MISSISSIPPI POWER & LIGHT COMPANY
Helping Build Mississippi
P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

June 9, 1981

NUCLEAR PRODUCTION DEPARTMENT

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File 0260/8010/0862
Fire Protection Responses to
FSAR Questions
AECM-81/200

Pursuant to your request in your letter dated April 3, 1981 (letter R. L. Tedesco, NRC, to J. P. McGaughy, MP&L, MAEC-81/68), Mississippi Power & Light (MP&L) is providing the attached information for your review and comment.

The information represents responses to questions concerning MP&L's approach to certain fire protection issues and is presented in question and response format. This information will be incorporated into a forthcoming amendment to Grand Gulf Nuclear Station Final Safety Analysis Report (FSAR) and although the responses may change in format they will not change in intent. Please be advised that responses to Questions 13.31 and 13.40 have been incorporated into the Grand Gulf Nuclear Station FSAR Amendment 48.

Following your review of the information provided, we request the opportunity to meet with appropriate members of your staff to resolve any comments they may have and to provide additional clarifications or information regarding the responses provided in the attachment. We request that this meeting be held Thursday, June 18, 1981. Members of our staff are available for such a meeting in the Washington, D.C. area on that date.

If you have any questions or require further information, please contact this office.

Yours truly,

L. F. Dale
Manager of Nuclear Services

RFP/JDR:lm
Attachment

cc: (See Next Page)

B002
S.1/1

cc: Mr. N. L. Stampley
Mr. G. B. Taylor
Mr. R. B. McGehee
Mr. T. B. Conner

Mr. Victor Stello, Jr., Director
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTACHMENT

Questions and proposed responses pertaining to Fire Protection.

013.18 (4) Your response to Item 013.1 is not totally acceptable. It is our position that the control room and remote shutdown panels be electrically isolated from each other so that a fire in either area that destroys redundant safe shutdown circuits in that area will not affect the safe shutdown capability from the other area. Consider that a postulated fire in the remote shutdown panel area will affect both remote shutdown panels simultaneously. Indicate how you will comply with this position.

RESPONSE

The NRC position requires that an exposure fire be postulated in the remote shutdown panel area that simultaneously affects both remote shutdown panels. Our position is that the remote shutdown panel areas are, in fact, separate fire areas (Division I panel in one area; Division II panel in the other area) separated by a 3-hour fire rated wall and fire door. MP&L plans to keep the door open with the provision for automatic closure upon smoke detection from either remote shutdown panel area.

Cables located in the control room are primarily control cables and are, therefore, an unlikely source for a fire. However, if a fire were to occur in an electrical cable, the fire would be limited to a single division because the electrical cables are installed in accordance with Regulatory Guide 1.75. Where possible, control panels and termination cabinets located within the control room are divisionalized and physical space between redundant panels is maximized. Where two safety releated divisions must enter the same termination cabinet or control panel, barriers are provided between the divisions to minimize the possiblity of a postulated electrical cable fire in one division affecting the opposite division. In addition, all termination cabinets and control room PGCC panels are provided with individual ionization smoke detector units.

As stated in subsection 7.2.2.46 of FSAR Appendix 9A, "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 1301 fire suppression system is provided for PGCC floor sections as described in GE Topical Report NEDO-10466A, "Power Generation Control Complex Design Criteria and Safety Evaluation," 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. One extinguisher is located on the north wall at elevation 166'-0" within the control room; one is located on the south wall at the same elevation within the control room; two are located just outside the control room (one at the east exit and one at the west exit). Four pressurized water fire extinguishers are located in the

RESPONSE - Continued

control room, and one is located above the control room suspended ceiling near the entrance to that area at elevation 177'-0".

Ionization smoke detectors are provided in the inlet ductwork of the control room ventilation system. The smoke detector monitors the incoming outside air, as well as the recirculated air. Upon sensing smoke, the detectors will initate an alarm in the control room identifying the signalling detector zone and initiating shutdown of the respective control room air conditioning unit fan. Emergency breathing apparatus is available to the control room operators to assist in fighting the postulated fire and to make immediate evacuation of the control room unnecessary.

Thus, any exposure fire in the control room which might occur would be rapidly detected and extinguished before both divisions of any redundant system could be jeopardized.

Further, NRC's NUREG-0138, "Staff Discussion of Fifteen Technical Issues Listed in Attachment to November 3, 1976, Memorandum from Director NRR to NRR Staff," (Issue No. 11-attached) states in part:

> "The staff concludes that a serious accident resulting from an event that both damages equipment in the control room and forces the operators to shut down the reactor from outside the control room is of such low probability as to be of negligible risk."

The staff's design basis, as stated in the NUREG, is as follows:

> "One of the basic assumptions in this implementation of GDC 19 is that the control room is not habitable. However, no major damage is assumed to occur to the equipment in the control room."

The staff further stated the following in NUREG-0138:

> "For an event in the control room to lead to serious consequences it would need to involve damage of redundant equipment in the control room (or anywhere else) in such a way that operations at the secondary control stations could not accomplish long-term cooling of the reactor. The fire damage experience at Browns Ferry involving (among other things) the loss of control of a number of systems helps to demonstrate that many redundant means are available to resourceful reactor operators to maintain a reactor in a safe condition. The analysis of the Browns Ferry fire in the Reactor Safety Study (WASH-1400) supports this position."

RESPONSE - Continued

Finally, the NRC states the following:

> "The staff concludes that a serious accident resulting from damage to the control room is of sufficiently low probability as not to warrant revision of the current design basis."

Additionally design features to mitigate the effects of massive damage to control room circuits are not feasible with current design nuclear plants without negative effects upon the reliability of safety systems. This reduction in reliability would be a greater risk to public health and safety than the small probability of such fire damage.

