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P. O. BOX 1640 JACKSON, MISSISSIPPI 39205

April 27, 1982

NUCLEAR PRODUCTION DEPARTMENT

U. S. Nuclear Regulatory Commission
Division of Licensing
Washington, D.C. 20555

Attention: Mr. Robert L. Tedesco, Assistant Director

Dear Mr. Tedesco:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File 0260/0277/L-860.0/L-814.1
Response to Safety Evaluation Report for
Environmental Qualification of
Safety-Related Electrical Equipment
for Grand Gulf Nuclear Station, Unit
1, Dated March 12, 1982
AECM-82/168

- References:
- 1) AECM-81/231, dated July 1, 1981
 - 2) AECM-81/335, dated September 1, 1981
 - 3) AECM-81/502, dated December 21, 1981
 - 4) AECM-82/141, dated April 8, 1982

Mississippi Power & Light Company's (MP&L) letter of July 1, 1981 (Reference 1) provided MP&L's evaluations of Class 1E electrical equipment qualification to the requirements of NUREG-0588.

Since MP&L's July 1, 1981 submittal, two (2) supplements have been submitted (Reference 1 and 2) that have provided additional information on the interim operation justification for equipment identified by MP&L as requiring interim operation justification.

To follow-up References 2 and 3 above, MP&L forwarded to the NRC on April 8, 1982 MP&L's response (AECM-82/141) to the NRC Equipment Qualification Branch Trip Report -- Audit of Documentation Concerning Environmental Qualification of Electrical Equipment for Grand Gulf Unit 1 (Reference 4).

With the submittal of the above (4) references, MP&L has established Justification for Interim Operation or Qualification on all equipment at Grand Gulf Nuclear Station, Unit 1 subject to the NUREG-0588 harsh environment review.

The purpose of this letter is to provide MP&L's response to the NRC -- Safety Evaluation Report (SFR) for Environmental Qualification of Safety-Related Electrical Equipment for Grand Gulf Nuclear Station, Unit 1 dated March 12, 1982.



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The following information is provided:

1. Concern

... "The applicant has not included the containment spray system in the master list. The applicant should either provide justification for excluding this system from the list or qualify equipment in the system required for accident mitigation." ...

Response

The Containment Spray System is a mode of operation associated with the Residual Heat Removal (RHR) System. The Containment Spray System is one of several modes of operation of the RHR System. The Containment Spray System is either manually or automatically initiated. The automatic initiation mode will occur after a 10 minute time delay if containment pressure is greater than 9.0 psig and drywell pressure is greater than 1.89 psig. The 10 minute time delay begins on the initiation of the Low Pressure Coolant Injection (LPCI) mode of RHR. At the end of the 10 minute time delay, the "A" train of containment spray is initiated first and 90 seconds later the "B" train of containment spray is initiated. The reason for the delayed start is to prevent rapid depressurization of the Containment. Also, the Containment Spray System can be manually initiated any time drywell pressure is greater than 1.89 psig.

The equipment associated with the Containment Spray System mode of operation has been included in MP&L's NUREG-0588 review. This equipment is either qualified or justification for interim operation has been provided.

MP&L is also revising Appendix D of the GGNS EQ SER(Safety-Related Systems) to incorporate the Containment Spray System as a system under the Containment Heat Removal function (See Attachment 1).

2. Concern

"Display instrumentation which provides information for the reactor operators to aid them in the safe handling of the plant was identified by the applicant. ... The completeness of this list provided will be determined after review of the final emergency procedures."

Response

Presently, the Procedures and Test Review Branch of the NRC is reviewing Rev. 0 of the Grand Gulf Nuclear Station (GGNS) Emergency Procedures (EP).

The Safety Related Display Instrument (SRDI) list in MP&L's NUREG-0588 submittal was developed based on Rev. 0 of the GGNS EP's.

