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

September 1, 1981

NUCLEAR PRODUCTION DEPARTMENT

Mr. Robert L. Tedesco
Assistant Director of Licensing
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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/L814.1
Re: AECM-81/231; July 1, 1981
Equipment Qualification
NUREG-0588 Evaluation
Supplement 1
AECM-81/335

Mississippi Power & Light Company's letter of July 1, 1981 (AECM-81/231) provided evaluations of Class IE electrical equipment at Grand Gulf Nuclear Station as related to the equipment qualification requirements of NUREG-0588.

As stated in our submittal, it is Mississippi Power & Light Company's intent to ensure in all cases that Class IE electrical equipment meets the requirements of NUREG-0588 or that the safe interim operation of the plant is justified.

The purpose of this letter is to provide additional information which has been requested by your Equipment Qualification Branch review staff. The following information is provided:

1. Attachment No. 1

   Provides more definitive follow-up qualification plans and additional justification for interim operation which was incomplete in our initial submittal.

2. Attachment No. 2

   Provides a list of equipment to be exempted from the NUREG-0588 review and the technical basis for exemption. This list also identifies the corresponding item No. from Table 1 or Table 2 of the Summary of Results.

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3. Attachment No. 3

   Provides the systems needed to achieve cold shutdown. Attachment No. 3 replaces Section 8.15 and Table F-1 of our introduction document.

4. Attachment No. 4

   Provides the results of our review of safety related display instrumentation.

5. Attachment No. 5

   Provides updated information on TMI Lessons Learned Equipment at Grand Gulf.

6. Attachment No. 6

   Provides updated NSSS worksheets and EQ Tables for equipment whose category has changed or where an item has been replaced.

If you have any questions regarding this information, please advise.

Yours truly,

L. F. Dale
Manager of Nuclear Services

RAB:dr

Attachment

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

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

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: B21-F022/F028 (EQ Table 200)
COMPONENT: MSIV Limit Switches
MANUFACTURER: NAMCO - Model EA 740

COMMENTS

The limit switches for the Grand Gulf MSIV's were manufactured in 1975. They were NAMCO Model EA-740 limit switches. At the time the EA-740's were purchased, there was not a qualification report available. NAMCO has since (1975) modified and qualified the EA-740's to meet IEEE 323-1974.

FOLLOW-UP ACTION

Test the current generation of NAMCO EA-740 limit switch to obtain a five (5) year qualified life by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

New Limit Switches will be provided by October 1981 and installed by December 1981. The current generation of limit switches is a NAMCO EA740 Model, which has a qualified life in the normal environment of 400 days and in the accident environment of 30 days according to NUREG-0588 Category II requirements. Since the specifications require 100 days operability in the accident environment, justification is provided for interim operation with the 30 day switches for application in the MSIV Leakage Control System (LCS). The Reactor Protection System (RPS) limit switches require operability less than 30 days; and so consequently, the new switches would meet the requirements of NUREG-0588 Category II.

a. MSIV Leakage Control System (LCS)

The MSIV Limit Switches used in the MSIV LCS are used to isolate or interlock the LCS depending on the in-board MSIV position indication. The LCS is used following a DBA recirculation line break to collect MSIV seat leakage and directed to the Standby Gas Treatment System in the Auxiliary Building for processing. As shown in the attached figure (Figure 1) there is one LCS between the in-board MSIV and out-board MSIV (outside containment on the out-board MSIV drain line) and a backup LCS outside of the out-board MSIV before the main steam shutoff valve. The MSIV LCS limit switch is on the in-board MSIV.

Major concerns of the MSIV limit switch failure would be exceeding dose limits or pressure integrity of the LCS blower. Since the limit switches are qualified for 30 day operation in the accident environment, the only concern is from 30 to 100 days post accident.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: B21-F022/F028 (Cont'd)

b. Dose Impact

The limiting failure after 30 days would be for the limit switch to erroneously indicate the in-board MSIV valve position open thus isolating the LCS. The limit switch is only on the in-board LCS; thus, the out-board LCS would remain activated even though the in-board LCS will be isolated. Therefore, all seat leakage would be collected by the outboard LCS system maintaining doses below required limits.

c. Pressure Integrity Impact

The limiting failure after 30 days would be for the limit switch to erroneously indicate the in-board MSIV valve position closed if the MSIV were to fail open. The failure of the in-board valve open would not be a common mode failure since it requires both sufficient air pressure and control logic to open the valve. Thus, the out-board MSIV would remain closed. A failed limit switch erroneously indicating the valve to be closed would prevent the LCS from isolating. The concern is that even though the LCS piping is qualified to approximately 1000 psi, the LCS blower is only qualified for atmospheric pressure. If the in-board MSIV were to open, the line pressure could be as high as 35 psia (with hydrogen recombiners and other equipment actuated). The LCS isolation valves isolate on valve position, high pressure in the steam line (greater than 5 psig) or high flow through the flow element upstream of the blower. Thus, the blower would be isolated even with erroneous valve position indication and hence pressure integrity of the LCS would be maintained.

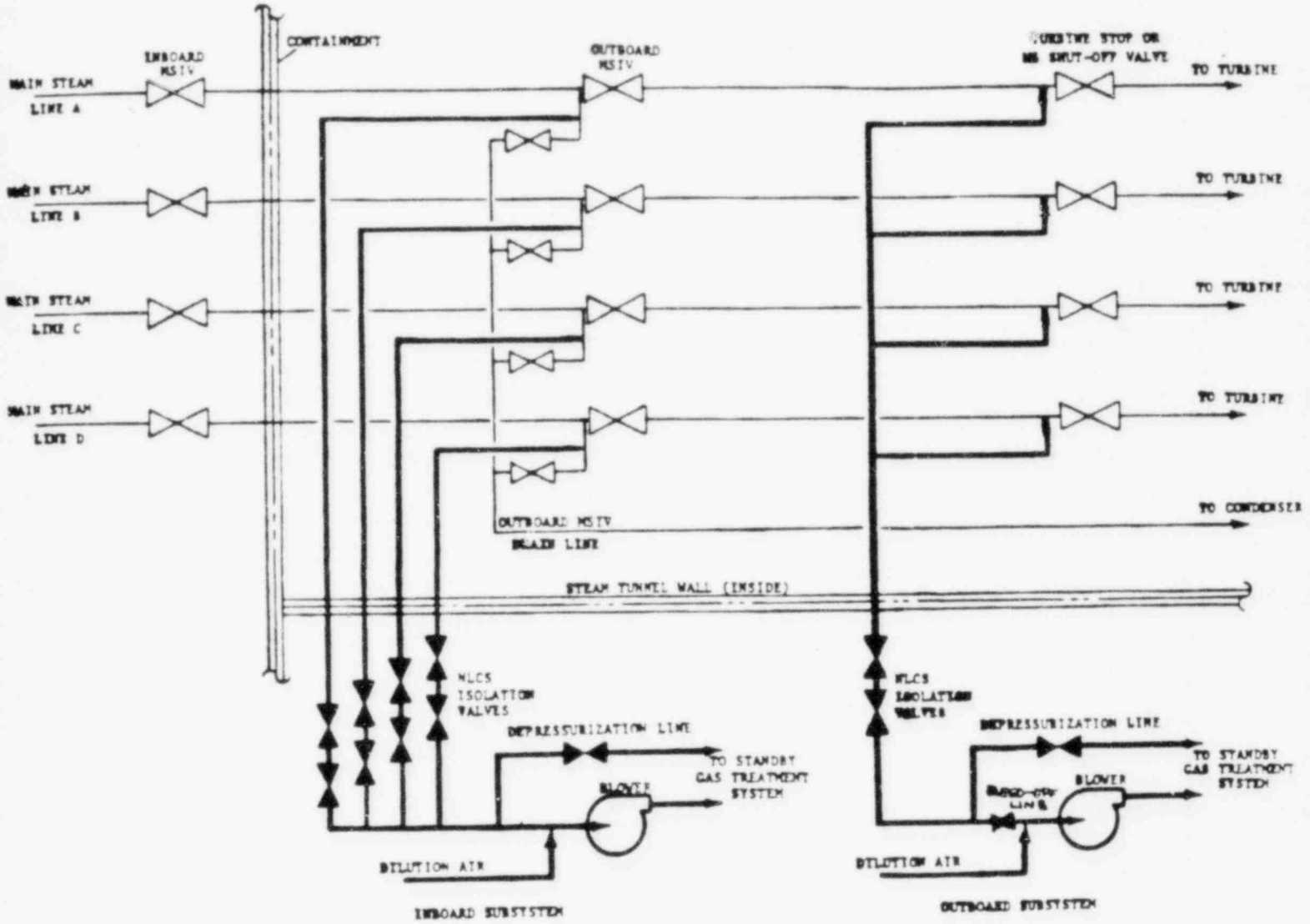

FIGURE 1 [illegible] MSIV NEGATIVE LEAKAGE CONTROL SYSTEM

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: B21-F041/F047/F051 (EQ Table 201)
COMPONENT: Solenoid Valve (Safety-Relief Valve Actuators)
MANUFACTURER: Dikkers Valve Company

COMMENTS

None

FOLLOW-UP ACTION

Solenoid valve to be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Interim operation is justified due to the following:

1. A successful DBA (four days) test was performed after thermal, mechanical, and radiation aging.
2. DBA temperature, pressure, and radiation test environments enveloped the NUREG-0588 calculated DBA values.
3. Operability test data during and after qualification testing indicates operability during a DBA environment.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E12-C002A/B/C (EQ Table 205)
COMPONENT: RHR Pump Motor
MANUFACTURER: GE (Model #5K6339XC186A)

COMMENTS

Two (2) of the three (3) RHR Motors are exposed to radiation levels as follows: (1) A-2.87 x 10^7 Rads (2). B-2.97 x 10^7 Rads. The third RHR Motor ("C") is exposed to a radiation level of 1.13 x 10^6 Rads.