In the light of existing plant design and fire protection provisions as stated earlier, we believe the present Grand Gulf design to be safe and fire protection provisions to be adequate. Further, in light of conclusions reached by the NRC staff in NUREG-0138, we believe that the small additional increase in safety does not justify the installaton of electrical isolation required by the NRC in Grand Gulf FSAR Question 013.18(4).

ISSUE NO. 11

Interpretation of GDC 19 "Control Room"

This issue was identified in a meeting of the Electrical, Instrumentation and Control System Branch held on September 10, 1976. In the attachment to the November 3, 1976 memorandum from the Director, NRR to the NRR Staff, it was listed as Issue #11 and defined as follows:

> "Clarification and amplification is needed of the detailed requirements of, and design bases for the capability for reactor shutdown from locations outside the control room required by GDC 19."

A meeting of all members of the Electrical, Instrumentation and Control Systems Branch was held on November 12, 1976 to discuss, clarify and redefine this issue as necessary in order to aid in developing a staff response. As a result, the issue was redefined by one or more concerned members of the Branch as follows:

> "The staff should revise its implicit assumption of no damage to the equipment and circuits in the control room. The staff should also require that equipment be provided outside the control room and independent of the control room to (a) place the plant in and maintain it in hot shutdown and (b) include the potential capability to proceed to cold shutdown."

Summary of Issue

General Design Criterion 19 expresses the philosophy that all of the instrumentation and controls needed by the operators to monitor and control the nuclear power plant under both normal and accident conditions be readily available at a single central location, the control room. The criterion also recognizes the vulnerability of having only one single central control room and therefore requires a capability to shut down the reactor from outside the control room. At issue is whether the circuits and equipment required outside the control room need to be designed to accommodate damage to circuits or equipment inside tne control room.

Summary Response

The staff concludes that a serious accident resulting from an event that both damages equipment in the control room and forces the operators to shut down the reactor from outside the control room is of such low probability as to be of negligible risk. The probability is considered to be low because the control room is required to be manned at all times and is designed to remain habitable under hazardous conditions, the equipment in the control room is redundant, the reactor is protected by automatic systems, and other means of safely shutting down the reactor are available.

Detailed Discussion

The NRC staff's implementation of General Design Criterion 19 is outlined in Standard Review Plan Section 7.4. One of the basic assumptions in this implementation of GDC 19 is that the control room is not habitable. However, no major damage is assumed to occur to the equipment in the control room.

The NRC staff believes that these provisions are adequate to protect the safety of the public. No U.S. nuclear power plant control room has ever had to be evacuated. Special separate ventilating systems protect against ingress of noxious chemical and radiological substances from outside the control room. Air breathing apparatus is available for defense of the operators against postulated sources of smoke, or other gaseous substances.

The equipment in the control room is redundant which makes the controls less vulnerable to damage. Equipment on the control panels is separated where necessary to provide protection against certain common mode failures. High energy lines are excluded from control rooms. Furthermore, since the control room is continuously manned, damage can be detected quickly, limited and possibly corrected.

The equipment that shuts down the nuclear chain reaction is automatic and, once initiated, cannot be inhibited by operator action from the control room or any

secondary control station. Damage, in most cases, would result in automatic trip and shutdown of the reactor. Similarly, the safety valves that prevent overpressurizing the primary system are activated by the system pressure and cannot be inhibited by an operator, or affected by damage in the control room.

For an event in the control room to lead to serious consequences it would need to involve damage of redundant equipment in the control room (or anywhere else) in such a way that operations at the secondary control stations could not accomplish long-term cooling of the reactor. The fire damage experience at Browns Ferry involving (among other things) the loss of control of a number of systems helps to demonstrate the many redundant means are available to resourceful reactor operators to maintain a reactor in a safe condition. The analysis of the Browns Ferry fire in the Reactor Safety Study (WASH-1400) supports this position.

The staff concludes that a serious accident resulting from damage to the control room is of sufficiently low probability as not to warrant revision of the current design basis.

Part of the issue also questions the adequacy and completeness of the detailed design requirements used by the staff in implementing GDC 19. These requirements are discussed in Standard Review Plan 7.4, which addresses the types of instruments and controls required outside the control room, and the independence, redundancy and design standards of these

instruments and controls. A standard which addresses design assumptions and criteria in more detail is under development in cooperation with industry. As a result of operating experience, particularly the fire at Browns Ferry, and in conjunction with the development of physical security requirements, the staff is again evaluating the need and desirability for remote shutdown capability.

The staff concludes that consideration of this issue does not warrant revisions to any existing licenses, or changes in the current priority being given to possible future changes in the implementation of GDC 19.

013.31 Your fire protection system diagrams indicate that the suppression and standpipe hose systems in containment are not connected to the plant fire water supply system. It is our position that these systems be part of the overall plant fire water system and receive their water supply from that system. As an alternate, demonstrate that the condensate and refueling water storage and transfer system is adequate to supply the required fire flow, assuming loss of off-site power, and that it otherwise meets the requirements for reliability and water supply storage reserve expected of fire water supply systems. Also, verify that the functional capability of the condensate and refueling water transfer system would not be de-graded.

RESPONSE

The condensate and refueling water storage and transfer system is utilized to supply water to all of the fire suppression systems located inside containment. These fire suppression systems consist of two manually actuated containment cooling system charcoal filter train deluge systems and 13 hose stations. Any fire suppression system inside containment would require action by the plant personnel before it would operate.