Rev. 10 of the GGNS EP's are being forwarded to the NRC by MP&L under separate letter for review by the Procedures and Test Review Branch. Rev. 10 of GGNS EP's have been reviewed by MP&L and will have no impact on the current SRDI list provided in MP&L's initial NUREG-0588 submittal.

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3. Concern

"The Staff requires that the applicant revise and update the status of installed TMI Action Plan equipment and Cold Shutdown related equipment."

ResponseA. Cold Shutdown Equipment

In Supplement No. 1 (AECM-81/335, dated 9/1/81) to MP&L's NUREG-0588 submittal, MP&L identified the NSSS Systems (attachment No. 3 of Supplement 1) required to achieve cold shutdown of GGNS, Unit 1. At that time, the non-NSSS Systems were not provided. MP&L has now revised Attachment No. 3 to include the non-NSSS systems supporting the identified NSSS systems (See Attachment No. 2 of this letter). Also, the cold shutdown list has been revised to reflect the systems identified in Appendix D of the GGNS EQ SER with regard to Emergency Reactor Shutdown, Reactor Core Cooling, and Core Residual Heat Removal.

B. TMI Action Plan Equipment

The TMI Action Plan Equipment identified in Attachment No. 5 of Supplement No. 1 to MP&L's NUREG-0588 Submittal remains unchanged. The equipment identified in Attachment No. 5 constitutes the group of safety-related equipment at GGNS required to meet NUREG-0737 requirements. This group of safety-related equipment is either in compliance with NUREG-0588 criteria or Justification for Interim Operation has been provided. Attachment No. 5 to Supplement No. 1 has been revised to include the plant ID number for this equipment (See Attachment No. 3 to this letter).

4. Concern

"The Staff has calculated values for steam bypass events and postulated reactor water cleanup (RWCU) line breaks inside the primary containment (outside the drywell). The applicants values for temperature in the affected zones of the primary containment do not in all cases envelop the Staff's calculated values. ... The applicant was informed of the Staff's calculated values and asked to reevaluate his previous calculations in light of the Staff findings or reexamine equipment in the affected locations using the higher temperature values."

ResponseA. Reactor Water Cleanup (RWCU) Line Breaks

Subsections 6.2.3 and 6.3.2 of the "Response to NUREG-0588" explains the method used to calculate the Grand Gulf subcompartment temperatures. The NRC has used the COMPARE MOD 1 code to confirm the Grand Gulf analysis. Since the two methods differ in their treatment of such things as nodalization of subcompartments and credit for heat sinks, small differences in calculated temperatures are not unexpected. MP&L has conducted a review of non-NSSS and NSSS equipment located in the affected areas and MP&L's NUREG-0588

program conclusions are unchanged even if NRC's temperatures are used.

B. Effect of Drywell Steam Bypass on Containment Environmental Temperature

Subsection 6.2.2 of MP&L's "Response to NUREG-0588" explains the methodology used to determine the Grand Gulf unique drywell and containment temperature. In regard to the effect of drywell steam bypass on containment environmental temperature, the following information is provided to address the NRC concern that the maximum containment temperature of 200°F provided for the Grand Gulf environmental qualification assessment by General Electric (GE) is not bounding (Grand Gulf EQ SER, Paragraph 3.3). GE understands that the basis of the NRC concern is a CONTEMPT-LT 028 computer analysis performed by the NRC assuming a small line break within the drywell and a steam bypass leakage in the drywell of $A/\sqrt{K} = 0.9 \text{ ft}^2$. In addition, GE understands the NRC analysis does not take credit for any heat sinks.

GE does not believe that the assumption of an $A/\sqrt{K} = 0.9 \text{ ft}^2$ leakage path coupled with no credit for any heat sink capacity is appropriate for containment environmental temperature assessment. The 0.9 ft^2 has been calculated to establish a leakage value where containment design pressure would not be exceeded. Starting with the containment design pressure of 15 psig, the drywell leak area, using a very conservative basis, was computed to be $A/\sqrt{K} = 0.9 \text{ ft}^2$. This leakage path is used to demonstrate containment structural design capability and is not mechanistically related to environmental qualification temperature assessments.