FOLLOW-UP PROGRAM

RHR motor to be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

The RHR Motors were originally qualified to a radiation level of 5 x 10^4 Rads. Further testing by Motorette yielded a qualification radiation level of 5 x 10^6 Rads. The current required radiation level is 3 x 10^7 Rads. All materials in the motors except for the silicon rubber cables were tested to 10^8 Rads. Testing by the cable manufacturer was performed up to 5 x 10^7 Rads. Thus, utilizing the Motorette test and the materials and cable testing, the RHR motors are shown to meet the required radiation level of 3 x 10^7 Rads.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E22-F001/F004/F010/F011/F012/F015/F023 (EQ Table 208 thru 214)
COMPONENT: HPCS Motor Operated Valve
MANUFACTURER: Limitorque

COMMENTS

HPCS Motor Operation Valves (MOV)

Adequate test data does not exist to demonstrate that motor operated valves used in the high pressure core spray system are qualified to the criteria of NUREG-0588. This equipment is identified as follows:

MPL#	TITLE
E22-F001	Limitorque SMB-00-15
E22-F004	Limitorque SB-3-100
E22-F010	Limitorque SMB-4-200
E22-F011	Limitorque SMB-4-200
E22-F012	Limitorque SB-0-25
E22-F015	Limitorque SB-1-40
E22-F023	Limitorque SMB-4-150

As documented in the EQ tables, all the actuators have an environmental capability which is demonstrated by test. The actuators, with the exception of E22-F004, have been subjected to extensive type testing for abnormal environment conditions, but the aging tests are considered inadequate to meet the requirements of NUREG-0588 for the design life of the equipment.

Plant startup and interim operation with E22-F001/F010/F011/F012/F015/F023 is justified until requalification is complete for these MOV's. This justification is based on the testing that has been performed.

The valve actuator, E22-F004, has very limited type test data available to support qualification of the actuator. This valve is the HPCS injection valve and is required to open during the first minute of an accident to initiate HPCS flow to the core, subsequently, the valve serves as an isolation valve to terminate HPCS flow on high reactor water level or operator action.

FOLLOW-UP PROGRAM

Limitorque MOV's for the HPCS valves will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for startup and interim operation for E22-F001/F010/F011/F012/F015/F023 has been previously supplied and is based on type test data. Justification for startup and interim operation with E22-F004 is as follows:

ATTACHMENT NO.1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E22-F001/F004/F010/F011/F012/F015/F023 (Cont'd)

A. The existing Limitorque MOV (SB-3-100) on E22-F004 will be replaced with a Limitorque MOV (SB-3-100) that is presently installed on Unit 2 of Grand Gulf. This MOV will be replaced by December 1981. This MOV (SB-3-100) has been qualified by Limitorque by test report #B0003 and will be at the same level of qualification as the existing MOV's that are installed now on E22-F001/F010/F011/F012 F015/F023. E22-F004 will then be upgraded by test along with the other HPCS MOV's.

B. High Pressure Core Spray (HPCS) Injection Valve System Justification.

Start-up and interim operation for Grand Gulf with the existing HPCS injection valve should proceed even though the documented qualification for E22-F004 does not meet the requirements as specified in NUREG-0588. This justification consists of demonstrating that core cooling, heat removal, and containment isolation are maintained with in-board testable check valve and out-board injection gate valve failed in the "open" position starting at a time after high pressure inventory makeup following a LOCA. Both the check and gate valves would be operable (as demonstrated by test) immediately following the LOCA to provide high pressure inventory make-up so that the justification is needed only for subsequent operation.

1. Core Cooling

Immediately following a design basis LOCA, either a "reactor vessel low level" signal or "high drywell" signal will actuate the HPCS injection valves (open) and will initiate high pressure inventory makeup. This flow will continue from approximately 1 minute after the LOCA for several hours after, at which time the low pressure ECCS systems (LPCS and LPCI) will be providing sufficient core make-up that the HPCS is no longer necessary. ECCS analysis has shown that one LPCI pump is sufficient to maintain core inventory (greater than 2/3 core hight) and long term core cooling so that if an additional failure of a diesel were assumed, in addition to the HPCS system failure, core and containment cooling would still be maintained.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E22-F001/F004/F010/F011/F012/F015/F023

CURRENT GRAND GULF ECCS CONFIGURATION

DIESEL 1	DIESEL 2	DIESEL 3
LPCI (with heat exchanger)	LPCI (with heat exchanger)	HPCS
LPCS	LPCI (no heat exchanger)	

2. Heat Removal

As noted in the core cooling section, there will always be at least one LPCI and and RHR heat exchanger available even with a worst single failure. Consequently, a cooling suppression pool-heat exchanger-core is established which will effectively remove heat and also maintain suppression pool (containment) temperature within acceptable limits.

3. Containment Isolation

A failure of the gate valve in the open position would allow flow back to the suppression pool from the vessel if the vessel level reaches the sparger elevation. However, even if this occurred, with the MSIV's closed, the dose increase would be negligible. The worst case consequence of the gate valve remaining open would be a closed cycle flow of water past several closed check valves from the vessel to the suppression pool which would be more than compensated for by the low pressure ECCS make-up inventory with no significant increased leakage to the environment.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E32-C001/C002 (EQ Table 216)
COMPONENT: MSIV Leakage Control Blower Motor
MANUFACTURER: Siemens, (Model 2CH6); modified by GE

COMMENTS

The MSIV leakage control system (LCS) is provided to direct any leakage from the containment through the closed MSIV's to the stand-by gas treatment system for processing prior to release to the environment. The system is manually initiated following a design basis LOCA approximately 20 minutes after closure of the main steam isolation valves. The LCS consists of an inboard and outboard train which draws any leakage between the closed MSIV's (inboard system) or outside the outboard MSIV's (outboard system) through a heater to evaporate condensate and direct the leakage to the stand-by gas treatment system by means of the blower in the bleed line.

The MSIV LCS blower has been qualified by type test for conditions representative of the anticipated service requirements, with the exception of the radiation environment. Material evaluations have concluded that the bearing grease used in the blower is the weak link component relative to radiation tolerance of the equipment. The grease has a minimum radiation tolerance of 1×10^6 Rads. The radiation exposure for this equipment is 2.4×10^6 Rads. Documentation does not currently exist to demonstrate the capability of the grease at the higher radiation level; thus the equipment was categorized as not being qualified to NUREG-0588 Category II.

FOLLOW-UP ACTION

The MSIV leakage control blower motor will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Interim operation with this equipment is justified until testing can be completed for the following reasons:

1. Because of the conservatism in the calculated radiation dose (2.4×10^6 Rads) and the known minimum tolerance of 1×10^6 Rads, there is a high degree of confidence that the blower would operate satisfactory for the time period required following a design basis LOCA.

2. Loss of the blower could occur as a result of radiation damage to the bearing grease and subsequent failure of the bearing, but such failure would not affect other safety related equipment or systems and not affect capability to achieve and maintain a safe shutdown condition.

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL: E32-C001/C002 (Cont'd)

3. In the event of a failure of the blower, the LCS would be isolated (inboard system isolates automatically; outboard system would alarm on failure of the blower and be isolated by the operator), thus failure does not compromise any containment integrity.

4. If both inboard and outboard leakage control systems were unavailable due to a simultaneous common mode failure of the blowers, leakage still would be minimal due to the bearing design at Grand Gulf (i.e., leakage would have to occur through the inboard MSIV, the outboard MSIV, and the steam shutoff valves before it could reach a path to the environment.)

ATTACHMENT NO. 1
SUMMARY OF RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

MPL:E51-C002 (EQ Table 217)
COMPONENT: RCIC Steam Turbine Electronic Governor/Controls
MANUFACTURER: Terry Turbine Corp. (Model GS-2N)

COMMENTS

None

FOLLOW UP ACTION

The RCIC steam turbine electronic governor/controls will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

As documented in the Grand Gulf qualification record file, the RCIC turbine has been fully qualified to a test environment that is less severe (radiation) than that defined by the current NUREG-0588 analysis; therefore, the turbine was considered not qualified. The demonstrated pressure, temperature, and humidity capability of equipment meets the predicted accident environment, but the calculated radiation environment exceeds the qualified level by a significant amount (2.7×10^7 Rads versus 1×10^4 Rads). It is important to note that the accident radiation dose of 2.7×10^7 Rads represents the 180 day integrated dose resulting from the design basis loss of coolant accident; however, the RCIC system is not required to operate for LOCA events. As demonstrated by the ECCS analysis (FSAR), adequate core cooling is maintained without availability of RCIC even assuming loss of HPCS; thus, qualification to environments resulting from LOCA is not required.

The design events for which the RCIC system is required to operate are listed as follows:

1. Vessel isolation with reactor at hot standby

2. Vessel isolation with loss of normal feedwater

3. Reactor shutdown with loss of normal feedwater prior to vessel depressurization until initiation of shutdown cooling

4. Control rod drop accident

In addition, the HPCS system serves as a backup source of high pressure coolant if the RCIC system were unavailable. On the basis of the foregoing discussion, start-up and interim operation of Grand Gulf Unit 1 is justified until such time as requalification of the RCIC turbine for its design service environment is completed.

ATTACHMENT No. 1
SUMMARY OR RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

PPD: 145C3224

MPL: E31-N001 to E31-N006, E31-N015/N017/N018, E31-N027 to E31-N031, E31-N034 to E31-N057 (EQ Tables 17, 145 to 181)

COMPONENT: Temperature Elements

MANUFACTURER: PYCO (Model 145C3224)

COMMENTS

The PYCO temperature element is exposed to the following required environment:

1.	Radiation:	Normal + A ident of 28.8×10^6 Rads (TID)
2.	Pressure:	44.7 Psia (Max) for 1 to 40 seconds
		44.7 Psia to 30 Psia for 40 to 368 seconds
		30.0 Psia for 368 seconds to 24.0 hours
3.	Temperature:	330°F (Max) for 0 to 3 hours
		330°F to 250°F Ramp for 3 to 24.0 hours
4.	Humidity	100% for 0-24.0 hours
5.	Operating Time:	Function time of 24.0 hours

FOLLOW-UP ACTION

The PYCO temperature element to be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

The PYCO temperature element has been subjected to the following environmental testing:

1.	Radiation:	Two units radiated; (1) 200×10^6 Rads (TID); (1) 100×10^6 Rads (TID)
2.	Aging:	168 hours (7 days) at 250°F
3.	LOCA Test:	346°F/127 Psia for 0 to 3 hours (twice)
		335°F/119 Psia from hour 3 to hour 6
		315°F/83 Psia from hour 6 to hour 10
		265°F/42 Psia from hour 10 to hour 106 (4 days)
		215°F/16 Psia from day 4 to day 30

NOTE: The LOCA test data is based on PYCO test report obtained from Carolina Power & Light Company.

