MISSISSIPPI POWER & LIGHT COMPANY
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August 21, 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 0272/0277/L-344.0/16054
Additional Information Requested
By Instrumentation and Control
Systems Branch
AECM-81/308

The attached information represents Mississippi Power & Light's (MP&L) responses to both formal and informal NRC requests for additional information in the instrumentation and control systems area. In general, the informal requests were brought to our attention by your Mr. J. Knight of Instrumentation and Control Systems Branch.

Information so designated in the attachments to this letter will be incorporated into the Grand Gulf FSAR by the next available amendment.

Yours truly,

L. F. Dale
Manager of Nuclear Services

JTB/JGC/JDR:ad

Attachments:
1. Capsule Status & Schedule: IE Notice 79-22, Control Systems Failures, IE Bulletin 79-27.
2. Failures Associated with Vessel Level Sensing Lines and SRV Low-Low Setpoint Logic.
3. BTP ICSB-3.
4. TMI Related Issues: II.D.3
II.F.2
II.K.3.18
II.K.3.21

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MISSISSIPPI POWER & LIGHT COMPANY

5. Revised Question and Response 031.58

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

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

CAPSULE STATUS & SCHEDULE: IE Notice 79-22, Control Systems Failures, and IE Bulletin 79-27.

1. IE Notice 79-22, "High Energy Line Breaks and Consequential Control Systems Failures."

   The NRC letter to MP&L, dated April 16, 1981, requested an evaluation of IE notice 79-22. This evaluation is currently in progress. For this evaluation a matrix is being developed which will show the effects, if any of high energy line breaks on control systems. If interaction is discovered, the impact of failure of the applicable system upon the GGNS safety analyses will be evaluated. A report on the results of this evaluation will be provided prior to the fuel load of Unit 1.

2. Control System Failures.

   The NRC letter to MP&L, dated April 16, 1981, requested an evaluation of the effects of control systems failures with respect to the plant's accident and transient analysis presented in FSAR Chapter 15. This analysis is currently in progress.

   To address Item (1) of the above referenced letter (identification of control systems failures which could impact plant safety), phenomena which could occur to initiate or worsen a transient/accident were determined. An exhaustive study was then made to determine all control systems failures which could result in the phenomena.

   Identification of the power panel, MCC, LCC, bus, transformer, battery and/or inverter, as applicable for each control system identified in Item (1) was made. A rearrangement of this information showed control systems with common power sources and the effects of cascading power losses.

   A determination of control systems identified in Item (1) that receive input signals from common sensors was completed.

   An evaluation of the effects of the loss of a common sensor or power source on the analyses presented in FSAR Chapter 15 is now being conducted. The results of this analysis will be reported prior to the fuel load of Unit 1.

3. IE Bulletin 79-27, "Loss of Non Class IE Instrumentation and Control Power System Bus During Operation."

   This bulletin was transmitted for information purposes to MP&L by the NRC letter, dated November 30, 1979. An evaluation of this bulletin was requested by the NRC letter to MP&L, dated December 12, 1980

Capsule Status & Schedule: (Cont'd)

For this requested evaluation, a series of tables has been developed which lists GGNS power sources down to the fuse level, including alarm indications, instruments, and control devices on these power sources. Completion of the tables with primary and secondary effects from loss of the power sources' is in progress.

The results of the evaluation with regard to plant design will be reported prior to the fuel load of Unit 1. The procedural review requested by the subject bulletin evaluating the effects of interactions of power source failures and the plant's operating procedures will be completed prior to the first scheduled refueling outage.

After evaluating the results of the review of IE Notice 79-22, Control Systems Failures and IE Bulletin 79-27, if any effects are determined to have an adverse impact on plant safety, design modifications will be made prior to startup after the first refueling outage.

Failures Associated with Vessel Level Sensing Lines and SRV Low-Low Setpoint Logic

Recently, the NRC reviewer for Grand Gulf in the Instrumentation and Control Systems area, Mr. J. Knight, has indicated concerns in the following areas.

