fire zone that could open both D.G. current transformer secondaries. Other current transformer secondaries have been analysed. This item is satisfactory.

- High Low Pressure Interface

The high-low pressure interfaces are outlined in Fire Protection Program (FPP)-1, Rev. 3, Appendix A pg. 4. The seven interfaces as listed were reviewed in the analysis, and were found to be satisfactory.

The licensee FPP-1, Appendix A, Rev. 3, discussed two Reactor Pressure Vessel (RPV) head vent valves and implied that it may be necessary to de-energize the valves at their associated motor control centers to ensure that they remain closed under postulated "hot-short" conditions. There were no administrative controls for this action. Instead, the licensee performed an additional evaluation that demonstrates that additional protection of power and control circuits for these valves is not required for postulated "hot short" conditions. This evaluation was reviewed during the inspection and was considered to be satisfactory. The licensee stated that this evaluation would be included in the next revision of their FPP-1, Appendix A.

- Isolation of Other Fire Instigated Spurious Signals

In the sample Appendix R, Section III.G.2 areas selected (zones 1A222, 1A322, 1A428, MH01, and 1D301) random sample raceways were selected to see if the circuits that were run in these raceways could affect safe shutdown with a postulated exposure fire. In all cases, these circuits have been satisfactorily analysed for spurious signals.

The containment has not been analyzed by zones and so the spurious signal concerns for Fire Area 25 could cause problems for safe shutdown. This is discussed in the general paragraph of associated circuits of concern section.

The licensee could have spurious signals that could adversely affect safe shutdown because of inadequate isolation for diesel generator controls or other spurious operations in other panels. This is discussed in the general paragraph of the associated circuits of concern section.

Associated Circuits by Common Enclosure

The associated circuits by common enclosure concern is found when redundant circuits are routed together in a raceway or enclosure and they are not electrically protected or fire can destroy both circuits due to inadequate fire protection means.

At the Grand Gulf 1 plant, the concern was answered satisfactorily when a sample of circuits selected were all found to be electrically protected. In addition, the licensee stated that nonsafety-related circuits were never routed from one redundant train to another. During the physical plant review, no exceptions to this statement were found.

c. Alternative Shutdown Capabilities

The inspectors reviewed operating personnel training, shift staffing, and the licensee's use of operating and surveillance procedures, as these activities relate to alternative shutdown capabilities. These areas were reviewed to determine if the requirements of Appendix R, Section III.L were met.

(1) Personnel Training and Shift Staffing

The inspectors reviewed the licensee's program for conducting training specifically in the area of those plant procedures used to achieve and maintain the plant in cold shutdown. It was noted that classroom training was given to all Reactor Operators (ROs) and Nuclear Operators (NOs). The inspectors reviewed training records and held discussions with shift operating personnel to verify that the above training was properly implemented.

The licensee's normal shift staffing was reviewed to verify that sufficient personnel were available to operate equipment and systems described in Procedure 05-1-02-II-1, Shutdown from Remote Shutdown Panel. The shift personnel that provided support to 05-1-02-II-1 are separate from the operating personnel assigned to the fire brigade. Adequate shift staffing was further demonstrated during a simulated drill of Procedure 05-1-02-II-1 which began in the control room followed by manning the remote shutdown panel and other stations in the plant.

(2) Procedures

The inspectors reviewed the licensee's operating procedures and off-normal procedures to verify that Appendix R, Section III.L., requirements as given below have been incorporated into applicable procedures.