GE has performed two separate analyses which confirm that the containment environmental temperature envelope provided for Grand Gulf is bounding. These two analyses examine the actual measured leakage rate of $A/\sqrt{K} = 0.017 \text{ ft}^2$ and the value of 0.9 ft^2 .

The first analysis assumes the heat sink capacity provided in the Grand Gulf FSAR Table 6.2-9; assumes the measured leakage of $A/\sqrt{K} = 0.017 \text{ ft}^2$ as determined from the Grand Gulf leak test; assumes no containment spray operation; and assumes no heat sink credit for concrete. The maximum containment air space temperature of 138°F was calculated assuming a normal six-hour plant shutdown (i.e., the main condenser was available).

A second analysis postulates a leakage of $A/\sqrt{K} = 0.9 \text{ ft}^2$; assumes the drywell air is compressed and is initially purged by the steam entering the drywell; and assumes the heat sink capacity provided in the Grand Gulf FSAR Table 6.2-9. Using a containment spray actuation 780 seconds after the postulated break, the calculated temperature is 150°F.

From the results of the above analyses, it is concluded that the Grand Gulf environmental containment temperatures submitted for the NUREG-0588 evaluation is conservatively bounding. It

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should be noted that both the above analyses include the conservatisms of 105% rated steam flow, loss of one RHR, and maximum decay heat.

5. Concern

"... The Staff requires that the applicant:

- (1) Establish an ongoing program to review surveillance and maintenance records to identify potential age-related degradations.
- (2) Establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components.

... the applicant has developed a plan for surveillance and maintenance to ensure that equipment will not degrade sooner than predicted. ... The Staff has reviewed the outline of this plan and finds it acceptable. Surveillance and maintenance program procedures are to be implemented before full-power operation. Until these procedures are implemented, aging will remain an open item. The applicant is requested to notify the Staff when procedures are implemented."

Response

The aging data developed during MP&L's NUREG-0588 review is presently being factored into the GGNS Surveillance and Maintenance Program (Maintenance History System/Maintenance Planning and Scheduling System). This effort will be completed prior to the beginning of Phase II operation. MP&L will notify the NRC when the aging data has been incorporated into the MP&L Surveillance and Maintenance Program.

6. Concern

"The applicant has performed or will perform prior to fuel load analysis to provide assurance that failure of exempted equipment or certain equipment lacking full qualification will not adversely affect any other safety function or mislead an operator."

Response

With the submittal of Reference 4 (AECM-82/141, dated 4/8/82), MP&L has completed the establishment of either Justification for Interim Operation or Qualification on all equipment at GGNS, Unit 1 subject to the NUREG-0588 harsh environment review.

7. ConcernEquipment Requiring Additional Information and/or Corrective Action

"Appendix B of the SER identifies equipment in this category, including a tabulation of deficiencies. The deficiencies are noted by a letter relating to the legend indicating that the information provided is not sufficient for the qualification parameter or condition."

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Response

With the submittal of Reference 4 (AECM-82/141, dated 4/8/82), MP&L has completed the establishment of either justification for interim operation or qualification on all equipment at GGNS, Unit 1 subject to the NUREG-0588 harsh environment review.

8. ConcernEquipment Considered Acceptable or Conditionally Acceptable

"Based on the staff review of the applicant's submittal, the staff identified the equipment in Appendix C of the GGNS EQ SER as (1) acceptable on the basis that the qualification program adequately enveloped the specific environmental plant parameters, or (2) conditionally acceptable subject to the satisfactory resolution of the staff concern identified in Section 3.7 of the GGNS EQ SER.

For the equipment identified as conditionally acceptable, the staff determined that

- (1) The applicant has not completed the evaluation of plant equipment materials to ensure that no known materials susceptible to degradation because of aging have been used.
- (2) Although the applicant has established a plant surveillance and maintenance program, implementation procedures have not been completed.