4. Response Time: The temperature element radiated for 100×10^6 Rads was tested to determine response time accuracy.

Based on the above environmental testing, interim operation and startup with the PYCO temperature element is justified.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 163C1561

MPL: E12-N007/N015, E21-N003, E22-N005, E32-N054/N059, E51-N003/N035, B21-N081, E31-N086/N087/N088/N089

COMPONENT: Differential Pressure Transmitter

MANUFACTURER: Rosemount (Model 1151)

COMMENTS:

1. The following MPLs are exposed to a radiation dose less than 2×10^6 Rads

E12-N007	E32-N054
E12-N015	E32-N059
E21-N003	E51-N003
E22-N005	E51-N035

2. The following MPLs are exposed to a radiation dose greater than 5×10^6 Rads

B21-N081
B21-N099
E31-N086
E31-N087
E31-N088

FOLLOW-UP PROGRAM:

The Rosemount Model 1151 transmitters will be replaced with Rosemount Model 1152 transmitters. The Rosemount Model 1152 will be tested by June 1982, or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION:

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 163C1563

MPL: E21-N054, E22-N052, E31-N092

COMPONENT: Pressure Transmitter

MANUFACTURER: Rosemount (Model 1151)

COMMENTS:

1. The following MPLs are exposed to a radiation dose less than 2×10^6 Rads

   E21-N054
   E22-N052

2. The following MPL is exposed to radiation dose greater than 5×10^6 Rads

   E31-N092

FOLLOW-UP PROGRAM

The Rosemount Model 1151 transmitters will be replaced with Rosemount Model 1152 transmitters. The Rosemount Model 1152 will be tested by June 1982, or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 163C1564

MPL: E21-N050, E22-N051, E32-N061, E51-N050/N052/N056, G41-N024, B21-N078

COMPONENT: Pressure Transmitter

MANUFACTURER: Rosemount (Model 1151)

COMMENTS:

1. The following MPLs are exposed to a radiation dose less than 2×10^6 Rads

E21-N050	E51-N052
E22-N051	E51-N056
E32-N061	G41-N024
E51-N050	

2. The following MPL is exposed to a radiation dose greater than 5×10^6 Rads

B21-N078

FOLLOW-UP PROGRAM

The Rosemount Model 1151 transmitters will be replaced with Rosemount Model 1152 transmitters. The Rosemount model 1152 will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 169C8391

MPL: B21-N095, B33-N014/N024, E31-N075/N076/N077

COMPONENT: Differential Pressure Transmitter

MANUFACTURER: Rosemount (Model 1152 - regular)

COMMENTS

1. The following MPLs are exposed to a radiation dose less than 5×10^6 Rads

   E31-N075
   E31-N077

2. The following MPLs are exposed to a radiation dose greater than 5×10^6 Rads

   B21-N095
   B33-N014
   B33-N024
   E31-N076

FOLLOW-UP PROGRAM

The Rosemount Model 1152 - regular transmitters will be replaced with Rosemount Model 1152 "T0280". The Rosemount Model 1152 "T0280" will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 169C8392

MPL: B21-N080/N091, E31-N080/N081/N084/N083, E12-N052, E21-N051, E22-N054/N056, E51-N051, C34-N003, B21-N073

COMPONENT: Differential Pressure Transmitter

MANUFACTURER: Rosemount (Model 1152 "T0280")

COMMENTS:

1. The following MPLs are exposed to a radiation dose less than 5×10^6 Rads

   E12-N052
   E21-N051
   E22-N054
   E22-N056
   E31-N083
   E51-N051

2. The following MPLs are exposed to a radiation dose greater than 5×10^6 Rads

   C34-N003
   E31-N081
   E31-N080
   B21-N073
   B21-N080
   B21-N091
   E31-N084

FOLLOW-UP ACTION

The Rosemount Model 1152 "T0280" will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 169C8393

MPL: B21-N068

COMPONENT: Pressure Transmitter

MANUFACTURER: Rosemount (Model 1152 - regular)

COMMENTS

The following MPL is exposed to a radiation dose greater than 5×10^6 Rads

B21-N068

FOLLOW-UP ACTION

The Rosemount Model 1152 - regular transmitter will be replaced with a Rosemount Model 1152 "T0280" transmitter. The Rosemount Model 1152 "T0280" will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 169C8394

MPL: B21-N062, E31-N085, E32-N050/N058, E22-N050, E12-N055/N056, E21-N052/N053, E32-N055, E51-N053/N055, B21-N097

COMPONENT: Pressure Transmitter

MANUFACTURER: Rosemount (Model 1152 "T0280)

COMMENTS:

1. The following MPL's are exposed to a radiation dose less than 5×10^6 Rads:

E22-N050	E21-N053
E12-N055	E32-N055
E12-N056	E51-N053
E21-N052	E51-N055

2. The following MPL's are exposed to a radiation dose greater than 5×10^6 Rads:

B21-N062	B21-N097
E31-N085	
E32-N050	
E32-N058	

FOLLOW-UP ACTION

The Rosemount Model 1152 "T0280" transmitter will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

PPD: 159C8969

MPL: B21-N067/N094, E12-N062, E32-N051/N056, C71-N050

COMPONENT: Pressure Transmitter

MANUFACTURER: Rosemount (Model 1152 "T0280")

COMMENTS

1. The following MPL's are exposed to a radiation dose less than 5×10^6 Rads

   E32-N051
   E32-N056

2. The following MPL's are exposed to a radiation dose greater than 5×10^6 Rads

   C71-N050
   B21-N067
   B21-N094
   E12-N062

FOLLOW-UP ACTION

The Rosemount Model 1152 "T0280" transmitter will be tested by June 1982 or as soon thereafter as possible.

JUSTIFICATION FOR INTERIM OPERATION

Justification for interim operation to be provided prior to fuel load.

ATTACHMENT NO. 1
SUMMARY OR RESULTS/FOLLOW-UP PROGRAM
SUPPLEMENT 1

PPD: 169C8338

MPL: E32-N006 (EQ Table 26)

COMPONENT: Flow Meter

MANUFACTURER: Schutte & Koerting (S&K) Model 20-9651-8550

COMMENTS

Pressure, temperature, and humidity are non-harsh for this device. Radiation is the only harsh environment (1.95×10^6 Rads).

FOLLOW-UP ACTION

The S&K flow meter will be modified as follows by June 1982 or as soon thereafter as possible.

1. Replace teflon washer with a brass washer
2. S&K to perform modification
3. S&K to re-calibrate flow meter

JUSTIFICATION FOR INTERIM OPERATION

The MSIV-Leakage Control System (MSIV-LCS) consists of two independent systems, inboard and outboard, each made up of blowers, valves, piping, accessories, and instrumentation. Each system operates in two process modes: depressurization, and bleed-off. During bleed-off (long-term leakage control), the leakage flow is diverted to the blower and ultimately discharged to a building volume served by the Standby Gas Treatment System. The MSIV-LCS, including instrumentation and circuits necessary for the functioning of the system, are designed in accordance with standards applicable to an engineered safety feature.

The flow meter, E32-N006, measures leakage flow in a 1" pipeline toward the low pressure manifold. The flow meter can act as a flow rate regulating check valve in both directions. If the Teflon washer is deformed due to radiation above 3×10^4 Rads, then the alignment of LVRT coil can be affected. However, the flow meter will continue to perform the necessary function of physically limiting the leakage flow to the Low Pressure Manifold. As indicated in design specification document GE 22A4674, the flow sensor is a fail-safe design and it activates an alarm under high leakage flow conditions. This alarm is used for initiation of isolation of the in-board LCS system. If the failure of the Teflon washer effects a misalignment of the LVRT coil, an erroneous flow signal can be generated.

This device will meet NUREG-0588, Category II requirements if the Teflon washer is replaced with a brass washer and the flow meter is recalibrated.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-009.4

Component: 7.2 KV Power Vac SWGR

Manufacturer: GE

a. Comments:

Subsequent to the July 1, 1981 submittal, summary test results have been obtained. All the components of the 7.2 KV switchgear except the breaker test switch (type SB9) have been aged and subjected to an integrated radiation exposure of 1×10^5 Rads of gamma radiation which is in excess of the specified value of 4.17×10^4 Rads.

The breaker test switch is neither required for nor can it interfere with the automatic tripping action of the breaker. This automatic tripping action, the only Class IE function of the breaker during DBA, is explained below. The breaker trip function is controlled by two separate and independent circuits. The circuit which utilizes the breaker test switch is the manual trip circuit. This circuit has a non-safety related function and is powered from a non-Class IE supply. The automatic trip circuit utilizes a separate trip coil and would be totally unaffected by failure of the breaker test switch in particular or any manual trip circuit failure in general. Thus there is no requirement for the breaker test switch to be qualified for this application.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Based on the fact that the equipment is located in an area which will experience only harsh radiation during DBA (temperature pressure, humidity are normal) and the equipment has been subjected to a radiation level higher than required, the equipment can be safely operated for an interim period until full qualification can be met.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-017.0

Component: 480V Load Centers

Manufacturer: Gould, Inc.

a. Comments:

The last sentance of the Summary of Results will be replaced by the following:

For interim operation of the equipment, aging need not be considered since the temperature, pressure and humidity will be normal at the equipment locations during normal, LBA, and post-DBA conditions. To justify operability under accident conditions for 100 days, correspondence with the vendor states that the equipment has been tested by other parties at radiation levels in excess of the specified maximum dose of 1.6×10^5 Rads.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

See Comments.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-018.0

Component: Motor Control Center

Manufacturer: Klockner-Moeller

a. Comments:

The last two sentances of the Summary of Results will be replaced by:

For interim operation of the equipment, aging need not be considered since temperature, pressure, and humidity will be normal at the equipment locations during normal, DBA, and post-DBA conditions. To justify operability under accident conditions for 100 days, tests performed by the vendor for other parties have demonstrated operability after exposure to 1.401×10^6 Rads which is in excess of the specified dosage of 1.233×10^5 Rads.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

See Comments

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-020.0

Component: 125V DC Distribution Panels

Manufacturer: R-T-E Delta

a. Comments:

The last sentence of the Summary of Results will be replaced by the following ones:

Appendix 'B' of the test report gives a breakdown of all non-metallic components and reveals the "Radiation Resistance" for each. All components are shown to have a resistance in excess of 2×10^5 Rads which exceeds the 1.6×10^5 Rads which is the most severe radiation environment. Since radiation is the only harsh environmental parameter encountered, the equipment can be allowed to operate during the interim period while qualification to NUREG-0588 is being met.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

See Comments.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-021.1

Component: D. C. Starter

Manufacturer: Gould, Inc.

a. Comments: Radiation is the only harsh environmental condition. The equipment has been tested for all environmental parameters except that one component (relay J-15) has not been subjected to 50% humidity. However, this is not a harsh condition and, is enveloped by standard product test. See the Worksheet Supplement, Section I, paragraph 3.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-021.1

Component: Hand Switch

Manufacturer: Gould, Inc.

a. Comments:

The Worksheet Supplement, Section II, Paragraph 1.4, and the Summary of Results, Paragraph 3 will be changed to read: "Radiation testing was performed prior to aging."