- Achieve and maintain hot shutdown conditions
- Achieve and maintain subcritical reactivity conditions in the reactor
- Provide decay heat removal capabilities
- Maintain reactor coolant inventory
- Achieve and maintain cold shutdown conditions
- Provide direct readings of process variables necessary to control the above conditions

The following procedures were reviewed:

<u>Number</u>	<u>Rev.</u>	<u>Title</u>
1. 03-1-01-2	18	Power Operations
2. 03-1-01-3	21	Plant Shutdown
3. 03-1-01-4	19	Scram Recovery
4. 05-A-01-EP-1	15	Level Control
5. 05-S-01-EP-2	15	Cooldown
6. 05-S-01-EP-3	16	Containment Control
7. 05-S-01-EP-4	13	Level Restoration
8. 05-S-01-EP-5	14	Rapid Depressurization
9. 05-S-01-EP-8	11	Alt. Shtd. Clg.
10. 05-1-02-I-1	17	Reactor Scram
11. 05-1-02-I-4	15	LOP
12. 05-1-02-II-1	15	Shtdn. From Remote Shutdown Panel
13. 05-1-02-II-14	10	Limited Fire in Control Room
14. 05-1-02-III-1	11	Inadequate Decay Heat Removal

15. 10-S-01-8	3	Fire
16. 10-S-03-2	6	Response to Fires

In addition to reviewing the above procedures, the inspectors conducted, in conjunction with a fire drill, a walk through of the shutdown from Remote Shutdown Panel Procedure 05-1-02-II-1, Revision 15. This procedure did not require electrical isolation from the Main Control Room. This procedure has been designated for use in placing the plant in safe shutdown conditions when operations can not be conducted from the control room. This procedure does not require hot shutdown to be maintained, it proceeds directly to cold shutdown. The procedure assumes all equipment in the control room required for a safe shutdown is affected and that the potential loss of offsite power may occur. The purpose of the walk through was to verify that:

- Communications between various stations are adequate and operable.
- Identification plates installed on valves and instrumentation agree with that called for in the procedure steps.
- Lighting at shutdown stations and along operator paths to shutdown stations is adequate.
- Equipment and valves to be operated can be reached and are not obstructed.
- Sound power phone headsets and procedures to be used are available and contain the latest revision.
- Steps of procedures are clear and can be accomplished.
- Instrumentation identified in IEN 84-09 is available to monitor system process variables or approval received from NRR to use other means.

The walkthrough demonstrated all of the above with the following exceptions:

- (1) Lighting - discussed in paragraph 6 of this report.
- (2) Suppression pool level is not protected - discussed in paragraphs 5.a and 5.c.4.
- (3) Fire Brigade Drill

During this inspection, the inspectors witnessed an unannounced fire brigade drill. The fire scenario was a fire within the Division I, "A" Bay, Diesel Generator Control Panel 864 of the main control room, which discharged sufficient heavy smoke to

require the control room to be evacuated. Five fire brigade members responded to the fire in full protective clothing and self-contained breathing apparatus, and with portable extinguishers, 1½ inch fire hose, smoke ejector, and miscellaneous equipment. Two health physics and three security personnel also responded. Based on the drill/fire scenario, it appeared that the fire brigade had executed the proper fire fighting techniques to effectively handle the fire condition.

(4) Conclusions

At the time of the inspection, the licensee did not demonstrate the ability to perform the safe shutdown of the plant in accordance with the requirements of Appendix R Section III.L. Nor did the licensee demonstrate the RCIC or Suppression Pool Level Indication would be available. The licensee further did not demonstrate that for a total control room fire the controls available at the remote shutdown panel would be adequate to safely shutdown the plant. However, the licensee did demonstrate that for limited control room fires, the systems available may be adequate to provide reasonable assurance of safe shutdown capabilities. These assurances are discussed in FPP-1 with Appendixes A and B which have not been reviewed by NRC/NRR. This issue is identified as part of Unresolved Item (416/85-16-03), and is discussed in paragraphs 5.a. and 5.b.