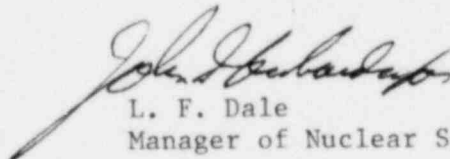
The applicant is, therefore, required to inform the staff of both completion of the aging program and implementation of the surveillance and maintenance program.

Response

MP&L will notify the NRC when the aging data developed by MP&L during the NUREG-0588 review has been factored into the GGNS Surveillance and Maintenance Program. This task will be completed prior to the beginning of the Phase II operation.

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

Yours truly,



L. F. Dale
Manager of Nuclear Services

RAB/JDR:lg

Attachments: 1. Safety-Related Systems
2. Cold Shutdown Equipment
3. TMI Lesson Learned Equipment

cc: (See Next Page)

MISSISSIPPI POWER & LIGHT COMPANY

cc: Mr. N. L. Stampley (w/o)
Mr. R. B. McGehee (w/o)
Mr. T. B. Conner (w/o)
Mr. G. B. Taylor (w/o)

Mr. Richard C. DeYoung, Director (w/o)
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. P. O'Reilly, Regional Administrator (w/a)
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 3100
Atlanta, Georgia 30303

Safety-Related Systems

Function	System
Reactor Core Cooling	High Pressure Core Spray Automatic Depressurization System Low Pressure Core Spray System Low Pressure Coolant Injection System Nuclear Boiler System Residual Heat Removal Reactor Core Isolation Cooling
Containment Heat Removal	Residual Heat Removal (Containment Spray System) Standby Service Water System
Core Residual Heat Removal	Residual Heat Removal
Prevent Radioactive Release	Main Steamline Isolation Valve Leakage Control System Process Radiation Monitoring System Area Radiation Monitoring System Combustible Gas Control System Leak Detection System Feedwater Leakage Control System Standby Gas Treatment System
Supporting Systems	Suppression Pool Makeup System Local Instrument Panels and Rocks 125-V DC Switchgear and Distribution Panels Containment and Drywell Instrumentation and Control System Standby Service Water System 480-V Load Centers; Motor Control Centers Electrical Penetration Protective Cabinets 1kV Power Cables 4.16-kV Switchgear; Load Shedding and Sequence Panels Medium Voltage Termination Equipment; Cable Terminations Specialty Cables Instrument and Computer Cables Coaxial and Triaxial Cables Thermocouple Extension Cable 600-V Multiconductor Control Cable Electrical Penetrations ESF Electrical Switchgear Room Cooling System Emergency Pump Room Ventilation System Combustible Gas Control 7.2 kV Switchgear System (Trip function)

Cold Shutdown Equipment

The licensing basis of the Grand Gulf plant is the achievement of a safe cold shutdown, as cold shutdown constitutes the only shutdown mode of a BWR (i.e., there is no hot shutdown mode in a BWR as occurs in a PWR).

Those systems required to achieve cold shutdown are those systems which function to achieve emergency reactor shutdown, reactor core cooling, and core residual heat removal plus those non-NSSS systems required to maintain and support these systems (i.e., on-site emergency power and service water). As reported in Section 2.3 of the Grand Gulf NUREG -0588 submittal, the NSSS systems (in a harsh environment) which perform these functions are listed as follows:

1. Emergency Reactor Shutdown

- Reactor Protection System
- Control Rod Drive System
- Pressure Relief System
- Standby Liquid Control System
- Neutron Monitoring System
- Nuclear Boiler System

2. Reactor Core Cooling (ECCS)

- High Pressure Core Spray System
- Automatic Depressurization System
- Low Pressure Core Spray System
- Low Pressure Coolant Injection System
- Nuclear Boiler System
- Residual Heat Removal System
- Reactor Core Isolation Cooling System

3. Core Residual Heat Removal System

- Residual Heat Removal System

It is noted that adequate core cooling can be achieved with any one of the five ECCS pumps (i.e., HPCS, LPCS, or one of the three LPCIs) and core exchangers and associated RHR pumps.