(1) Failures in vessel level sensing lines common to control and protective systems, and

(2) Consequences of single failures in the Safety Relief Valve (SRV) Low-Low Setpoint Function.

These concerns were brought to MP&L attention in telephone conversations held in July, 1981, with Mr. G. Cesare, MP&L Supervisor of Licensing, and were further discussed in informal meetings held the week of August 10, 1981, in Bethesda. Maryland, with Mr. J. Richardson, MP&L Manager of Safety and Licensing. Mr. Knight has also discussed these issues on a generic basis during the same time period with representatives of General Electric. Grand Gulf specific evaluations of these issues are currently underway.

The results of these evaluations will be provided for NRC review prior to fuel load. These results will be incorporated into the Grand Gulf FSAR in the next available amendment following the completion of the evaluations. Status and schedule information will be provided informally to the NRC Project Manager, Mr. M. D. Houston, as available. After evaluation of the results, if any effects are determined to have an adverse impact on plant safety, design modifications will be made prior to startup after the first refueling outage.

Compliance to Design Recommendations of
Branch Technical Position ICSB-3, Rev. 1

1. Interlock logic associated with the RHR/recirculation system shutdown suction interface follows all applicable design recommendations of Section B, with the exception of the diverse interlock recommendation established in Section B.2. As discussed in revised subsection 7.6.1.3.3.1 the valves are provided with four separate (by division) pressure transmitters. All four transmitters must indicate low pressure before both valves can open and the valves close automatically whenever the primary pressure exceeds the subsystem design pressure.

   Additional reliability is assured by the transmitter/trip unit method of implementing pressure interlocks. Trip units are equipped with meters and trip point calibration units so that proper operation can be checked on a frequent basis. Finally, administrative control ensures that the initiation of shutdown cooling begins by draining and flushing of RHR lines when reactor pressure has decreased to approximately 135 psig, the low pressure components of the RHR system are rated at approximately 500 psig, this constitutes more than a factor of 3 safety margin for any control panel instrument error or operator error independent of any interlock.

2. Interlock logic associated with the RHR/recirculation system shutdown discharge as described in revised subsection 7.6.1.3 follows all applicable design recommendations of Section B.

3. Interlock logic associated with the RHR system head spray as described in revised subsection 7.6.1.3 follows all applicable design recommendations of Section B.

4. The interface between the main steam system and the RHR system in the steam condensing mode of RHR involves a three valve network; i.e., an upstream MOV (E12-F052) and a parallel configuration of an air operated valve (AOV) (E12-F051) and a MOV bypass (E12-F087). Further description is provided in revised subsection 7.6.1.3. To minimize the possibility of damage due to overpressurization of the subsystem, a relief valve was provided downstream of the AOV. This relief valve is designed to prevent the loss of subsystem integrity due to an overpressure condition resulting from a failed open AOV. In addition, the MOV bypass is interlocked with upstream pressure to prohibit its opening when upstream pressure is greater than subsystem design pressure. There are no high/low pressure interlocks associated with the upstream MOV. As required in this Branch Technical Position, suitable valve position indication is provided for all valves.

5. Interlock logic associated with the feedwater leakage control system as described in revised subsection 7.6.1.3 follows all design recommendations of Section B.

6. Interlock logic associated with the main steam isolation valve leakage control system (MSIV-LCS) as described in subsections 6.7.1 and 7.3.1.1.3 follows all applicable design recommendations of Section B.

7. The high pressure/low pressure interface for the LPCS and the RHR-LPCI mode do not contain pressure interlocks on the automatic or manual system level initiation. There is a pressure interlock on each of the LPCI, and the LPCS injection valves that prevents the test opening of these valves unless the pressure between the injection valve and the testable check valve is below the setpoint. To insure ECCS reliability it is not desirable to have a pressure interlock which would prevent the opening of the LPCS and LPCI injection valves to operate on a LOCA when needed. As allowed in Section B.5 design recommendations of the BTP are not applied in this case since the LPCS and LPCI lines are required for proper ECCS operation.