6. Compliance with 10 CFR 50, Appendix R Section III.J, Emergency Lighting

Section III.J, requires emergency lighting units with at least an eight hour battery power supply to be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Eight hour emergency battery powered lighting units have been provided in the Control Room, remote shutdown panel rooms and in the egress and access from the control room to the remote shutdown panels. The inspectors verified that the lighting units were installed in accordance with drawing Nos. E-0627 through E-0630, E-0637 and E-0638 and were certified by the manufacturer as having a minimum illumination time of eight hours. However, eight hour emergency lighting units have not been provided for other panels and equipment components requiring manual manipulation and the egress and access to this equipment. The specific support equipment and components required for safe plant shutdown following installation of the devices needed to provide electrical isolation of one remote shutdown panel have not yet been all identified. This equipment is to be identified and the required eight hour lighting is to be provided prior to startup from the first refueling outage. In the interim, Procedure 05-1-02-II-1, Shutdown From Remote Shutdown Panel has been revised by Temporary Change Notice to require the auxiliary plant operators to carry portable handlights. This is identified as Inspector Followup Item (416/85-16-04), Inadequate Number of Eight Hour Emergency Lighting Units, and will be reviewed during a subsequent NRC inspection.

7. Licensee Identified Items

- a. (Closed) Licensee Event Report (LER) 416/84-050, Fire Barriers Omitted From Safe-Shutdown Related Cables. On October 15, 1984, during the licensee's Appendix R fire protection reanalysis review, redundant safety-related shutdown cable raceways were identified in several areas of the plant and were not provided with the required separation or protection specified by Appendix R, Section III.G. The licensee established the fire watch compensatory measures specified by the Technical Specification and is to maintain these fire watches until completion of the modifications required to bring these areas into compliance with the Appendix R, Section III.G. requirements. This LER item is closed and the licensee corrective action will be tracked by Unresolved Item (416/85-16-03).

8. Enforcement Conference

An Enforcement Conference was held at the NRC Region II office on August 8, 1985, to discuss concerns regarding the adequacy of a safety evaluation prepared for revised Appendix R safe shutdown systems at Grand Gulf 1. The following personnel were in attendance:

a. Mississippi Power and Light (MP&L) Company

J. B. Richard, Senior Vice President-Nuclear
 O. D. Kingsley, Vice President-Nuclear Operations
 T. H. Cloninger, Director, Nuclear Engineering and Construction
 J. G. Cesare, Manager, Nuclear Licensing
 M. H. Philips, Bishop, Liberman, Cook, Purcell and Reynolds
 S. P. Hutchins, Principal Electrical Engineer
 T. E. Barnett, Jr., Electrical Engineer, Nuclear Plant Engineering
 D. Harmon, Technical Leader, Plant Safety Systems Engineering General Electric (GE)
 C. E. Morris, Senior Project Engineer, GE
 R. W. Jackson, Project Engineer, Bechtel

b. NRC Region II

J. N. Grace, Regional Administrator
 A. F. Gibson, Acting Director, Division of Reactor Safety (DRS)
 V. L. Brownlee, Chief, Reactor Projects Branch 2, Division of Reactor Projects (DRP)
 A. R. Herdt, Chief, Engineering Branch, DRS
 T. E. Conlon, Chief, Plant Systems Section, DRS
 V. W. Panciera, Chief, Reactor Projects Section 2B, DRP

R. E. Carroll, Jr., Project Engineer, Reactor Projects Section 2B, DRP
 G. R. Jenkins, Director, Enforcement and Investigation Coordination Staff
 W. H. Miller, Jr., Fire Protection Engineer
 G. R. Wiseman, Fire Protection Engineer
 L. P. Modenos, Enforcement Specialist
 T. C. Poindexter, Enforcement Staff - IE/HQ
 L. S. Mellen, Reactor Inspector, Test Programs Section

During the meeting, the licensee presented a chronology of events starting in early 1981 regarding the development of their safe shutdown analysis including a discussion of the comparison of the original and revised SS/D listing and the process they utilized in developing and evaluating the revised listing.

The licensee pointed out that in their original FSAR rapid depressurization with low pressure injection (ADS/LPCI) was always considered to provide a division of shutdown capability as was the Reactor Core Isolation Cooling (RCIC) system.

MP&L stated that the original FSAR fire hazards analysis indicated that RCIC need not be protected from all exposure fires, and that the latest MP&L Appendix R review confirmed that RCIC is not required.