The last paragraph of Summary of Results will be changed to read: "Thermal and humidity aging have been included in the testing sequence. Since the radiation levels predicted for 5 of the 6 handswitches are well below the level tested, and since temporary shielding will be provided for handswitch M-009B, interim operation is justified."

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Since the radiation level predicted for 5 of the 6 handswitches are well below the level tested, and temporary shielding will be provided for handswitch M-009B, interim operation is justified.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-030.1

Component: 1.0 KV Power Cable

Manufacturer: Okonite

a. Comments:

The last sentence of General Note 3, paragraph 2 on the Worksheet Supplement will be deleted.

The last sentence of paragraph 6 in the Summary of Results will be revised as follows:

> Aging is a long term effect which is considered for the establishment of qualified life only.

The 3rd sentence of the last paragraph of the Summary of Results will be revised to read:

> However, the pressure is low (22 psia or less) at this end of the curve; furthermore, pressure is not a parameter of failure for cables.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-030.2

Component: 600 Volt Multi-Conductor Control Cable

Manufacturer: Okonite

a. Comments:

Okonite Report NQRN-1 has been received. Based on a preliminary review of this report, cable listed on Exhibit F is expected to meet NUREG-0588, Category II requirements. Until the review is complete, the Comments for Specification No. 9645-E-030.1 are applicable here, also.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-031.2

Component: Co-axial and Tri-axial Cable

Manufacturer: Rockbestos

a. Comments:

The Vendor has notified us that two types of cables are qualified for use up to 230°F, only. Grand Gulf does not have any applications of these types of cables above 230°F. Other cables purchased under this specification are qualified to any application in Grand Gulf. Based on this information, the cables identified in Exhibit F meet NUREG-0588, Category I requirements.

b. Follow-Up Action:

The evaluation will be revised prior to fuel load.

c. Justification for Interim Operation:

None required

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-031.2

Component: Coaxial and Triaxial Cable (Flamtrol using Stilan insulation)

Manufacturer: Raychem Corporation

a. Comments:

Raychem test report EM 1415 has been received. Based on a preliminary review of this report, the cable identified in Exhibit F is expected to meet NUREG-0588 Cateogry I requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-035.0

Component: Electrical Penetration Assembly (Canister/Modular Type)

Manufacturer. Westinghouse

a. Comments:

None

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No Change

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-35.0

Component: Terminal Blocks

Manufacturer: KULKA

a. Comments: None

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-035.1

Component: Drywell Seal Condulet

Manufacturer: Crouse-Hinds

a. Comments: The last sentence of the Summary of Results will be replaced by:

Since the Chico A and Chico X sealing compounds are chemically inert, interaction with the cable insulation is not considered to be a problem. Since aging does not apply because the seal condulet assembly is inorganic in nature, interim operation is justified.

b. Follow-Up Action:

The equipment will be qualified by testing by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

See Comments

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-035.4

Component: Penetration Protective Cabine & MSCP's

Manufacturer:

a. Comments: Delete paragraph 2 of Summary of Results.

Section II, Paragraph 2 of the Worksheet Supplement will be revised to read:

Equipment is not qualified to NUREG-0588 without a complete set of environmental test data and related documents.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon as thereafter as possible.

c. Justification for Interim Operation:

No change.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-062.3

Component: Cable Termination Kits

Manufacturer: Raychem Corporation

a. Comments: The following will be deleted from the Worksheet Supplement:

1. Last sentence of Section I, Paragraph 1.

2. Last sentence of Section I, Paragraph 4.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-062.3

Component: Coaxial Cable Ferrule and Solder Sleeve

Manufacturer: Amp and Raychem

a. Comments: The following paragraph will be added to the Summary of Results:

The components are mechanical connectors; they are made of solid metal, thus failure of the connection when experiencing harsh environments due to material breakdown is not a concern. Retest of the Raychem heat shrinkable cable sleeve which has been used to protect these components would be sufficient to qualify the entire assembly.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-E-062.3

Component: Heat shrinkable cable sleeves and In-Line cable splices

Manufacturer: Raychem Corporation

a. Comments: None

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. None

Component: Terminal Blocks; Electrical Conductor Seal Assembly

Manufacturer: General Electric; Conax Corporation

a. Comments: None

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation will be justified by test prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-301.0A

Component: Electronic Transmitters Model 1151 (Outside Containment).

Manufacturer: Rosemount Inc.

a. Comments:

Model 1151 transmitters are rated for 2 megarads integrated gamma radiation dosage. However, one of the 44 transmitters (tag no. 1E38-PT-N002A, located in Room 1A302) could be exposed to an integrated gamma dosage of 2.51 megarads during LOCA/HELB conditions.

b. Follow-Up Action:

The one transmitter (tag no. IE38-PT-N002A, located in room 1A302) will be replaced by a qualified model 1153 before fuel load.

All model 1151 transmitters will be replaced with the qualified model 1153, series 'B' before June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation for all 1151 transmitters except for tag no. 1E38-PT-N002A has been provided in summary of results. Since this one transmitter will be replaced by a qualified model 1153 before fuel load, no further justification is required.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-301.0A

Component: Electronic Transmitter Model 1153GB9 (Inside Containment)

Manufacturer: Rosemount Inc.

a. Comments:

Rosemount Inc. has indicated that the supplementary tests are in progress. The tests are to be completed on schedule and the test report is due in September. Upon review and approval, the transmitter will be shipped.

b. Follow-Up Action:

No change.

c. Justification for Interim Operation:

Since the qualified transmitter will be installed before fuel load, no justification is required for interim operation.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-359.0

Component: Hydrogen Analyzer

Manufacturer: Comsip Delphi Inc.

a. Comments:

1. Motor/Pump Bearing Anomaly: Test results indicated that one of the bearings failed on the 42nd day of the 100 day LOCA test. The bearing selected by Reliance Electric Company is based on AFBMA Standard #9 which is accepted by the IEEE 334-1974 daughter Standard of IEEE 323-1974. Bearing life is defined by the L-10 value, the number of hours that are expected to be exceeded by 90% of the bearings operated with adequate lubrication. Comsip had indicated that L-10 bearings for 10 lbs. load had a life allowance of 100,000 hrs. (approximately 11 years). Hence, bearing failure after 1,000 hrs. of LOCA operation is considered a random failure.

2. The Reliance Electric Summary Report for nuclear power motor systems indicate that the motors are qualified in accordance with IEEE 334-1974, Section 5. This section utilizes the IEEE 117-1974 standard for qualification of the insulation systems by motorette method. Preliminary review of the summary report shows that the motors are adequately qualified to IEEE 323-1974 standards.

3. Beta radiation effect on pump diaphrams: Comsip has calculated that the Beta dose based on source terms from TID 14844 indicate a maximum surface exposure largely from XE 133, to the pump diaphram of about $1x10^6$ Rads. Tests run for $1x10^7$ Rads Beta on pump diaphrams showed no degradation. Comsip has based their calculations on information from Appendix D of NUREG-0588.

4. Accuracies: See section C of this supplement.

b. Follow-Up Action:

Comments on test report were given to Comsip on July 21, 1981. Comsip is due to respond by August 28, 1981. Comsip has indicated that they will retest the moto[illegible]ump assembly to prove their integrity. The equipment will [illegible]e qualified by test by June, 1982, or as soon thereafter as possible.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-359.0

Component: Hydrogen Analyzer

Manufacturer: Comsip Delphi Inc.

c. Justification for Interim Operation:

1. Preliminary review of the Reliance Electric Summary Report for nuclear power motor systems shows that the motors are qualified in accordance with IEEE 334-1974 standard, daughter standard of IEEE 323-1974.

2. Comsip Delphi letter dated July 31, 1980, indicates that the motors with a redesigned shaft use L-10 type bearings with a life allowance of 100,000 hrs. These motor/pump assemblies were purchased in February, 1981, to replace existing ones. These have been installed on Grand Gulf. Since the life allowance of L-10 bearing is 100,000 hrs. (11.4 years), the failure of the bearing during LOCA test sometime after 1,000 hrs. of operation is considered as a random failure. The performance of the replacement bearing with high temperature grease through LOCA test and 90 days of ambient temperature operation confirm that the earlier anomaly was not generic. Further testing on the motor/pump assembly is anticipated with results by June, 1982.

3. Accuracy - Three gases were used after each environmental exposure to ascertain the response of the test assembly. These gases were zero, approx. 9% hydrogen in nitrogen, and approx. 4.4% hydrogen in nitrogen. No rational mechanism has been formulated for how two test results could be different when the response to the other two gases, and on three occasions to the third gas, were within expected limits. Therefore, Comsip believes that these two out of limits data points are erroneous. This is substantiated by the fact that 12 readings after seismic and during post-LOCA test were stable and within specified accuracy.

   Comsip Inc. considers the KIII system to be qualified per IEEE 323-1974 to the parameters specified in the qualification plans. We believe the equipment will be qualified after current testing is completed.

4. Based upon the above information, safe operation of the plant until June, 1982, is justified.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-359.1

Component: Heat Tracing

Manufacturer: Thermon Manufacturing Co.

a. Comments:

Summary of results indicates that the test reports are expected to be completed by November 1981. Since the equipment is still in thermal aging test stage, the test program will not be completed before January 1982. Hence, it is expected that the test reports will be completed by February 1982.

b. Follow-Up Action:

Equipment associated with this specification is still in the testing phase at this time. The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

The equipment is presently being sequentially tested for thermal aging, radiation aging and seismic. This testing phase is due to be completed by September 30, 1981. Then a 100 day post accident (LOCA) test will be performed. This test will begin immediately following the seismic testing. Justification for interim operation will be provided prior to fuel loading based on satisfactory completion of 30 days of LOCA testing.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-363.0

Component: Radiation Detector and Cable Assembly (Model 877-1 & 878-1 respectively)

Manufacturer: Victoreen and BIW

a. Comments:

A test report has been received from Victoreen.
The high range containment area monitor detector and cable assembly were subjected to sequential testing following the guidelines of IEEE 323-1974 as follows:

1. Thermal Aging:

   a. Radiation Detectors: The detector was not subjected to thermal aging as all parts are of stainless steel, nickle, ceramic or aluminum. These materials have a life time much in excess of 40 years.

   b. Cable Assembly: The cable assemblies were thermally aged at accelerated temperature of 151°C (304°F) for 10 days to simulate service temperature of 60°C (140°F) for service period of 40 years. Arrhenius regression analysis was used.

2. Operational Aging: Electronic check source operation which is performed every 17 minutes was simulated. Approximately 1,240,000 cycles were applied (for 40 year period) in 172 minutes to the detector and cable assembly.