The remaining pages of this attachment represent proposed changes to FSAR subsection 7.6 which will be incorporated into the next available FSAR amendment.

7.6.1.3 High-Pressure/Low-Pressure Interlock Protection System

7.6.1.3.1 Function Identification

The low-pressure systems which interface with the reactor coolant pressure boundary and the instrumentation which protects them from overpressurization are discussed in this section.

7.6.1.3.2 Power Sources

The power for the interlocks is provided from the essential power supplies for the associated systems, (RHR for the RHR valves and LPCS for the LPCS valves).

7.6.1.3.3 Equipment Design

The following high-pressure/low-pressure interlock equipment is provided:

Process Line	Type	Valve	Parameter Sensed	Purpose
Shutdown Cooling Suction	MO MO	E12-F009 E12-F008	Reactor pressure	Prevents valve opening until reactor pressure is low
Shutdown Cooling Discharge	MO	E12-F053	Reactor Pressure	Prevents valve opening until reactor pressure is low
Head Spray	MO	E12-F023	Reactor pressure	Prevents valve opening until reactor pressure is low
Steam Condensing Mode	MO	E12-F087	Steam Line	Prevents valve opening until pressure is low
Feedwater Leakage Control System	MO	E38-F001	Feedwater Pressure	Prevents valve opening until feedwater pressure is low

7.6.1.3.3.1 Circuit Description

Motor operated RHR shutdown inboard and outboard suction valves E12-F009 and E12-F008 are in series for isolation from the primary system boundary. The valves are provided with four trip unit activated interlocks two per valve and four separate (by division) pressure transmitters which are connected to four physically separated instrumentation lines. All four interlocks must indicate low pressure before both valves are permitted to open. Valves E12-F008 and E12-F009 close automatically whenever the primary pressure exceeds the subsystem design pressure.

Motor operated RHR shutdown discharge valve E12-F053 and remote testable check valve E12-F050 are in series for isolation from the primary system boundary. Motor operated valve E12-F053 is provided with two trip unit activated interlocks and two separate (by division) pressure transmitters which are connected to two physically separated instrumentation lines. Both interlocks must indicate low pressure before the discharge valve can open. The discharge valve closes automatically whenever the primary pressure exceeds the subsystem design pressure. The check valve position can be confirmed at any time and relief valve E12-F025 will handle any leakage of the closed check valve.

Motor operated RHR head spray valve E12-F023 and testable check valve E12-F019 are in series for isolation from the primary system boundary. Motor operated valve E12-F023 is provided with two trip unit activated interlocks and two separate (by division) pressure transmitters which are connected to two physically separated instrumentation lines. Both interlocks must indicate low pressure before the head spray valve can open. The head spray valve closes automatically whenever the primary pressure exceeds the subsystem design pressure.

RHR steam condensing mode motor operated valve E12-F087 and air operated valve E12-F051 are in a parallel configuration. The upstream MOV (E12-F051) has no high/low pressure interlocks associated with it. The normal steam path to the RHR heat exchanger at subsystem design pressure is through both valves. The AOV is designed to handle necessary flow rates for the existing conditions during steam condensing mode. The pressure relief valve downstream of the AOV is designed to handle overpressure conditions in the event the AOV is not positioned properly or, in the worst case, failed open. The AOV is bypassed by the motor operated valve E12-F087 for low subsystem pressure in the steam condensing mode. MOV E12-F087 is provided with two trip unit activated interlocks and two separate (by division) pressure transmitters which are connected to two physically separated instrumentation lines. Both interlocks must indicate low pressure before the bypass valve can open. Overpressure signal conditions occuring upstream of valve E12-F087 whenever the primary pressure exceeds the subsystem design pressure will automatically initiate valve closure.

The inboard and outboard feedwater leakage control subsystems are equipped with one motor operated valve F001 in series with two parallel check valves F002 and F003 providing isolaton from the primary system boundary to prevent high feedwater back pressure. Motor operated valve F001 is provided with a trip unit activated interlock to prevent the valve from opening whenever the pressure sensed between the MOV and the check valves is above the subsystem design pressure and automatically close whenever the primary pressure exceeds the subsystem design pressure. The outboard subsystem also requires the main feedwater lines isolation valves to be fully closed before subsystem initiation.