The condensate and refueling water storage and transfer system utilizes one continuously running 600 gpm pump. Upon sensing high flow in the containment fire protection supply, a flow switch initiates closure of valves in all branch lines and directs the entire flow to the fire protection supply. If the fire fighting demand is greater than 600 gpm, the standby pump will automatically start on low discharge pressure; and a 1200 gpm supply (two pumps operating) is then available for fire fighting. The largest postulated fire protection demand would be 135 gpm for one of the charcoal filter train deluge systems and a 500 gpm demand for hose streams for a total of 635 gpm. Therefore, with both pumps operating, sufficient flow is available. Should the fire last for 2 hours, a total of 76,200 gallons would be required. The condensate tank has a storage capacity of 300,000 gallons, 130,000 gallons of this storage capacity is available for fire fighting. Therefore, a sufficient quantity of water is also available.

If the plant should lose off-site power, the condensate and refueling water storage and transfer system would be inoperable. Therefore, a cross connection from the plant fire water system to the condensate and refueling water storage and transfer system has been provided just outside of containment as a backup fire water source. By realigning two manually operated valves, a continuous water supply to all fire suppression systems inside containment would be maintained.

013.32 Your fire protection system diagrams indicate that the control building and diesel generator buildings water suppression and standpipe and hose station systems are supplied by a single connection to the looped fire water system from each building. It is our position that you provide additional connections to portions of the looped fire water system and provide sufficient valves so that a single break in the fire water system will not preclude all fire water supply to any areas of the plant.

RESPONSE

With the exception of automatic sprinkler systems installed in the non-safety-related work areas at elevation 93', and the control room standby fresh air charcoal filter deluge systems installed at elevation 133', all control building fixed fire suppression systems are gaseous systems, utilizing either CO_2 or Halon. Therefore, the fire water system in the control building functions primarily as a backup fire fighting source. The water supply to the diesel generator building provides both the primary and backup fire fighting source.

The water suppression systems and standpipes in the control building are supplied from a single connection from the underground fire water loop. The water suppression systems and standpipes in the diesel generator building are supplied from a single connection from the underground fire water loop. Therefore, a single line break in the loop connection would only negate all permenent water fire suppression systems in the respective buildings. However, a number of alternative backup measures are available in such an event.

Located adjacent to the diesel generator building are outdoor hose houses which are in strict compliance with Paragraph E.2.(g) of Appendix A to Branch Technical Position ASB 9.5-1. Each hose house is equipped with a fire hydrant connected to the underground fire loop, 250 feet of 2 1/2" fire hose, two 2 1/2" nozzles (adjustable from straight stream to 90 degree fog), and other assorted tools. Section valves in the underground fire loop allow yard fire hydrants to operate even if the single building connection is lost due to a break in the line. In addition to the outdoor hoses, multiple 1 1/2" hose streams are accessible to the diesel generator building from the auxiliary building.

In the event that a break occurred in the control building fire water loop connection, operation of the gaseous fire suppression systems would not be affected. Portable water extinguishers are available throughout the building and provide a backup to the gaseous suppression system. Areas normally served by water suppression systems can be reached by multiple 1 1/2" hose streams from the turbine building. A hose connection will be installed in the standby fresh air filter deluge connections to enable connecting the turbine buiding fire hose and utilizing the turbine building fire loop as a deluge source.

RESPONSE - Continued

Finally, Grand Gulf has a mobile foam/water pumper available for use by the plant fire brigade.

The combination of these secondary fire protection measures provides an adequate backup to the primary suppression systems.

013.36 During our site visit we noted that many of the doors identified on your Fire Protection Plan drawings as 3-hour rated fire doors are actually air-tight doors or other doors that have not been tested for fire resistance. Although you have a statement from the manufacturer that these doors are "similar" in design to rated doors, it is our position that you provide 3-hour rated, labeled fire doors at all openings from the turbine building to the auxiliary and control buildings.

RESPONSE

It has been verified that 15 openings from the turbine building to the auxiliary and control buildings have been provided with manufacturer certified fire doors. These air-tight and pressure doors do not bear the UL label, but have been manufactured in accordance with UL approved procedures for label construction. The manufacturer provided certification that these doors were manufactured in accordance with UL approved procedures for label construction.

013.37 During our site visit you indicated that redundant safe shutdown system cable was routed through both the Division I and Division II switchgear areas on elevation 111'-0" of the control building. These areas are presently protected by CO_2 total flooding systems, and you indicated that the redundant train of cables in each area would be wrapped with a one hour fire rated barrier. It is our position that an automatic water suppression system be installed in each area in addition to the one hour fire rated barrier around one division of cable. As an alternate, the cable could be relocated so that it is not routed through the redundant division switchgear room.

RESPONSE

Grand Gulf utilizes two completely separate and independent switchgear rooms. Both rooms contain safety-related switchgear and cabling necessary for safe shutdown capability. Area OC202 contains Division I switchgear, and Area OC215 contains Division II switchgear. Both switchgear rooms have redundant safe shutdown related raceways (see attached Table 013.37-1) routed through them to the emergency remote shutdown panel rooms.

There are a number of passive and active fire protection measures provided. Each room has complete area coverage by ionization smoke detectors and a total flooding, double shot, fixed carbon dioxide system actuated automatically by rate-compensated heat detectors. The ionization smoke detectors and the rate-compensated heat detectors alarm locally and in the control room when activated. There are water and dry chemical extinguishers as well as multiple, 1 1/2" hose lines available for use by the plant fire brigade.

In addition to the active fire protection measures provided, each switchgear room is separated from all adjacent areas of the plant by 3 hour rated fire barriers. All Division I redundant safe shutdown related raceways in the Division II switchgear room and all Division II redundant safe shutdown related raceways in the Division I switchgear room are protected by one hour rated fire barriers. Finally, doors leading into these rooms are security doors. Therefore, administrative controls will limit the number of transient combustibles entering these areas.