The licensee stated that they believed that a safety evaluation of minimum safe shutdown systems, as a basis for the Appendix R review, did not meet the criteria for conducting a 50.59 safety evaluation until plant procedures were revised. They pointed out that the evaluation of safe shutdown systems involved an orderly documented process. The change required no design changes to be made to the RCIC system that would degrade the previous protection committed to in the FSAR. Additionally, they stated that the shutdown analysis for non-loss of coolant accidents utilizing ADS/LPCI provided by General Electric have shown there is no fuel cladding integrity damage and are bounded by other plant specific accident analysis. It was noted that MP&L, by letter dated July 19, 1985, provided to NRR/NRC the results of a plant specific analysis that verified six ADS valves would be available for use in the event of a fire in any plant area, including the control room. This analysis showed only a short-term uncovering of the upper portion of the core during depressurization.

Originally MP&L considered that an exception to Appendix R, Section III.L (alternative and dedicated shutdown capability) was not necessary until the first refueling outage due to the license condition concerning isolation from the control room. However, by letter dated June 18, 1985, the licensee requested an exception to the Appendix R; Section III.L requirements regarding the use of ADS/LPCI because the core did not remain covered. In this letter they further requested a deviation to the staff's position regarding the need for suppression pool level monitoring.

The NRC staff stated that had the reviewer of the original FSAR fire hazards analysis realized the intended use of ADS/LPCI, an exception to Appendix R would have been required at that time due to the short term core uncover.

Based on the additional information presented, NRC personnel concluded that the actions taken by the licensee were adequate and escalated enforcement was not warranted.

ATTACHMENT:
Meeting Agenda

ATTACHMENT

FIRE PROTECTION/APPENDIX R - MINIMUM SAFE SHUTDOWN SYSTEMS LISTING

MEETING AGENDA: AUGUST 8, 1985

- | | |
|----------------------------------------------------------------------------------|---------------------|
| I. INTRODUCTION/PURPOSE | O. D. KINGSLEY, JR. |
| II. LICENSING HISTORY: KEY GGNS EVENTS RELATED TO
APPENDIX R | J. G. CESARE |
| III. ORIGINAL FSAR/FIRE HAZARDS ANALYSIS | J. G. CESARE |
| IV. MP&L'S APPENDIX R REVIEW/REVISED FIRE HAZARDS
ANALYSIS | T. H. CLONINGER |
| V. 10CFR50.59 EVALUATION ASSOCIATED WITH MINIMUM SAFE
SHUTDOWN SYSTEM LISTING | J. G. CESARE |
| VI. CONCLUSIONS | T. H. CLONINGER |

II. LICENSING HISTORY: KEY GGNS EVENTS RELATED TO APPENDIX R

HISTORY - SIGNIFICANT EVENTS

- 2/81 APPENDIX R RULE EFFECTIVE
NOT APPLICABLE TO GGNS
- 9/81 SER ISSUED
 - ° BACKFIT III, G, J, AND O
 - ° STAFF CONCLUSION, "INTENT OF APPENDIX R" WILL BE MET
- 6/82 LOW POWER OPERATING LICENSE ISSUED
 - ° INSTALL TRANSFER SWITCH, FIRST OUTAGE
 - ° PROGRAM MAINTAINED TO MEET "INTENT OF APPENDIX R"
- 10/83 GENERIC LETTER 83-33 ISSUED
- 2/84 IEIN 84-09 ISSUED
- 5/84 NRC REGION II, APPENDIX R WORKSHOP
- 5/84 MP&L APPENDIX R REVIEW PROJECT COMMENCED
- 8/84 FULL POWER LICENSE ISSUED
- 4/15/85 PRE-AUDIT MATERIALS PROVIDED TO NRC
- 4/25/85 MET WITH NRC TO DISCUSS AUDIT