7.6.1.3.3.2 Logic and Sequencing

There is no logic as such, since the sensor inputs operate the interlocks without logic combination.

7.6.1.3.3.3 Bypasses and Interlocks

There are no bypasses in the high-pressure/low-pressure interlocks.

7.6.1.3.3.4 Redundancy and Diversity

As described in subsection 7.6.1.3.3.1 each process line has two valves in series which are redundant in assuring the interlock except for the steam condensing mode line which has a pressure reducing control valve with a relief valve rated at reactor operating pressure on the low pressure side.

7.6.1.3.3.5 Actuated Devices

The motor-operated valves and air-operated valve listed in 7.6.1.3.3 are the actuated devices.

7.6.1.3.3.6 Separation

Separation is maintained in the instrumentation portion of the high-pressure/low-pressure interlocks by assigning the interlocks, including sensors and cabling, to the same ESF division as valves controlled by these interlocks.

7.6.1.3.3.7 Testability

The actuated devices cannot be tested during reactor operation but are verified during startup and shutdown. The sensors can be tested during reactor operation in the same manner that the ECCS sensor are tested. Refer to paragraph 7.3.1.1.1.1.9 for a discussion of typical ECCS testing.

7.6.1.3.4 Environmental Considerations

The instrumentation and controls for the high-pressure/low-pressure interlocks are qualified as Class IE equipment. The sensors are mounted on local instrument racks and the control circuitry is housed in control panels in the control room.

7.6.1.3.5 Operational Considerations

7.6.1.3.5.1 General Information

The high-pressure/low-pressure interlocks are strictly automatic. There is no manual actuation capability. If the operator initiates a low-pressure system, the interlocks will prevent exposure to the high pressure.

TMI Related Issues

This attachment provides responses to concerns identified informally on July 14, 1981, to Mississippi Power & Light by Instrumentation and Controls Systems Branch. These concerns pertain to the following TMI related issues:

1)	II.D.3	Direct S/RV position indication
2)	II.F.2	Instrumentation for the detection of inadequate core cooling
3)	II.K.3.18	Modification of automatic depressurization system logic
4)	II.K.3.21	Restart of core spray and low pressure coolant injection systems

The responses provided in this attachment will be incorporated into the appropriate subsections of Chapter 18 by the next available FSAR amendment.

1) II.D.3 - Direct Indication of Relief and Safety Valve Position (FSAR 18.1.24).

The discussion given in the June 12, 1981, submittal is insufficient to determine conformance with the guidance of the position.

RESPONSE: Mississippi Power & Light Company will provide a safety/relief valve position monitoring system consisting of pressure switches, sensor relays, annunciators and indicating lights as necessary to monitor, annunciate, and indicate the open/closed condition of each safety/relief valve.

The safety/relief valve position monitoring system is designed to be safety grade. This equipment has been qualified to IEEE 323-1974, IEEE 344-1975, and NUREG-0588 in accordance with the Commission order of May 23, 1980. (CLI-20-81).

The downstream piping of each safety/relief valve will be fitted with a single hydraulic sensing line connected to a pressure switch. An open safety/relief valve pressurizes the discharge line and the associated hydraulic sensing line to the pressure switch, thus actuating the pressure switch. The electrical output of the pressure switch controls a sensor relay mounted on the circuit board at a point remote from the pressure switch. The relay contacts provide input to a control room annunciator and open/closed indicator lights at the P601 panel. After the pressure in the discharge piping decays, the pressure switch resets.

Additional indication of safety/relief valve position is available in the control room utilizing thermocouples located in the safety/relief valve downstream piping. Thermocouple output is recorded and also actuates a high temperature alarm in the control room, thus providing an alternate method for determining if a safety/relief valve is opened or closed. Alarms associated with safety/relief valve position are responded to be the operator in accordance with the Alarm Response Instructions (ARI).