The use of CO_2 suppression systems in the switchgear rooms minimizes the effects of a postulated fire on the safe shutdown capabilities of the plant. It is unlikely that any postulated fire would immediately render all equipment in the associated switchgear room inoperable. Although a single division provides safe shutdown capabilities, the ability to use equipment from the affected division will enhance the safe shutdown capability. Actuation of the CO_2 suppression system

RESPONSE - Continued

will not immediately affect operability of equipment not affected by the fire, and recovery time is minimized. Also for the type of equipment installed in this area CO_2 suppression is more desirable than water because of the CO_2 ability to penetrate spaces between cables, into cabinets and other enclosures. With the 100% total flooding capability installed, the CO_2 can reach anywhere oxygen is available to support combustion. Thus, the CO_2 could extinguish a fire located within the switchgear where the panels would shield a fire from water spray.

If a water suppression system were utilized, a small fire that would cause limited damage, if extinguished by CO_2, has the potential for causing the loss of all electrical equipment in the switchgear room due to water impingement. The worst case scenario for the water suppression system would be a fire in the Division I cables routed through the Division II switchgear room or the Division II cables routed through the Division I switchgear room that actuates the water system. The fire could render safety realted equipment from one division inoperable; the water spray could render much equipment from the opposite division inoperable. Therefore, the suppression system would have a greater potential for adversely affecting plant safe shutdown capabilities than the fire. With a CO_2 suppression system, the only equipment lost immediately would be the equipment directly affected by the fire. In addition, the damage caused by the water spray would significantly increase the time required for recovery from the event and could require the replacement of several essential pieces of equipment.

Table 013.37-1

OC202 — Division I Switchgear Room

Division II Cable No.	Equipment	Function
1BOC61A	C61LTN402B	Suppression Pool Level
1B2NC61A	C61FTN001B	SSW System 'B' Flow
1B20C61A	C61TEN403B	Suppression Pool Temperature
1B3NC61A	C61FTN200B	RHR System B Flow
1B6NC61B	C61LTN400B	Reactor Vessel Level
1B7NC61B	C61PTN401B	Reactor Vessel Pressure
1BODB21A	TB1B21F051D	ADS Safety Relief Valve
1BODB21B	TB1B21F051A	ADS Safety Relief Valve
1BODB21D	TB1B21F051A	ADS Safety Relief Valve
1B1DB21A	TB1B21F051D	ADS Safety Relief Valve
1B1DB21B	TB1B21F051D	ADS Safety Relief Valve
1B2DB21A	TB1B21F051B	ADS Safety Relief Valve
1B2DB21B	TB1B21F051B	ADS Safety Relief Valve
1B2DB21C	TB1B21F051B	ADS Safety Relief Valve
1B8BE12D	TB1E12F010	Shutdown Cooling Valve
1BA606B	1E12HSM600B	RHR Pump B
1BA616B	1P41HSM602B	SSW Pump B
1BB61108C	1P41HSM673B	Diesel Generator Jacket Water Cooler 12 Inlet Valve
1BB61108D	1C61HSM009B	RHR Ht. Exch. Inlet Valve from Makeup Water Treatment System
1BB63107D	1C61HSM215B	Shutdown Cooling Injection Valve
1BB63113E	1C61HSM209B	RHR B Injection Valve
1BB63121E	1C61HSSM255B	Shutdown Cooling Valve Transfer Switch
1BB63122D	1C61HSM231B	RHR Ht. Exch. B Flow to Suppression Pool
1BB63125D	1C61HSM206B	RHR Ht. Exch. B Inlet Valve
1BB63125E	1C61HSSM256B	RHR Ht. Exch. B In Valve Transfer Switch
1BB63126F	1C61HSM211B	RHR B Injection Valve
1BB63127D	1C61HSM202B	RHR Pump B Suction Valve
1BB63128D	1C61HSM228B	RCIC to RHR Ht. Exch. B
1BB63130D	1C61HSM207B	RHR Ht. Exch. B Outlet Valve
1BB63131D	1C61HSM226B	RHR Ht. Exch. B to RCIC
1BB63137D	1C61HSM202A	SSW Pump A Discharge Valve
1BB63142C	Q1P41F068B-B	SSW Discharge Valve from RHR B Ht. Excn.
1BB63142D	1C61HSM008A	RHR Ht. Exch. B Outlet Valve
1BB63145C	Q1P41F014B-B	SSW Inlet Valve from RHR B Ht. Exch.
1BB6505B	1C61HSM011B	SSW B Cooling Tower Fan 'C'
1BB6505D	1C61HSM011B	SSW B Cooling Tower Fan 'C'
1BB6506B	1C61HSM012B	SSW B Cooling Tower Fan 'D'
1BB6506D	1C61HSM012B	SSW B Cooling Tower Fan 'D'

Table 013.37-1 (Continued)

OC202 — Division I Switchgear Room

Division II Cable No.	Equipment	Function
1BB65107C	1C61HSM003B	SSW B Basin Transfe lve
1BB65108C	1C61HSM003B	SSW B Basin Transfer ..ive
1BB65108D	1C61HSM002B	SSW Pump B Discharge Valve
1BB65109C	1C61HSM002B	SSW Pump B Discharge Valve
1BB65109D	1C61HSM010B	SSW B Return Valve to Cooling Tower
1BB65112C	1C61HSM010B	SSW B Return Valve to Cooling Tower
1BB65112D	1H22-P151	DC Power for Shutdown Panel
1BB661151	1H22-P151	AC Power for Shutdown Panel
1BB63145D	Q1P41F014B	SSW Inlet Valve from RHR B Ht. Exch.