5/7/85 MP&L SUBMITTED APPENDIX R SUMMARY REPORT WITH FINDINGS/EXCEPTIONS

5/18/85 PROPOSED FSAR CHANGES SUBMITTED

5/17/85 ADDITIONAL EXCEPTIONS SUBMITTED

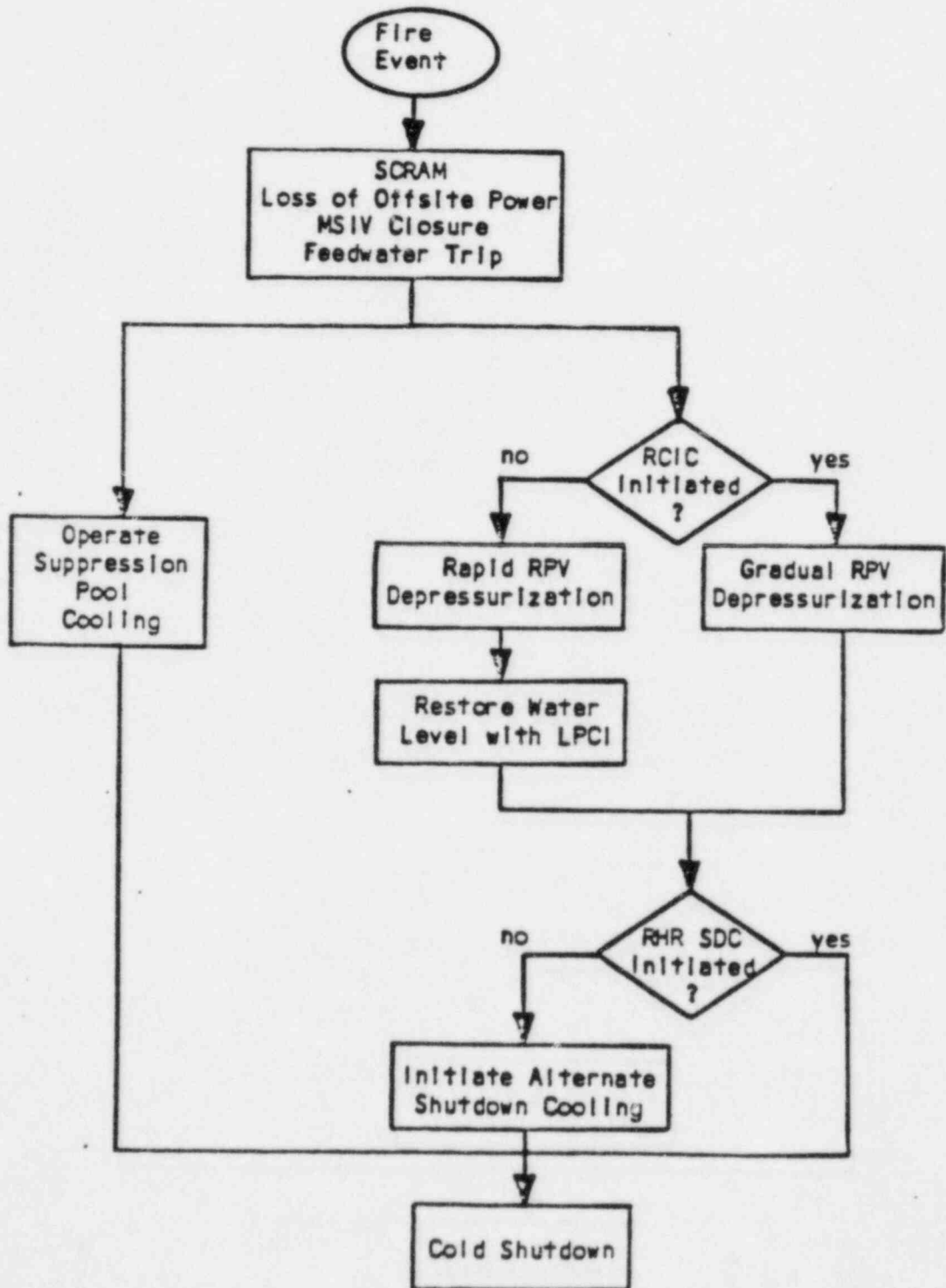
5/20-
24/85 NRC CONDUCTED GGNS APPENDIX R AUDIT