The safety/relief valve position monitoring system will be implemented prior to exceeding 5% power.

2) II.F.2 - Instrumentation for Detection of Inadequate Core Cooling (FSAR 18.1.28).

The GE Owners Group has concluded that no additional instrumentation is needed to monitor inadequate core cooling. The applicant has adopted this position. However, core thermocouples are required for BWR's as specified in Revision 2 (December, 1980) to Regulatory Guide 1.97. Therefore, the applicant will be required to address incore thermocouples requirements as stipulated in the referenced regulatory guide.

RESPONSE: MP&L has committed to Regulatory Guide 1.97, Revision 2, and its implementation schedule. Incore thermocouples for BWR's are not required by NUREG-0737; thus, the implementation schedule for this is June, 1983. (Reference: AECM-81/225, dated July 21, 1981)

3. II.K.3.18 - Modification of Automatic Depressurization System Logic- Feasibility for Increased Diversity for Some Event Sequences (FSAR 18.1.30.6).

The applicant has stated that the study is complete and GE is reviewing but has not documented any proposed modifications.

RESPONSE: Mississippi Power & Light Company has participated in a BWR Owners' Group study to modify ADS actuation without degrading other functionally related ECC systems. This study is complete and the results have been provided to the NRC. Five options, including retaining the current design, were considered. The results indicated that the addition of a bypass of the high drywell pressure trip if the reactor water level remains below the low-pressure ECCS initiation setpoint for a sustained period or the elimination of the high drywell pressure trip are the preferred methods.

GGNS will utilize the addition of a bypass of the high drywell pressure trip if the reactor water level remains below the low-pressure ECCS initiation setpoint for a sustained period.

This will be accomplished by installing a "bypass timer" activated on low water level (Level 1). When this timer runs out, the high drywell pressure trip is bypassed, and the ADS is initiated on the low water level signal, provided other system prerequisites are met for ADS actuation. Starting the bypass timer at low water level (Level 1) allows the operator adequate time to control the system manually and still assure automatic depressurization in time to prevent excessive fuel heatup even under the worst case conditions.

Analysis supporting the selection of proper bypass timer delay will be provided prior to implementation. Implementation of the ADS modifications will be performed prior to startup following the first refueling outage six months after NRC approval.

4. II.K.3.21 - Restart of Core Spray and Low Pressure Coolant Injection Systems (FSAR 18.1.30.7).

Design of the HPCS restart on low level has not been submitted although the commitment to provide it has.

RESPONSE: Design of the HPCS restart on low level following manual termination by the operator will be implemented prior to startup following the first refueling outage. A functional description of the design modifications will be provided four months prior to fuel load.

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(7.3.1.1.4.1)
(7.3.1.1.4.3)

Justify the claim that the containment spray cooling can be manually actuated when the drawings indicated that the manual pushbutton must be held depressed continuously for 90 seconds to initiate spray B. Identify any other manual pushbuttons that must be held depressed for more than a few seconds to initiate the desired action.

RESPONSE

The containment spray cooling can be manually actuated by the operator. Loop A has immediate initiation and loop B has a 90 second time delay. The loop manual initiation must be held for a continuous 90 seconds at which time the initiation light will come on to confirm initiation. This constitutes proper functioning of containment spray loop B. There exists no requirement that manual operator action have a prescribed time duration either minumum or maximum. However, an inter-disciplinary engineering evaluation is underway to determine the basis for the existing design. Following the evaluation, if the basis cannot be justified, a design modification will be proposed prior to fuel load for implementation prior to startup after the first refueling outage.

Another manual action which requires more than momentary actuation is RCIC initiation out of the test mode when the discharge valve inlet to the condensate storage tank is open due to testing. This dealyed actuation is applicable only in the test mode described above. However for normal RCIC initiation, only momentary pushbutton contact is required. There are not other manual pushbuttons that must be held depressed for more than a few seconds to initiate the desired action.