OC215 — Division II Switchgear Room

Division I Cable No.	Equipment	Function
1A4AP41A	1H13-P715	SSW A Out of Service Annunciator
1A6AP41C	Q1P41F068A	SSW Discharge Valve from RHR A Ht. Exch.
1AB5505B	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AB5506B	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'
1AB55017A	Q1P41F001A-A	SSW Pump A Suction Valve
1A55107C	Q1P41F001A-A	SSW Pump A Suction Valve
1AB55110A	Q1P41F006A-A	SSW A Recirc. Valve
1AB55110C	Q1P41F006A-A	SSW A Recirc. Valve
1AB55112A	Q1P41F005A-A	SSW Pump A Discharge Valve
1AB55112C	Q1P41F005A-A	SSW Pump A Discharge Valve
1AB55113A	Q1P41F007A-A	SSW A Recirc. Valve
1AB55113C	Q1P41F007A-A	SSW A Recirc. Valve
1AB55114A	Q1Y47C001A-A	SSW Pump House Outside Air Fan
1A4AP41H	1H13-P715	SSW A Out of Service Annunciator
1A4AP41I	1H13-P715	SSW A Out of Service Annunciator
1A5BP41B	1H13-P7?1	SSW A Out of Service Indicat.
1AA504B	Q1X77C001A.A	D. G. Room A Outside Air Fan
1AB5501A	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'
1AB5501B	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AB5501C	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AB5505A	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AB5505C	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AB5506A	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'
1AB5506C	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'

Table 013.37-1 (Continued)

OC215 — Division II Switchgear Room

Division I Cable No.	Equipment	Function
1AB55114C	Q1Y47C001-A-A	SSW Pump House Outside Air Fan
1AD1121	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AP55116A	Q1Y47F001A-A	SSW Exhaust Damper
1AP551171	Q1P41C001A-A	SSW Pump A
1AP55117A	Q1P41C001A-A	SSW Pump A
1AP55120A	Q1Y47F003A-A	SSW Return Damper
1AONC61A	1C61FTN001A	SSW System A Flow
1AONP41B	1P41FTN016A	SSW Pump A Discharge Flow
1AONY47A	1Y47TEN005A	SSW Pump House A Space Temp.
1A2NP41B	1P41PTN009A	SSW Pump A Discharge Pressure
1AONP41A	1P41FTN018A	SSW Cooling Tower A Return Flow
1A1NY47A	1Y47TEN013A	SSW Pump House A Outside Air Inlet Temp.
1AA5041	Q1P41C003A-A	SSW A Cooling Tower Fan 'A'
1AA5041	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'
1AA5031	Q1P41C001A-A	SSW Pump A
1AD1121	Q1P41C003B-A	SSW A Cooling Tower Fan 'B'
1AA5031	Q1P41C001A-A	SSW Pump A
1AB5501C	Q1Y47F002A-A	SSW Pump House Inlet Damper
1AP55118C	Q1Y47F002A-A	SSW Pump House Inlet Damper
1AP55118E	Q1Y47F002A-A	SSW Pump House Inlet Damper

013.40 It is our position that you comply with Section F.3 of Appendix A to BTP 9.5-1 by providing a fixed pipe water suppression system in both the upper and lower cable spreading room.

RESPONSE

Grand Gulf utilizes two completely separate and independent cable spreading rooms for each unit. None of the cable spreading rooms contains any safety-related equipment except for cabling. The lower cable spreading room contains Division II safe shutdown-related raceways and the upper cable spreading room contains Division I safe shutdown-related raceways. Both cable spreading rooms do contain certain cables of the opposite division, however, none are required for safe shutdown. Therefore, a fire in either cable spreading room will not compromise safe shutdown capability.

Both cable spreading rooms are provided with a number of active and passive fire protection measures. Each room has complete area coverage by ionization smoke detectors and a total flooding, double shot, fixed carbon dioxide system actuated automatically by rate-compensated heat detectors. The ionization smoke detection and the rate-compensated heat detection systems alarm locally and in the control room when activated. Secondly, the configuration of each room allows two access routes for the plant fire brigade. The fire brigade can utilize water and dry chemical extinguishers as well as multiple, 1 1/2" hose lines which are located at each entrance to the rooms. In addition to the active fire protection measures provided, each cable spreading room is separated from all adjacent areas of the plant by 2 and 3 hour rated fire barriers. Finally, all doors leading into these rooms are security doors; therefore, administrative controls will limit the number of transient conbustibles entering these rooms.

If a fire were to cause complete operative loss of either cable spreading room, safe shutdown capability would not be compromised. An equivalent level of safety to that specified in Paragraph F.3 of Appendix A to NRC Branch Technical Position ASB 9.5-1 has been provided; therefore, a backup fixed pipe water suppression system is unnecessary.

013.41 Indicate the type of floor covering which will be used in the control room. It is our position that carpet not be utilized.

RESPONSE

Floor covering in the control room and viewing gallery will be carpet with an ASTM E84-70 rating of 20-25-110.

The basic NRC requirement for an interior finish as noted in Regulatory Guide 1.120 is that the finish should be noncombustible or listed by a nationally recognized lab for:

a. Surface flamespread rating of 50 or less, and

b. Potential heat release of 3500 Btu/lb or less per ASTM D-3286 or NFPA 259.

Carpet supplied has a flame spread of 20. The carpeting is being tested for potential heat release.

Carpeting has a superior overall human factors performance in an area such as the control room viewing gallery based on the following:

a. The flame spread rating is less than 50.

b. Maintenance frequency and duration is less than resilient tiles and is much less disruptive to operations.

c. Carpeting offers a better walking surface, minimizes fatigue and cushions falls. It does not become slippery when wet.

d. Carpeting contributes to noise reduction.

e. Carpeting enhances morale.

013.42 Verify that the interface between the control room viewing gallery (room OC 601) and the concealed space above the control room suspended ceiling will be separated with at least a 1-hour fire barrier.

RESPONSE

The control room viewing gallery is part of the control room fire area. In addition, the control room fire area is separated from other fire areas by 3 hour fire walls and doors. Therefore, there should be no requirement for a one hour fire barrier between the viewing gallery and the control room ceiling space.