3. Radiation: The detector and cable assembly were subjected to 2.? x 10^8 RADS gamma dose from a cobalt 60 source. The detectors are sealed and the cable is enclosed in conduit, therefore beta is not a concern.

4. Seismic: Vibration was simulated to include degradation effects by vibration.

5. LOCA Simulation: Eight (8) attempts to perform the LOCA Test were aborted prior to completion of the required 28 days due to failure of the cable assembly. These failures were caused by high pressure and saturated steam causing failure of the connector and electrical shorts. The ninth LOCA Test was performed successfully with the cable sealed, connector to connector, in stainless steel tubing via a sealed junction box. The test was run for 30 days. The generic test profile is as follows:

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Time Period	Temperature	Test Plan Pressure Requirement PSIG	Actual Pressure PSIG
2 hrs.	120°F	---	
0-10 seconds	120°F - 357°F	133	Uncontrolled
10 sec - 3 hrs	357°F	133	Uncontrolled
3 hrs - 7 hrs	320°F	75.8	Uncontrolled
7 hrs - 11 hrs	300°F	53.8	Uncontrolled
11 hrs - 4 days	250°F	15	15
4 days - 30 days	200°F	0	0

Although the LOCA simulation was 30 days instead of 100 days this is not considered a problem. The test profiles contain significant margin above the predicted profiles, hence no malfunctions over the remaining 70 days are expected.

The method used to seal the cable assembly and connector during installation will insure its integrity for LOCA environment by using qualified electrical termination methods.

Based upon this preliminary review of the available data, the radiation detectors and cable assemblies, identified in Exhibit F, are expected to meet NUREG-0588, Category I requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None Required

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-561.0

Component: Temperature Elements (Outside Containment)

Manufacturer: Thermo-Electric

a. Comments:

The Follow-Up Program previously stated that 'Hemit' terminal blocks would be tested. See b. for a revised Follow-Up Program.

b. Follow-Up Action:

A complete thermocouple assembly will be submitted to a laboratory for testing and evaluation. The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-561.0

Component: Temperature Elements (Inside Containment)

Manufacturer: Thermo-Electric

a. Comments:

The Follow-Up Program previously stated that 'Hemit' terminal blocks would be tested. See b. for a revised Follow-Up Program.

b. Follow-Up Action:

A complete thermocouple assembly will be submitted to a laboratory for testing and evaluation. The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

No change

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-J-606.0

Component: Solenoid Valve

Manufacturer: ASCO

a. Comments:

The initial review of ASCO solenoid valves was based on information available from a certificate of compliance. A test report has now been received. A preliminary review of the test report confirms information submitted by ASCO in their certificate of compliance.

The radiation exposure of the solenoid valves was performed in two parts. Radiation aging before seismic test was for a gamma dosage of 50 megarads. Accident dosage of 150 megarads was applied after seismic testing and before LOCA testing to simulate accident conditions. Hence, the ASCO solenoid valve had a total gamma exposure of 2×10^8 Rads.

The LOCA test followed the guidelines of IEEE 382-1972. Actual LOCA simulation is as follows:

TIME	TEMPERATURE	PRESSURE
0-12 min.	140°F-346°F	0-110 psig
12 min-3 hrs-12 min	346°F	110 psig
3 hrs 12 min-5 hrs 12 min	346°F-140°F	
5 hrs 12 min-5 hrs 20 min	140°F-346°F	to 110 psig
5 hrs 20 mins-8 hrs 20 mins	346°F	110 psig
For 3 hr period	320°F	75 psig
To 4 days	250°F	15 psig
To 30 days	200°F	10 psig

Based on this preliminary review of the available data, the control valves identified in Exhibit F are expected to meet NUREG-0588 Category I requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-084.0

Component: Jockey Pump Motors

Manufacturer: Westinghouse

a. Comments:

Because testing was performed on motorettes, operability of the motor assembly was not demonstrated. The motors see only a radiation harsh environment of 3.11×10^7 Rads and were tested to 2×10^8 Rads. Documentation has been obtained from Westinghouse which establishes the ability of the lubrication to sustain a radiation exposure of 2×10^8 Rads. As the motor bearings are entirely metalic (52-100 steel) they will not be adversely affected by this level of radiation.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

The motorette testing and documentation discussed above are sufficient to assure safet operation until June 1982.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-190.0

Component: Electric Hydrogen Recombiner

Manufacturer: Westinghouse

a. Comments:

None

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

With the exception of the beta radiation exposure, the open items stem from the lack of data enabling a thorough, independent review. There is every indication that an extensive test program was conducted for the predicted environment. Therefore, these items do not represent a risk to safe interim operation. The slight shortfall for the tested beta exposure will be evaluated and justified prior to fuel load.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-190.0

Component: Recombiner Power Supply

Manufacturer: Westinghouse

a. Comments:

The power supply sees only a radiation harsh environment (1.6×10^5 Rads). No aging was performed.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Prior to power operation, temporary shielding will be provided to remove the harsh radiation environment. Since aging is a long term effect and since the power supply is de-energized except for periodic testing, interim operation is justified until June 1982.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: D.C. Reversing Starters, Outside Containment

Manufacturer: Gould

a. Comments:

The Summary of Results will be clarified as follows:

1. No test report. Only certificate of conformance was submitted.
2. The terminal blocks were included in the sequence of testing.
3. The environmental parameters that the starters will experience are listed below:

(Normal/Accident)

Temp: 80°F/80°F
Press: ATM $\pm$ 1.0 in. wg/ ATM $\pm$ 1.0 in. wg
Humidity: 50%/50%
Radiation: 4.57×10^4 RADS (normal + Accident)

4. The environmental test performed on the starters was a performance type test in a 50°C (122°F ambient environment).
5. The starters were irradiated to 10×10^6 RADS.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified until June 1982 for the following reasons:

1. The starters have a qualified life greater than 40 years.
2. The environmental test adequately enveloped the accident parameters that the starters will be exposed to.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Valve Actuator AC Motor, Type RH Insulation, Inside Containment

Manufacturer: Reliance

a. Comments:

1. A review of the Limitorque Report B0058 indicates that activation energy for the insulating materials used in the motor is about 1 eV. Based on this new information the motors are qualified for more than 40 years.

2. The effects of flood level are currently being reviewed based on more specific criteria. The new flood level is 125'4" vs. an earlier level of 127'7". Preliminary evaluations indicates that valves G33F100, G33F102 and G33F106 are not required to function following DBA. Only valve E12F009 is required to function post DBA.

   However, a brief submergence of this valve will not jeopardize its ability to function for the following reasons:
   a. The flooding takes place for only 4 seconds
   b. The level of the motor is at 125 ft vs. the highest flood level of 125 ft 4 in.
   c. During the operability test, the test chamber was inadvertently flooded with water submerging the motor. Subsequent to draining the chamber, the motor was dried and it successfully operated.

3. The literature search completed thus far has revealed a weep hole in the motor enclosure drain plug. This would permit beta radiation to enter the chamber.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified until June 1982 for the following reasons:

1. The motors have a qualified life of 40 years.

2. Though flooding was not addressed, based on the new criteria only one valve is required to function post DBA. A brief submergence of this valve will not jeopardize its ability to function for the following reasons:

   a. The flooding takes place for only 4 seconds.
   b. The level of the motor is at 125 ft vs. the highest flood level of 125 ft 4 in.
   c. The motor is enclosed in a water-tight NEMA 4 enclosure.
   d. During the operability test, the test chamber was inadvertently flooded with water submerging the motor. Subsequent to draining the chamber, the motor was dried and it successfully operated.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Valve Actuator AC Motor, Type RH Insulation, Inside Containment

Manufacturer: Reliance

c. Justification for Intrim Operation:

3. Though spray was not addressed, it is not a problem as all motors have NEMA-4 watertight enclosures. Additionally, the spray is not caustic.

4. The beta radiation released during an accident in the drywell would be of the order of 1500×10^6 Rads; the actual radiation which would enter the enclosure is considerably less based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation would reach 2.35×10^8 Rads, therefore exceeding the equipment qualified dose of 2.04×10^8 Rads. However, a dose of 2.35×10^8 Rads is still not significant, because similar magnetic wires with type RH insulation have shown very little effect in electrical and physical properties even after they were exposed to a radiation dose of 3×10^9 Rads (per Report NUC-9 dated July 1, 1978, by Reliance Electric Company).

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: 4 Train Limitorque Switch, Outside Containment

Manufacturer: Limitorque

a. Comments: 1. A review of the Limitorque Report B0058 indicates that molded phenolic material has been used for these switches. This material has a temperature index of 150°C per Underwriters Laboratory. When this phenolic material was heated at that temperature for 6×10^4 hours, its physical properties were reduced to one half of their original value. A conservative value for its activation energy, per EPRI Research Project 980-1, is 0.96 EV. Assuming that its degradation due to thermal aging at a normal temperature of 135°F follows the Arrhenius Curve, it would take 9.8×10^7 hours to reach the same level of degradation. A qualified life of 40 years is only 0.46% of this period.

2. Switches will be exposed to an accident temperature of 310°F vs a test temperature of 250°F max. However, rise of temperature from a normal value of between 80°F and 125°F to 310°F and the fall to 212°F takes place in a short duration of less than 5 minutes.

3. Switches will be exposed to up to 57.9×10^6 Rads during a DBA event; during the test they were exposed to a gamma radiation of 20×10^6 Rads, only.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

The interim operation of these switches will be justified by fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: 4 Train Limitorque Switch, Inside Containment

Manufacturer: Limitorque

a. Comments:

1. A review of the Limitorque Report B0058 indicates that molded phenolic material has been used for these switches. This material has a temperature index of 150°C per Underwriters Laboratory. When this phenolic material was heated at that temperature for 6×10^4 hours, its physical properties were reduced to one half of their original value. A conservative value for its activation energy, per EPRI Research Project 890-1, is 0.96 eV. Assuming that its degradation due to thermal aging at a normal temperature of 135°F follows the Arrhenius curve, it would take 9.8×10^7 hours to reach the same level of degradation. A qualified life of 40 years is only 0.36% of this period.

2. The effects of flood level are currently being reviewed based on more specific criteria. The new flood level is 125'4" vs. an earlier level of 127'7". Preliminary evaluation indicates that valves G33F100, G33F102 and G33F106 are not required to function following DBA. Only valve E12F009 is required to function post-DBA. However, a brief submergence of this valve will not jeopardize its ability to function for the following reasons:

   a. The flooding takes place for only 4 seconds.

   b. The level of the actuator is at 125 ft. vs. the highest flood level of 125 ft. 4 in.

   c. During the operability test, the test chamber was inadvertently flooded with water submerging the actuator. Subsequent to draining the chamber, the actuator was dried and it successfully operated.