4. Non-NSSS Systems

- Suppression Pool Makeup System
- Local Instrument Panels and Rocks
- 125-V DC Switchgear and Distribution Panels
- Containment and Drywell Instrumentation and Control System
- Standby Service Water System
- 480-Load Centers; Motor Control Centers;
- Electrical Penetration Protective Cabinets
- 1-kV Power Cables
- 4.16 kV Switchgear; Load Shedding and Sequence
- Medium Voltage Termination Equipment; Cable Terminations

- Specialty Cables
- Instrument and Computer Cables
- Coaxial and Triaxial Cables
- Thermocouple Extension Cable
- 600-V Multiconductor Control Cable
- Electrical Penetrations
- ESF Electrical Switchgear Room Cooling System
- Emergency Pump Room Ventilation System
- Combustible Gas Control
- 7.2 kV Switchgear System (Trip Function)

The non-NSSS systems (in a harsh environment) required for cold shutdown are those listed in the Grand Gulf EQ SER Appendix D as Supporting Systems (same as item 4 above) with the following clarifications:

1. The Suppression Pool Makeup and Combustible Gas Control Systems, although important to safety, are considered supportive of those systems identified in Appendix D of the GGNS EQ SER for the system required to Prevent Radioactive Release.
2. The trip Function of the 7.2kV Switchgear System should be added to the list of Supporting Systems.

The NSSS and non-NSSS components (in a harsh environment) associated with the systems required for cold shutdown are shown in "Response to NUREG-0588." Table A-1.

TMI Lesson Learned EquipmentNon-NSSS

Subsection 8.13.1 of the Response to NUREG-0588 listed only those TMI Items which required new equipment specifications to be prepared; it did not include equipment which was purchased under existing specifications. A complete list of non-NSSS TMI equipment within the scope of NUREG -0588 is as follows:

- a. Containment and Drywell High-Range Radiation Monitors
Specification 9645-J-363.0

1D21-RE-N048 A, B, C, D

- b. Hydrogen Ignition System Components Specification 9645-M-198.0
Q1E61-D106 through D196 (being installed)

- c. Hydrogen Analyzers Specifications 9645-J-359/359.1

J-359.0

1E61-J001 A, B
1E61-J002 A, B

J-359.1

1E61-T001
-T002
-T003
-T004
-T006
-T008

(Heat Tracing Cables)

1E61-TE-N038 A, B
-N039 A, B
-N040
-N041
-N042 A, B
-N043 A, B
-N044
-N045

(RTD's)

1H22-P131 A, B
-P139 A, B
-P143
-P144

(Panel's)

- d. Containment Isolation Pressure Transmitters-Specification
(9645-J-301.0A)

1C11-PT-N075(1153GB9)
1P42-PT-N053(1153GB6)

e. Containment High-Range Pressure Monitors-Specification
(9645-J-301.0A)

1M71-POT-N001 A, B
-N002 A, B (Model 1151's)
-N027 A, B

f. Containment Water Level Specification 9645-J-301.0A
1E30-LT-N003 A, B, C, D (1151)

g. Containment Temperature Monitors-Specification 9645-J561.0

1M71-TE-N007 A, B, C, D
-N008 A, B, C, D
-N012 A, B, C, D
-N013 A, B, C, D (Temperature Elements)
-N022 A, B
-N023 A, B
-N024 A, B
-N025 A, B
-N026 A, B

The extent to which non-NSSS TMI equipment complies with NUREG-0660 and 0737 is addressed in FSAR Chapter 18.

NSSS

Subsection 8.13.2 of the Repsonse to NUREG-0588 covers only NSSS (GE) TMI item requiring new equipmebnt. This new item was the Safety Relief Valve Monitoring System. This item has been qualified to the NUREG-0588 criteria.

1B21-PS-N410 A, B, C, D, E, F, G, H, J, K, L, M, N, P,
R, S, T, U, V, W