5/30/85 ADDITIONAL INFORMATION SUBMITTAL IN SUPPORT OF NRC REVIEW OF MINIMUM
6/18/85 SS/D SYSTEM LISTING
7/19/85

III. ORIGINAL FSAR/FIRE HAZARDS ANALYSIS

- ° INTENDED TO DEMONSTRATE PROTECTION OF AT LEAST ONE SAFE SHUTDOWN (SS/D) TRAIN GIVEN EXPOSURE FIRE
- ° INCLUDES
 - SYSTEMS LISTING
 - KEY ASSUMPTIONS
 - METHOD/CRITERIA
 - ANALYSIS RESULTS
- ° FHA
 - KEY POINTS
 - CONSIDERED TO MEET THE INTENT OF APP. R
 - AT LEAST ONE DIVISION PROTECTED IN EACH FIRE AREA
 - SUMMARY DOCUMENTATION OF FIRE HAZARDS ANALYSIS PROVIDED IN FSAR
 - CONTROL ROOM FIRE, DAMAGING 2 DIVISIONS, NOT CREDIBLE
 - TREATMENT OF RCIC
 - FROM FUNCTIONAL STANDPOINT, CONSIDERED EQUIVALENT TO DEPRESSURIZATION/LOW PRESSURE SYSTEM SS/D PATH
 - PROTECTED/ROUTED WITH DIVISION I
 - NEED NOT BE PROTECTED FROM ALL EXPOSURE FIRES

Safe Shutdown Flow Chart



IV. APPENDIX R REVIEW PROJECT/REVISED FHA

- ° GOAL TO ESTABLISH APPENDIX R COMPLIANCE DOCUMENTATION IN AUDITABLE FORMAT

SAFE SHUTDOWN EQUIPMENT LIST
LOGIC DIAGRAMS
P&ID'S
RACEWAY DRAWINGS
FIRE HAZARDS ANALYSIS
FIRE PROTECTION DRAWINGS
UPDATED FSAR

- ° REVIEW PROJECT CONDUCTED IN MAY 84 - MAY 85 TIMEFRAME
- ° REVISED FHA
 - DEVELOP RIGOROUS DOCUMENTATION AND PROVISIONS FOR MAINTAINING IT THROUGHOUT PLANT LIFE.
 - EVALUATION INCLUDED CONSIDERATION OF LATEST NRC GUIDANCE FOR:
 - INTERVENING COMBUSTIBLES
 - REVISED FIRE AREA DEFINITION
 - SPURIOUS ACTUATIONS
 - ASSOCIATED CIRCUITS
 - FIRE PROTECTION FEATURES

- MINIMUM SAFE SHUTDOWN SYSTEMS LISTING
 - CRITERIA ESTABLISHED TO IDENTIFY MINIMUM SYSTEMS REQUIRED TO ACHIEVE/MAINTAIN SAFE SHUTDOWN
 - GE UTILIZED EXISTING NRC ACCEPTED ANALYSES TO SUPPORT SYSTEM SELECTION (E.G., EPG'S). GE, IN REVIEWING SYSTEMS, RECOGNIZED POTENTIAL FOR CORE UNCOVERY.
 - CRITERIA INCLUDED CONSIDERATION OF NRC GUIDANCE (E.G., STAFF POSITION ON ADS/LPCI INVOLVING SHORT TERM CORE UNCOVERY)
 - CONFIRMED THAT RCIC NOT REQUIRED FOR SAFE SHUTDOWN
 - SAFETY/ANALYSIS PROVIDED BY GENERAL ELECTRIC FOUND TO BE
 - CONSERVATIVE/BOUNDING
 - LATER CONFIRMED BY ADDITIONAL ANALYSES
- DETAILED EVALUATION OF CONTROL ROOM FIRE TO INCORPORATE ALTERNATE SHUTDOWN CAPABILITIES.
- RESULTS
 - MAJORITY OF AREAS MET LITERAL REQUIREMENTS OF APPENDIX R EVEN UNDER THIS RIGOROUS ANALYSIS
 - ANY IDENTIFIED NONCONFORMANCES WERE IMMEDIATELY DOCUMENTED
 - EXCEPTIONS SUBMITTED WHERE IDENTIFIED
 - NO EXCEPTION TO III.L CONSIDERED NECESSARY UNTIL RFOI DUE TO LICENSE CONDITION ON CONTROL ROOM ISOLATION