3. The literature search completed thus far has revealed a weep hole in the limit switch compartment drain plug. This would permit beta radiation to enter the chamber. Though the beta radiation released during an accident in the drywell would be of the order of 1500×10^6 Rads, the actual radiation which would enter the enclosure is considerably less based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation would reach 2.35×10^8 Rads, therefore exceeding the equipment qualified dose of 2.04×10^8 Rads.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification of Interim Operation

Interim operation is justified until June 1982, for the following reasons:

1. The switches have a qualified life of more than 40 years based on additional data.

2. Though flooding was not addressed, based on the new criteria only one valve actuator is required to function post-DBA. A brief submergence of this valve actuator will not jeopardize its ability to function for the following reasons:

   a. The flooding takes place for only 4 seconds.

   b. The level of the actuator is at 125 ft. vs. the highest flood level of 125 ft. 4 in.

   c. The switch is enclosed in watertight NEMA-4 enclosures.

   d. During the operability test, the test chamber was inadvertently flooded with water submerging the actuator. Subsequent to draining the chamber, the actuator was dried and it successfully operated.

3. Though spray was not addressed, it is not a problem as all switches have nema 4 watertight enclosures. Additionally, the spray is not caustic.

4. Retesting for radiation will be completed before fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Solenoid Valves (Model HTX), Inside and Outside Containment

Manufacturer: ASCO

a. Comments:

The test report for the "HTX" solenoid valves is being acquired. These ASCO solenoids contain Viton seals and discs which are susceptible to aging effects. A conservative value for the activiation energy of Viton is 1.11 eV. (Reference: EPRI Report No. NP-1558 dated September 1980).

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

A comparison of parts was performed between the ASCO "HTX" series and "NP" series solenoid valves. The investigation yielded a difference only in the seal and disc materials. The difference was that Viton is used in "HTX" solenoids and ethylene propylene is used in the "NP" solenoids.

The environmental testing performed on the "NP" solenoids yielded a qualified life of approximately 14 years. This was calculated by using an activation energy of 0.95 eV (Reference EPRI Report No. NP-1558 dated September 1980).

In comparing the two materials, the activiation energy of 1.11 eV for Viton would have yielded an increase in the qualified life to approximately 41 years. Therefore, pending the completion of the evaluation, the interim operation until June 1982 is justified.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Terminal Blocks, Inside and Outside Containment

Manufacturer: GE

a. Comments:

It has been determined that the terminal blocks are Model EB-25, manufactured by GE. The material of construction is wood-flour phenolic.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Testing will be conducted prior to fuel load to justify interim operation.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Limit Switches, Inside and Outside Containment

Manufacturer: Micro-Switch

a. Comments:

A 3-page test report has been submitted. However, no radiation, seismic, or thermal aging were performed. The qualified life is unknown.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation will be provided prior to fuel load.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0

Component: Position Switches EA 740-50001, Inside and Outside Containment

Manufacturer: NAMCO Controls

a. Comments:

1. A literature search provided a higher activation energy than the one previously used to calculate the equipment's qualified life. The qualified life is now approximately 1 year.

2. The effects of flooding are currently being reviewed based on more specific criteria. The new flood level of 125'4" as opposed to the earlier level of 130'10" indicates only one valve would be exposed to flooding conditions. (Locked-open, manual valve #E12-F010).

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

1. The qualified life of 1 year was calculated using a normal service temperature of 135°F for inside containment. However, the normal temperature inside containment at this stage of construction is 100°- 105°F maximum. Using this temperature, the qualififed life would be approximately 4 years. This ensures that the equipment has sufficient qualified life to span the final stages of pre-fuel load construction plus interim operation until June 1982.

2. The evaluation concerning the submerged valve E12-F010 will be completed prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0/251.0

Component: 4 Train Limit & Torque Switch Wire Insulation for DC Motor, Outside Containment

Manufacturer: Limitorque Operators

a. Comments:

No change

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation will be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0/251.0

Component: DC Motor, Class B Insulation, Outside Containment

Manufacturer: Limitorque Operators (A.K. Porter and Reliance)

a. Comments:

No change

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation will be provided prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9643-M-242.0/251.0/257.0/258.0

Component: Wire Insulation, Outside Containment

Manufacturer: Limitorque Operators

a. Comments:

1. No details are available in the test report for the type of wiring used for jumpers inside the switch compartment.

2. Based on new information from Limitorque, wiring may not be the same as tested; it could be Flametrol, Rockbestos, or PVC.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation will be justified prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0/251.0/257.0/258.0

Component: Wire Insulation, Inside Containment

Manufacturer: Limitorque Operators

a. Comments:

1. No details are available in the test report for the type of wiring used for jumpers inside the switch compartment.

2. Based on new information from Limitorque, wiring may not be same as tested. Furthermore, it could be either Flametrol or Rockbestos.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation will be justified prior to fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-242.0/251.0/257.0/258.0

Component: Valve Actuator AC Motor, Class B Insulation, Outside Containment

Manufacturer: Reliance

a. Comments:

1. A review of the Limitorque Report B0052 indicates that activation energy for the insulating materials used in the motor is about 0.93 e' Based on this new information and the aging done the motors are qualified for 203 days at normal working temperature of 105°F.

2. Commercial Class B motors are in general rated for maximum continuous temperature rating of 248°F (120°C). The actuators are expected to operate for short duration only. Hence it is expected that the actual life will be longer than the calculated life of 209 days.

3. Actuators are exposed to an accident temperature of 310°F vs. a test temperature of 250°F maximum. However, the use of temperature from normal temperatures between 80°F and 125°F to 310°F and the fall to 212°F takes place in a duration of less than 5 minutes.

4. Actuators are exposed to up to 57.9×10^6 Rads during a DBA; actuators were exposed during test to a gamma radiation of 20×10^6 Rads.

b. Follow-Up Actions:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified until June 1982, for the following reasons:

1. The motors have a very conservative qualified life of 209 days, in actual practice aging is a long term effect.

2. When the actuator was tested, two motors with Class B insulation, irradiated to 200×10^6 Rads, were also tested under the same harsh environment. Although the motors were not "loaded", they were operated (at no load) during the complete test at regular intervals along with actuator. Since an exposure to 200×10^6 Rads is far in excess of the DBA exposure of 57.9×10^6 Rads, it can be assumed that actuator will not malfunction becuase of radiation exposure.

3. The motors are completly enclosed. This enclosure is expected to provide a buffer for the temperature extremes, which occurs only for a short duration of less than 5 minutes.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-251.0

Component: Valve Actuator AC Motor, Type RH Insulation, Inside Containment

Manufacturer: Reliance

a. Comments:

1. A review of the Limitorque Report B0058 indicates that activation energy for the insulating materials used in the motor is about 1.0 eV. Based on this new information the motors are qualified for more than 40 years.

2. The effects of flood level are currently being reviewed based on more specific criteria. The new flood level is 125'4" vs. an earlier level of 127'7". Preliminary evaluations indicates that valves P45F097 and P45F096 are not required to function following the DBA.

3. The literature search completed thus far has revealed a weep hole in the motor enclosure drain plug. This would permit beta radiation to enter the chamber.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified until June 1982 for the following reasons:

1. The motors have a qualifed life of 40 years.

2. Though flooding was not addressed initially, based on the new criteria this is no longer an element of the harsh environment since the valves are not required to operate post DBA.

3. Though spray was not addressed it is not considered a problem as all motors have NEMA-4 water-tight enclosures. Additionally, the spray is not caustic.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-251.0

Component: Valve Actuator AC Motor, Type RH Insulation, Inside Containment

Manufacturer: Reliance

c. Justification for Interim Operation (Continued):

4. The beta radiation released during an accident in the drywell would be of the order of 1500×10^6 Rads; the actual radiation which would enter the enclosure is considerably less based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation would reach 2.35×10^8 Rads, therefore exceeding the equipment qualified dose of 2.04×10^8 Rads. However, a dose of 2.35×10^8 Rads is still not significant, because similar magnetic wires with type RH insulation have shown very little effect in electrical and physical properties even after they were exposed to a radiation dose of 3×10^9 Rads (per Report NUC-9 dated July 1, 1978 by Reliance Electric Company).

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-251.0

Component: Position Switches (EA170-11302, 12302), Inside Containment

Manufacturer: NAMCO Controls

a. Comments:

1. No test report was submitted

2. No test report for environmental qualification is available for these switches.

b. Follow-Up Action:

The equipment will be replaced with qualified switches prior to fuel load.

c. Justification for Interim Operation:

None required.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-251.0

Component: 4 Train Limitorque Switch, Inside Containment

Manufacturer: Limitorque

a. Comments: 1. A review of the Limitorque Report B0058 indicates that molded phenolic material has been used for these switches. This material has a temperature index of 150°C per Underwriters Laboratory. When this phenolic material was heated at that temperature for 6×10^4 hours, its physical properties were reduced to one half of their original value. A conservative value for its activation energy per EPRI Research Project 890-1 is 0.96 EV. Assuming that its degradation due to thermal aging at a normal temperature of 135°F follows the Arrhenius Curve, it would take 9.8×10^7 hours to reach the same level of degradation. A qualified life of 40 years is only 0.36% of this period.

2. The effects of flood level are currently being reviewed based on more specific criteria. The new flood level is 125'4" vs. an earlier level of 127'7". Preliminary evaluation indicates that valves P45F097 and P45F096 are not required to function following the DBA.

3. The literature search completed thus far has revealed a weep hole in the limit switch compartment drain plug. This would permit beta radiation to enter the chamber. Though the beta radiation released during an accident in the drywell would be of the order of 1500×10^6 Rads. The actual radiation which would enter the enclosure is considerably less based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation could reach 2.35×10^8 Rads, therefore exceeding the equipment qualified dose of 2.04×10^8 Rads.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-251.0

Component: 4 Train Limitorque Switch, Inside Containment

Manufacturer: Limitorque

c. Justification for Interim Operation:

Interim operation is justified until June 1982 for the following reasons:

1. The switches have a qualified life of more than 40 years based on additional data.

2. Though flooding was not addressed initially, based on the new criteria this is no longer an element of the harsh environment since the valves are not required to operate post DBA.

3. Though spray was not addressed it is not considered a problem as all switches have NEMA-4 water-tight enclosures. Additionally the spray is not caustic.

4. Retesting for additional radiation will be completed before fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257.0/258.0

Component: Valve Actuator AC Motor, Type RH Insulation, Inside Containment

Manufacturer: Reliance

a. Comments:

1. A review of the Limitorque Report B0058 indicates that activation energy for the insulating materials used in the motor is about 1 eV. Based on this new information the motors are qualified for more than 40 years.