As designed, the viewing gallery area includes a concrete floor slab, reinforced CMU end walls, bullet proof glazed viewing wall with steel mullions, a non-combustible ceiling on both sides of the wall and a plaster and sheet metal closure above the viewing wall and ceiling to the underside of the slab above the ceiling space. The bullet proof glazing is not fire rated.

013.45 It is our position that the diesel generator room outside air fans be arranged to start automatically in the Division I or II diesel generator rooms upon detection of smoke in either of the other two diesel generator rooms to prevent the smoke from a fire in one room from filtering back into the other rooms through the exhaust openings to the common corridor, room 1A 301. As an alternate, the fire dampers presently installed in the exhaust openings should be arranged to also close as a smoke damper.

RESPONSE

As described in FSAR Appendix 9A, subsection 7.2.4.2, and FSAR subsection 9.5.1.2.2.7, ultraviolet flame detectors provide area detection capabilities in each diesel generator bay and initiate alarms in the control room and locally. The alarms provided in the control room identify the location of the detected fire.

Administrative procedures will be implemented at Grand Gulf to require that, as part of the operator action, the control room operators start the outside air fans in the other two diesel generator bays. During normal plant operation, with the diesels shut down, temperature control within each generator bay is provided by a recirculation cooling system utilizing a fan coil unit with no air makeup or exhaust. Therefore, it is unlikely that any significant communication between generator bays would occur before the fire would be detected and the supply air fans in the unaffected bays could be started. If the fire were to occur during operation of the affected standby diesel generator, causing either a manual or automatic shutdown of that diesel generator, the fan in the bay housing the redundant standby diesel generator would automatically start when the diesel generator starts.

Fan start by operator action upon a fire alarm is more desirable than automatic initiation by the flame detectors since separation of safety-related and non-safety-related circuitry is maintained. The manual fan start also minimizes the amount of equipment which could potentially fail and affect plant safety as could occur with an installed smoke damper.

If the presently installed fire dampers were modified to close as a smoke damper, actuation by a signal from the non-safety-related detector circuits would be required. Inadvertent closure of a fire damper by these circuits would disable the affected diesel generator by restricing air flow required for diesel combustion and ventilation of the area during diesel running. Once shut, a fire damper can be opened only by manual manipulation.

Therefore, it is our position that mitigating action as requested by the NRC is detrimental to plant safety.

013.51 In accordance with Section 9.5.1, Branch Technical Position ASB 9.5-1, position C.4.a(1) of NRC Standard Review Plan and Section III.G of new Appendix R to 10 CFR Part 50, it is the staff's position that cabling for redundant safe shutdown systems should be separated by walls having a three-hour fire rating or equivalent protection (see Section III.G.2 of Appendix R). That is, cabling required for, or associated with the primary method of shutdown, should be physically separated by the equivalent of a three-hour rated fire barrier from cabling required for or associated with the redundant or alternate method of shutdown. To assure that redundant shutdown cable systems and all other cable systems that are associated with the shutdown cable systems are separated from each other so that both are not subject to damage from a single fire hazard, we require the following information for each system needed to bring the plant to a safe shutdown.

1. Provide a table that lists all equipment including instrumentation and vital support system equipment required to achieve and maintain hot and/or cold shutdown. For each equipment listed:

   a. Differentiate between equipment required to achieve and maintain hot shutdown and equipment required to achieve and maintain cold shutdown.

   b. Define each equipment's location by fire area.

   c. Define each equipment's redundant counterpart.

   d. Identify each equipment's essential cabling (instrumentation, control, and power). For each cable identified: (1) Describe the cable routing (by fire area) from source to termination, and (2) Identify each fire area location where the cables are separated by less than a wall having a three-hour rating from cables for any redundant shutdown system, and

   e. List any problem areas identified by item 1.d(2) above that will be corrected in accordance with Section III.G.3 of Appendix R (i.e., alternate or dedicated shutdown capability).

2. Provide a table that lists Class 1E and Non-Class 1E cables that are associted with the essential safe shutdown systems identified in item 1 above. For each cable listed:

   a. Define the cables' association to the safe shutdown system (common power source, common raceway, separation less than IEEE Standard-384 guidelines, cables for equipment whose spurious operation will adversely affect shutdown systems, etc.).

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b. Describe each associated cable routing (by fire area) from source to termination, and

c. Identify each location where the associated cables are separated by less than a wall having a three-hour fire rating from cables required for or associated with any redundant shutdown system.

3. Provide one of the following for each of the circuits identified in item 2.c above:

a. Results of an analysis that demonstrates that failure caused by open, ground, or hot short of cables will not affect it's associated shutdown systems.

b. Identify each circuit requiring a solution in accordance with Section III.G.3 of Appendix R, or

c. Identify each circuit meeting or that will be modified to meet the requirements of Section III.G.2 of Appendix R (i.e., three-hour wall, 20 feet of clear space with automatic fire suppression, or one-hour barrier with automatic fire suppression).

4. To assure compliance with GDC 19, we require the following information be provided for the control room. If credit is to be taken for an alternate or dedicated shutdown method for other fire areas (as identified by item 1.e or 3.b above) in accordance with Section III.G.3 of new Appendix R to 10 CFR Part 50, the following information will also be required for each of these plant areas.

a. A table that lists all equipment including instrumentation and vital support system equipment that are required by the primary method of achieving and maintaining hot and/or cold shutdown.

b. A table that lists all equipment including instrumentation and vital support system equipment that are required by the alternate, dedicated, or remote method of achieving and maintaining hot and/or cold shutdown.

c. Identify each alternate shutdown equipment lists in item 4.b above with essential cables (instrumentation, control, and power) that are located in the fire area containing the primary shutdown equipment. For each equipment listed provide one of the following:

013.51 - Continued

1. Detailed electrical schematic drawings that show the essential cables that are duplicated elsewhere and are electrically isolated from the subject fire areas, or

2. The results of an analysis that demonstrates that failure (open, ground, or hot short) of each cable identified will not affect the capability to achieve and maintain hot or cold shutdown.

d. Provide a table that lists Class 1E and Non-Class 1E cables that are associated with the alternate, dedicated, or remote method of shutdown. For each item listed, identify each associated cable located in the fire area containing the primary shutdown equipment. For each cable so identified, provide the results of an analysis that demonstrates that failure (open, ground, or hot short) of the associated cable will not adversely affect the alternate, dedicated, or remote method of shutdown.