• NRC APPENDIX R AUDIT OF GGNS

- MP&L HAS ESTABLISHED THOROUGH, WELL DOCUMENTED FHA. USEFUL FOR LIFE OF PLANT
- NO NONCONFORMANCES IDENTIFIED THAT WERE NOT PREVIOUSLY IDENTIFIED BY MP&L
- NRC EXIT BRIEFING: MP&L PROGRAM ONE OF THE MOST COMPREHENSIVE REVIEWED TO DATE

V. 10CFR50.59 EVALUATION - SAFE SHUTDOWN SYSTEMS LISTING

- ° MP&L POSITION: 10CFR50.59 SAFETY EVALUATION
 - REQUIRED FACILITY CHANGE, PROCEDURE CHANGE, SPECIAL TEST OR EXPERIMENT
 - NOT REQUIRED ENGINEERING ANALYSES (UNLESS NONCONFORMANCES IDENTIFIED)
- ° EVALUATION OF MINIMUM SS/D SYSTEMS, AS BASIS FOR APPENDIX R REVIEW DID NOT MEET CRITERIA FOR CONDUCTING 50.59 EVALUATION UNTIL PLANT PROCEDURES WERE REVISED
- ° ORIGINAL FSAR FHA RESULTS INDICATED RCIC NEED NOT BE PROTECTED. APPENDIX R REVIEW CONFIRMED RCIC NOT REQUIRED
- ° EVALUATION OF SS/D SYSTEMS INVOLVED ORDERLY DOCUMENTED PROCESS AND GE/ BECHTEL CONCURRENCE. NO DESIGN CHANGES MADE ASSOCIATED WITH RCIC THAT DEGRADED PREVIOUS PROTECTION.
- ° SAFETY EVALUATION WAS PERFORMED ON REVISED PROCEDURES

VI. CONCLUSIONS

- ° CONFIRMATORY ANALYSES CONSISTENT WITH ORIGINAL GE CONCLUSIONS REGARDING MINIMUM SAFE SHUTDOWN SYSTEMS LISTING
- ° EXCEPTION SUBMITTED TO APP. R III.L CONSISTENT WITH LICENSE CONDITION TO ADDRESS CONTROL ROOM FIRE
- ° 50,59 EVALUATIONS PERFORMED AS NECESSARY AND CONSIDERED ADEQUATE
- ° OVERALL ASSESSMENT: GGNS FIRE PROTECTION PROGRAM ENHANCED BY APPENDIX R REVIEW EFFORT
 - SYSTEMS ARE AFFORDED IMPROVED PROTECTION VIA COMMITTED MODIFICATIONS
 - NO PROTECTION HAS BEEN REMOVED FROM PLANT WITH THE SS/D SYSTEM LISTING
 - ADDITIONAL PROTECTION INDIRECTLY PROVIDED TO RCIC VIA BARRIERS ADDED TO DIVISION I CABLING
 - CONTROL ROOM/REMOTE SHUTDOWN PANEL ISOLATION MORE THOROUGHLY EVALUATED; DESIGN IMPROVED THROUGH REVIEW
 - OVERALL PLANT SAFETY HAS BEEN ENHANCED THROUGH ACTIONS TAKEN TO DATE