2. The literature search completed thus far has revealed a weep hole in the motor enclosure drain plug. This would permit Beta radiation to enter the chamber.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified until June 1982, for the following reasons:

1. The motors have a qualified life of 40 years.

2. Though spray was not addressed it is not considered a problem as all motors have NEMA-4 water-tight enclosures. Additionally, the spray is not caustic.

3. Though the Beta radiation released during an accident in the drywell would be on the order of 1500×10^6 Rads, the actual radiation which would enter the enclosure is considerably less based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation would reach 2.35×10^8 Rads, therefore, exceeding the equipment qualified dose of 2.04×10^8 Rads. However, a dose of 2.35×10^8 Rads is still not significant, because similar magnetic wires with type RH insulation have shown very little effect in electrical and physical properties even after they were exposed to a radiation dose of 3×10^9 Rads (per Report NUC-9, dated July 1, 1976, by Reliance Electric Company).

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257.0/M-258.0

Component: 4 Train Limitorque Switch, Inside Containment

Manufacturer: Limitorque

a. Comments: A review of the Limitorque Report B0058 indicates that molded phenolic material has been used for these switches. This material has a temperature index of 150° C per Underwriters Laboratory. When this phenolic material was heated at that temperature for 6×10^4 hours, its physical properties were reduced to one half of their original value. A conservative value for its activation energy, per EPRI Research Project 890-1, is 0.96 eV. Assuming that its degradation due to thermal aging at a normal temperature of 135°F follows the Arrhenius Curve, it would take 9.8×10^7 hours to reach the same level of degradation. A qualified life of 40 years is only 0.36% of this period.

The literature search completed thus far has revealed a weep hole in the limit switch compartment drain plug. This would permit Beta radiation to enter the chamber. Though the Beta radiation released during an accident in the drywell would be of the order of 1500×10^6 RADS the actual radiation which would enter the enclosure is considerably lower based on location of the equipment and plate out effects. The total integrated dose of gamma and beta radiation would reach 2.35×10^8 RADS, therefore, exceeding the equipment qualified dose of 2.04×10^8 RADS.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Interim operation is justified till June 1982 based on the following reasons:

1. The switches have a qualified life of more than 40 years based on additional data.

2. Though spray was not addressed, it is not a problem as all switches have NEMA-4 watertight enclosures and spray is not caustic.

3. Retesting for additional radiation will be completed before fuel load.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257.0/258.0

Component: Position Switches (EA170-41100, 42100) Inside and Outside Containment

Manufacturer: NAMCO Controls

a. Comments:

1. No test reports were submitted.

2. The material used in these switches has a maximum service temperature of only 225°F. Therefore, it would not remain functional in the elevated temperatures during a LOCA or HELB.

b. Follow-Up Action:

The equipment will be replaced with qualified switches by fuel load.

c. Justification for Interim Operation:

None Required

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257.0/258.0

Component: Terminal Blocks, Inside and Outside Containment

Manufacturer: TRW/Cinch

a. Comments:

It has been determined that the terminal blocks are Model 8-141, manufactured by TRW/Cinch. The material of construction is a general phenolic.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation will be provided prior to fuel load.

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257/258

Component: Solenoid Valve (Model NP), Outside Containment

Manufacturer: ASCO

a. Comments:

Test report AQ-21678/TR, Rev. A, has been obtained. A review of the report yields the following preliminary results:

1. Extremes in frequency were not addressed, however, this is not considered a problem. Operability was demonstrated at 85% of rated voltage.

2. The number location, and type of thermocouples used was not addressed. However, the testing was performed in a controlled chamber.

3. The valves were tested to 201.3×10^6 Rads which envelopes expected post-accident radiation exposures.

4. Post-accident test duration was 30 days instead of 100 days; however, this is not considered a problem because calculated post-accident conditions will be harsh for radiation only.

Based on this preliminary review of the test report, the solenoid valves identified in Exhibit F are expected to meet NUREG-0588, Category II requirments.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-257/258

Component: Solenoid Valve (Model NP), Inside Containment

Manufacturer: ASCO

a. Comments:

Test report AQ-21678/TR, Rev. A, has been obtained. A review of the report yields the following preliminary results:

1. Extremes in frequency were not addressed; however, this is not considered a problem. Operability was demonstrated at 85% of rated voltage.

2. The number, location, and type of thermocouples used was not addressed. However, the testing was performed in a controlled chamber.

3. The valves were tested to 201.3×10^6 Rads which envelopes required post-accident radiation exposures. Though the period of operation for equipment following a LOCA/MELB event has generally been defined to be 100 days, it is not applicable to solenoid valves. The solenoid valves are only required to operate one time to vent air to move the Butterfly valve to its fail safe position. These Butterfly valves serve an isolation function and are automatically moved to a fail safe position based on high pressure, radiation and/or temperature. The solenoids are only required to function during the initial phase of the accident and therefore, require qualification conservatively based on 1½ hour duration only. During this period the integrated radiation dose is bounded by the test dose of 201.3×10^6 Rads.

4. Post-accident test duration was 30 days instead of 100 days; however, this is not considered a problem because:

   a. The test temperature profile envelops the required post-accident temperature for the 30-day duration. Furthermore, test temperature was held constant at 200°F from day 4 through day 30; expected post-accident temperature for this period ramps down to 140°F (and continues to ramp to 100°F at 100 days). Since operability was demonstrated at 200°F, no malfunctions at 140°F and below are expected.

   b. The test pressure profile did not fully envelop the required post-accident pressure for 57 hours during the 30-day duration. However, since operability was demonstrated at 110 psig, no malfunctions are expected.

   c. As noted above, the equipment only needs to operate during the initial phases of the accident.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Based on this preliminary review of the test report, the solenoid valves identified in Exhibit F are expected to meet NUREG-0588, Category II requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-611.0

Component: Room Cooler Fan Motors

Manufacturer: Joy/Reliance

a. Comments:

In the initial NUREG-0588 submittal, it was felt that sufficient documentation did not exist to enable a conclusion that the motor tested represented the motor supplied for GGNS. The motor sees only a radiation harsh environment of 1.85×10^7 Rads and was tested to 2×10^8 Rads.

A telecon with Joy on August 10, 1981 confirmed that test report NUC-9 is applicabl to the GGNS motors with H class RH insulation. Written confirmation of this fact will be obtained from Joy.

Based on this preliminary information, the equipment identified in Exhibit F is expected to meet NUREG-0588, Category II requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-619.0

Component: Building recirculation Fan Motors

Manufacturer: Joy/Reliance

a. Comments:

In the initial NUREG-0588 submittal, it was felt that sufficient documentation did not exist to enable a conclusion that the motor tested represented the motor supplied for GGNS. The motor sees only a radiation harsh environment of 1.85×10^{7} Rads and was tested to 2×10^{8} Rads.

A telecon with Joy on August 10, 1981 confirmed test report NUC-9 is applicable to the GGNS motors with H class RH insulation. Written confirmation of this fact will be obtained from Joy.

Based on this preliminary information, the equipment identified in Exhibit F is expected to meet NUREG-0588, Category II requirements.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

None required.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-632.0

Component: SGTS Exhaust Fan Motor

Manufacturer: CVI

a. Comments:

This motor sees only a radiation harsh environment (5.7×10^5 Rads). Failure to meet NUREG-0588 requirments was only because the test report did not provide data enabling an independant evaluation of the test report conclusions. A telecon with the vendor has confirmed the availability of supporting test data, and a written request for the data has been sent. It is anticipated that a review of the data will show that the equipment meets NUREG-0588 criteria.

b. Follow-Up Action:

The review will be completed prior to fuel load.

c. Justification for Interim Operation:

In the event that the review cannot be completed prior to fuel load, the test report qualitatively supports the motor performed adequately during the test program. The test report contains a letter from Westinghouse which confirms the motor tested and the motor supplied for GGNS are generically similar. Hence, interim operation until June 1982 is justified.

ATTACHMENT NO. 1

SUMMARY OF RESULTS/FOLLOW-UP PROGRAM

SUPPLEMENT 1

Specification No. 9645-M-632.0

Component: SGTS Filter Train Heater and Heater Controls

Manufacturer: CVI

a. Comments:

The heater and heater controls were not supplied to IEEE 323 requirements, Hence no test data is available.

b. Follow-Up Action:

The equipment will be qualified by test by June 1982, or as soon thereafter as possible.

c. Justification for Interim Operation:

Justification for interim operation will be provided prior to fuel load.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT I
NON-NSSS

Additional technical justification for exempting certain non-NSSS equipment from the NUREG-0588 review is provided below.

EXEMPT EQUIPMENT NUREG-0588

a. Table E-1 Remote Shutdown Instrumentation

Failure of the subject instrumentation due to environmental effects of a LOCA/HELB could be in the form of an erroneous signal output, short circuit, or open circuit. These failures would cause the associated indicators on the remote shutdown panels to indicate erroneously, fail upscale, or fail downscale. No overloading of power supplies would occur. Furthermore, there would be no effects on control room indications, since these remote shutdown instrumentation circuits are completely independent of the control room circuits. The erroneous indications on the remote shutdown panels would not mislead the operator, since the remote shutdown panels will not be manned in event of a LOCA/HELB.

b. Table E-2 Solenoid Valves

The subject solenoid valves are of the energize-to-open, spring closed type. They are not required to be energized or opened to perform any safety function. There are no conceivable failure modes of the valves which would cause them to spontaneously open while the solenoids are de-energized. Also, failure of these valves would only allow leakage into the suppression pool. Therefore, these solenoid valves are exempt from the NUREG-0588 review.

c. Table E-3 Miscellaneous Equipment

Notes 1, 3, and 4 are adequate as is. Note 2 should be revised as follows:

2. These valves are for normal plant operating convenience only and, as such, are not required to function during or after a harsh environment. Valve and system integrity are not impaired by loss of operation or inadvertent operation of the components. These consequences will not affect other safety operations or mislead the operator.

d. Future Table E-4 Reactor Protection System SCRAM Sensors

The only high-energy line breaks of concern in the non-seismic Category I turbine building are those having a potential to impact safety related equipment in adjacent buildings. Although the Reactor Protection SCRAM sensors for the turbine stop and control valves are located in the turbine building, they are not considered essential in the evaluation of low probability events, such as pipe breaks. Other SCRAM signals, not related to the turbine building, are available as backup. It can, therefore, be concluded that the following instruments can be excluded from the NUREG-0588 program because the safety-related SCRAM function can be accomplished by other instruments that are adequately qualified and satisfy the single-failure criterion.