5. The residual heat removal system is generally a low pressure system that interfaces with the high pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Branch Technical Postion RSB 5-1. Thus, this interface most likely consists of two redundant and independent motor operated valves with diverse interlocks in accordance with Branch Technical Position ICSB 3. These two motor operated valves and their associated cable may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire-initiated LOCA through the subject high-low pressure system interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire, we require the following information:

a. Identify each high-low pressure interface that uses redundant electrically controlled devices (such as two series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

b. Identify each device's essential cabling (power and control) and describe the cable routing (by fire area) from source to termination.

c. Identify each location where the identified cables are separated by less than a wall having a three-hour fire rating from cables for the redundant device.

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d. For the areas identified in item 5.c above (if any), provide the bases and justification as to the acceptability of the existing design or any proposed modifications.

RESPONSE

The Grand Gulf project has recently completed an extensive Safe Shutdown Analysis. The following methodology was utilized in the analysis.

013.51.1, 2, 4, 5 Under normal operating conditions, normal power supplies and balance of plant systems and components are utilized in conjunction with the safety-related residual heat removal and standby service water systems to achieve an orderly, controlled plant shutdown and cooldown.

In the event of abnormal occurrences which could possibly disable routinely operable equipment, several high reliability and redundant safety-related systems are available to safely shut down the plant without the use of balance of plant systems. These systems include:

Residual heat removal (RHR) A, B, and C systems
Standby service water system
LPCI C system
Reactor core isolation cooling (RCIC) system
Low-pressure core spray (LPCS) system
High-pressure core spray (HPCS) system
Automatic depressurization (ADS) system
Containment isolation valves
Ultimate heat sink
Standby diesel generators
Electric power and control systems
Safety-related HVAC

As discussed in FSAR subsection 6.3.1.1.2 and Chapter 15, these systems can be used in various combinations to mitigate the consequences of an accident. Detailed descriptions of these systems and the available modes of operation are given in the applicable FSAR subsections.

To protect the extensive reliability of the safe shutdown capabilities of Grand Gulf, a safe shutdown analysis was performed for all areas of the plant in which safety-related equipment, components, or cables are installed. Specifically, the intent of the safe shutdown analysis was to ensure that no single fire will prevent the plant from being safely shut down and from being maintained in a safe shutdown condition.

RESPONSE - Continued

Safety-related equipment areas reviewed during the safe shutdown analysis are located in the auxiliary, control, containment, diesel generator, and standby service water pumphouse buildings. For each area, the analysis addressed possible ignition sources, installed and transient combustibles, and flame spread. Where inherent design features of safety-related equipment and installation were not adequate to comply with the Grand Gulf defense in depth fire protection design concept, additional fire protection measures were provided. As a minimum, all safety-related areas of the plant, except the containment, are provided with area smoke detection or flame detectors. Each area was analyzed and the results of the analysis has been discussed in FSAR Appendix 9A, Section 7.2, and summarized in Table 9A-2.

The subjects of fire-fighting water drainage, ventialation, and wetting of electrical cables and equipment are addressed in FSAR Table 9A-1, subsections D.1.i, D.4, and D.3.c, respectively.

1. Power and Control Cable Fire Protection Analysis

Power and control cables are separated into three independent electrical divisions -- I, II, and III -- each serving separate safety-related systems. Operation of either Divisions I and III or II and III can be completely lost without affecting safe shutdown capability. Operation of Division I only or operation of Division II only is sufficient to achieve safe shutdown. The operability of either Division I or II is ensured by fire protection measures taken to ensure that a single fire cannot disable both divisions. Separation criteria utilized during the installation of safety-related cables provide protection against disabling redundant safety-related equipment by cable fire. To protect against the effects of an exposure fire from in situ or transient combustibles, each area of the plant with safety-related equipment installed was analyzed for the postulated exposure fire as described in FSAR Appendix 9A, subsection 7.1.5. Fire protection measures, in addition to separation, were provided where necessary.

The criteria used for separation of safety-related cable trays and conduits are based on Regulatory Guide 1.75. The intent is to prevent a possible fire in one safety-related cable tray from spreading into a safety-related cable tray of a redundant electrical division and to prevent a possible fire in a non-safety-related cable tray from spreading into any safety-related cable tray.

1.1 Separation Criteria for Safety-Related Cable Trays and Conduits Outside Cable Spreading Rooms

Safety-related cable trays are separated from other division safety-related cable trays a minimum of 5 feet vertically and 3 feet horizontally.

RESPONSE - Continued

Enclosed safety-related cable trays or safety-related cable conduits are separated a minimum of 1 inch from safety-related enclosed cable trays or safety-related cable conduits of other divisions.

1.2 Separation Criteria for Safety-Related Cable Trays and Conduits Inside Cable Spreading Rooms

Safety-related cable trays inside the cable spreading rooms are separated from other division safety-related cable trays a minimum of 3 feet vertically and 1 foot horizontally.

Enclosed safety-related cable trays and safety-related conduits are separated a minimum of 1 inch from enclosed safety-related cable trays and safety-related conduits of other divisions.

1.3 Separation of Safety-Related Cables from Non-Safety-Related Cables

Both inside and outside the cable spreading rooms, if a non-safety-related cable is located in proximity to safety-related cables of electrical divisions, the non-safety-related cable will be considered as if it were safety-related. The separation criteria outlined in FSAR Appendix 9A, subsections 7.1.1 and 7.1.2, will then be maintained between the non-safety-related cable and the safety-related cables.

1.4 In addition to the separation criteria described in FSAR Appendix 9A, subsections 7.1.1, 7.1.2, and 7.1.3, the electrical cable insulation used is of the non-fire-propagting type and has passed either IEEE-383 or IPCEA S-19-81 flame retardance tests. If attaining the physical separation criteria is not possible, approved fire barriers are used to separate electrical cable trays and conduits, in accordance with Regulatory Guide 1.75.

1.5 Exposure Fire Analysis

To protect against the possibility of an exposure fire affecting redundant safe shutdown-related cables in Division I and Division II concurrently, the routing of all safe shutdown-related cables in either conduit or trays was evaluated as part of the safe shutdown analysis.

Safe shutdown-related cables were identified as those cables necessary to ensure the function of the minimum safety-related equipment necessary to bring the plant to a cold shutdown condition and maintain the plant in a safe condition after shutdown. The equipment identified either: is operable from both the control room and the remote shutdown panel; is

RESPONSE - Continued

automatically started without operator action; or, as in the case of ECCS room coolers, is started automatically when the associated safety-related component is started automatically or manually from either operating station. Cables analyzed for the effects of an exposure fire are part of the following systems:

a. Automatic Depressurization System, A and B

b. Residual Heat Removal System; A, B, and C, LPCI, Suppression Pool Cooling, and Decay Heat Removal Modes

c. Reactor Core Isolation Cooling System

d. Standby Service Water System, A and B

e. Diesel Generators, A and B

f. ECCS Rooms HVAC

g. ESF Switchgear HVAC

h. Standby Service Water Pump House HVAC

i. Diesel Generator HVAC

Protecting at least one division of the essential equipment in the above listed system from the effects of an exposure fire ensures that the safe shutdown capability of the plant will not be endangered by a single exposure fire coincident with a loss of offsite power.

To ensure that a postulated exposure fire cannot increase the probability of a loss of coolant accident, cables essential to maintaining isolation at the primary coolant high to low pressure interfaces described in FSAR subsection 5.1.2 were also included in the exposure fire analysis.

The results of the Grand Gulf exposure fire review are included in the component fire protection analysis summarized in FSAR Appendix 9A, Section 7.2. The postulated exposure fire areas listed were determined by reviewing the physical characteristics of the area and by convenience of analysis. Where defined areas were not completely separated by a 3-hour fire-rated barrier, such as in the auxiliary building corridors, the exposure fire area was analyzed individually and in conjunction with the adjacent area.

Each exposure fire area was investigated for the routing of any Division I or II cable associated with the above listed safety-related systems, whether the cables were routed in trays or conduit. The identified cables were then reviewed to

RESPONSE - Continued

determine whether the cable was essential to safe shutdown and, where cables in Division I and II were routed through the same or adjacent exposure fire areas, a redundancy evaluation was performed.

Where redundant safe shutdown-related cables are identified as being routed within the same exposure fire area, the cable locations and the area within which the cables are routed were assessed for the hazard presented by the postulated exposure fire. Protection from an exposure fire is afforded by:

a. Evaluating the possible transient combustibles within an area containing redundant opposite division cables and the characteristics of an exposure fire due to ignition of the transient combustibles.

b. Rerouting the affected cables where possible and practical, or

c. Installing additional fire protection measures, as applicable except where specifically described otherwise in FSAR Appendix 9A, Section 7.2. The following minimum fire protection measures are provided where the cable review indicated the need for additional fire protection measures to protect redundant safe shutdown-related cables routed in proximity to one another:

    1. Where redundant safe shutdown-related cables are routed through the same exposure fire area and separated by more than 50 feet, area smoke detection is provided.

    2. Where redundant safe shutdown-related cables are routed in the same exposure fire area and are separated by 20 to 50 feet, area smoke detection and automatic sprinkler protection is provded.

    3. Where redundant safe shutdown-related cables in the same exposure fire area are separated by less than 20 feet, area smoke detection, automatic sprinklers, and 1-hour fire rated barriers separating Division I from Division II are provided.

In addition to the systems and fire protection measures installed to specifically protect the operation of at least one division in the event of an exposure fire, hose stations and water extinguishers are located in stragegic areas of the seismic Category I buildings to provide a quick response capability by the plant fire brigade.

RESPONSE - Continued

The Grand Gulf remote shutdown panels are separated and completely redundant to one another. Cables associated to either panel were included in the safe shutdown analysis. Therefore, protection of the cable for the remote shutdown panel from the effects of a fire that disables the equivalent same division cable from the control room is not required. The consequences of this postulated fire to safe shutdown capability is no worse than a fire that disables a single divisionalized power cable to a piece of equipment that is operable from either a remote shutdown panel or the control room.

013.51.3 (a) General Design Criteria (GDC) 17 and 19 require that the plant be built such that a single failure cannot compromise its ability to achieve and maintain safe shutdown. Every system and component is analyzed and re-analyzed during the design process to ensure compliance with this goal. The failures which were analyzed included every conceivable happening from loss of power, to hot shorts; from grounds to spurious signals; from non-operation of equipment to mal-operation. These GDC are verified by each branch of the NRC individually and are documented throughout the main body of the FSAR, in the FSAR Appendices and in the responses to numerous questions.

(b)&(c) The cable study described in other parts of this position detailed the method or methods used to ensure that each cable complies with all fire protection requirements.

Though our results are not documented in the format required, we believe that all concerns have been extensively addressed in our analysis.