Exempt pressure transmitters:

1C71-PT-N005A	1C71-PT-N006A	1C71-PT-N006E
1C71-PT-N005B	1C71-PT-N006B	1C71-PT-N006F
1C71-PT-N005C	1C71-PT-N006C	1C71-PT-N006G
1C71-PT-N005D	1C71-PT-N006D	1C71-PT-N006H

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PFD: N/A

MPL: G41-C001

COMPONENT: Fuel Pool Cooling and Cleanup Pump Motor

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: N/A (Not included in original submittal)

TECHNICAL BASIS OF EXEMPTION

The Fuel Pool Cooling and Clearup Pump Motor is located in the Auxiliary building and would not be exposed to the harsh environments resulting from any LOCA or HELB event. The motor would experience an incremental dose contribution from a DBE resulting in release of the assumed source term radiation dictated by NUREG-0588. The accident dose contribution is calculated to be 63 rads (Table B-8), this dose is insignificant and represents approximately 1% of the calculated normal 40 year dose of 5.3×10^{8} rads. Thus the environment in which the motor is required to function is its normal operating environment.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: N/A

MPL: C41-F004

COMPONENT: SLC Pump Motor

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: N/A (Not included in original submittal)

TECHNICAL BASIS OF EXEMPTION

The Standby Liquid Control (SLC) System equipment (C41-C001, C41-F004) are not required to operate to mitigate LOCA or HELB events. The SLC System is provided as an alternate means of reactivity control. This equipment would be exposed to the harsh environment resulting from a HELB in the Reactor Building, however, the system would not be required to function during such an event, nor would system or component failure effect any safety-related system or equipment required to function during LOCA or HELB events.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: N/A

MPL: C41-C001

COMPONENT: SLC Pump Motor

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: N/A (Not included in original submittal)

TECHNICAL BASIS OF EXEMPTION

The Standby Liquid Control (SLC) System equipment (C41-C001, C41-F004) are not required to operate to mitigate LOCA or HELB events. The SLC System is provided as an alternate means of reactivity control. This equipment would be exposed to the harsh environment resulting from a HELB in the Reactor Building, however, the system would not be required to function during such an event, nor would system or component failure effect any safety-related system or equipment required to function during LOCA or HELB events.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: N/A

MPL: B33-F023/F067

COMPONENT: Recirc MOV's (Limitorque)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 13

TECHNICAL BASIS OF EXEMPTION

These valves are located in the recirculation system and function to isolate the recirculation pump during reactor shutdown for maintenance. The valve (not actuators) must maintain integrity of the pressure boundary which is demonstrated by stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 112C3144

MPL: C51-N002

COMPONENT: IRM Detector

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 17

TECHNICAL BASIS OF EXEMPTION

This device serves active functions in the intermediate range neutron monitoring system. The system functions to provide neutron flux indication in the intermediate range from about 10^{8} to 1.5×10^{13} nv. The system initiates emergency reactor shutdown during reactor startup if the system reads a flux value exceeding specified limits. The system is not used during normal power operation and has no function after reactor shutdown. The system serves no function relative to LOCA/HELB mitigation.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 117C3485

MPL: B21-N059/N061, B33-N021/N022, E12-N002/N003/N004
E12-N005/N024/N027

COMPONENT: Temperature Element (PYCO)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 18

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The thermowells are therefore required to maintain pressure boundary integrity which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 133D9679

MPL: B21-N004

COMPONENT: Temperature Element (PYCO)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 19

TECHNICAL BASIS OF EXEMPTION

This device serves no function during accident events, but is located in pressure boundary piping. The thermowell is therefore required to maintain pressure boundary integrity which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 133D9868

MPL: C51-N011/N012/N013/N014

COMPONENT: Power Range Detector

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 20

TECHNICAL BASIS OF EXEMPTION

This device serves active functions in the power range neutron monitoring system. The system functions to provide neutron flux indication in the power range from about 2.8×10^{13} nv to 2.8×10^{14} nv. The system initiates emergency reactor shutdown during normal power operation (5% to 100% power) in the event of abnormal power levels. There is no Class 1E function for this system after reactor shutdown. The system serves no function relative to LOCA/HELB mitigation.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 145C3046

MPL: G41-N006

COMPONENT: Pressure Switch (Barksdale)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 21

TECHNICAL BASIS OF EXEMPTION

This device performs active functions to assure proper operation of the fuel pool cooling system. The device serves no function relative to LOCA/HELB mitigation, containment isolation, core cooling, or reactor shutdown. The device is located in a mild environment.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 145C3156

MPL: E12-N008

COMPONENT: Level Transmitter (Barton)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 22

TECHNICAL BASIS OF EXEMPTION

The level transmitter is used only during steam condensing mode of RHR and serves no function relative to accident mitigation. The transmitter must maintain the integrity of the pressure boundary which is demonstrated by static stress analysis and hydrostatic test.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 157C4629

MPL: C41-N003

COMPONENT: Temperature Switch (Weed)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 24

TECHNICAL BASIS OF EXEMPTION

This device is used in the Standby Liquid Control System to provide SLC tank temperature indication and control. Minimum tank temperature of 70°F is maintained by the SLC area environment. The active function of this device has no direct relationship with safety injection of boron. The device is connected to the SLC storage tank and must maintain the pressure boundary of the tank which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 158B7072

MPL: C41-N006

COMPONENT: Temperature Element (Weed)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 25

TECHNICAL BASIS OF EXEMPTION

This device is used in the Standby Liquid Control System to provide SLC tank temperature indication and control. Minimum tank temperature of 70°F is maintained by the SLC area environment. The active function of this device has no direct relationship with safety injection of boron. The device is connected to the SLC storage tank and must maintain the pressure boundary of the tank which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 159C4361

MPL: E51-N010/N037

COMPONENT: Level Switch (Magnetrol)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 26

TECHNICAL BASIS OF EXEMPTION

The level transmitters are used in the RCIC steam supply and turbine exhaust line drains. The drain systems only operate when the RCIC system is in a standby mode and serve no function during RCIC operation or for accident mitigation. The devices must maintain integrity of the pressure boundary which is demonstrated by static stress analysis and hydrostatic test.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 159C4520

MPL: B21-N040, B33-N023/N029/N030

COMPONENT: Temperature Element (Rosemount)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 27

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The thermowells are therefore required to maintain pressure boundary integrity which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1263AA

MPL: C51-K002

COMPONENT: Voltage Preamplifier

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 28

TECHNICAL BASIS OF EXEMPTION

This device serves active functions in the intermediate range neutron monitoring system. The system functions to provide neutron flux indication in the intermediate range from about 10^{8} to 1.5×10^{13} nv. The system initiates emergency reactor shutdown during reactor startup if the system reads a flux value exceeding specified limits. The system is not used during normal power operation and has no function after reactor shutdown. The system serves no function relative to LOCA/HELB mitigation.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1544

MPL: E12-N001

COMPONENT: Conductivity Element

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 29

TECHNICAL BASIS OF EXEMPTION

The conductivity element provides indication of water quality downstream of the RHR heat exchanger. The device serves no function relative to accident mitigation or safety mode of RHR operation. The device must maintain the integrity of the pressure boundary which is demonstrated by static stress analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1559

MPL: G41-N011/N012

COMPONENT: Level Transmitter (Rosemount 1151)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 31

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The transmitters are therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1560

MPL: B21-N027/N032/N044, B33-N011/N037/N038, C34-N004/N017, E12-N013

COMPONENT: Level Transmitter (Rosemount 1151)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 32

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The transmitters are therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1561

MPL: B21-N099

COMPONENT: Level Transmitter (Rosemount 1151)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 33

TECHNICAL BASIS OF EXEMPTION

This device serves no function during accident events but is located in pressure boundary piping. The transmitter is therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1563

MPL: B33-N040, C34-N005/N008, C41-N004
E12-N026/N028/N053/N057, E51-N007

COMPONENT: Pressure Transmitter (Rosemount 1151)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 34

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The transmitters are therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1564

MPL: B21-N058, E12-N050/N051/N058

COMPONENT: Pressure Transmitter (Rosemount 1151)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 35

TECHNICAL BASIS OF EXEMPTION

These devices serve no function during accident events, but are located in pressure boundary piping. The transmitters are therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 163C1915

MPL: G41-N026

COMPONENT: Temperature Transmitter (535 G Rosemount)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 36

TECHNICAL BASIS OF EXEMPTION

This device performs active functions to assure proper operation of the fuel pool cooling system. The device serves no function relative to LOCA/HELB mitigation, containment isolation, core cooling, or reactor shutdown. The device is located in a mild environment.

ATTACHMENT NO. 2
EQUIPMENT EXEMPT FROM THE NUREG 0588 REVIEW
SUPPLEMENT 1

PPD: 169C8392

MPL: C34-N003

COMPONENT: Level Transmitter (Rosemount 1152)

CORRESPONDING ITEM NO.
OF TABLE 2 TO SUMMARY
OF RESULTS-NSSS EQPMT: 41

TECHNICAL BASIS OF EXEMPTION

This device serves no function during accident events, but is located in pressure boundary piping. The transmitter is therefore required to maintain pressure boundary integrity which is demonstrated by hydrostatic test and aging analysis.

ATTACHMENT NO. 2

EQUIPMENT EXEMPT FROM THE NUREG-0588 REVIEW
SUPPLEMENT I

PPD: 194X927

MPL: D17-N009

Component: Sensor and Converter (Process Radiation Monitoring)

Corresponding Item No.
of Table 2 to Summary
of Results-NSSS Equipment: 46

Technical Basis of Exemption

The purpose of this monitoring system is to isolate the containment upon detection of an excessive radioactivity in the containment exhaust. The monitoring system is provided to act as an engineered safeguard against the consequences of the refueling accident. The setpoint for the system is normally less than 10 milliRads. Therefore, the system is not intended as the primary insolation signal from a LOCA/HELB and, therefore, is exempted from the NUREG-0588 review.

ATTACHMENT NO. 3

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 reactor shutdown, 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 which perform these functions are listed as follows:

1. Emergency Reactor Shutdown

   - Reactor Protection System
   - Control Rod Drive System
   - Pressure Relief System

2. Reactor Core Cooling (ECCS)

   - High Pressure Core Spray System
   - Automatic Depressurization System
   - Low Pressure Core Spray System
   - Low Pressure Coolant Injection 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 residual heat removal can be achieved with any one (of two) RHR heat exchangers and associated RHR pumps.

ATTACHMENT NO. 4

SAFETY RELATED DISPLAY INSTRUMENTATION

In subsection 8.2 of the Response to NUREG-0588, MP&L has identified three (3) safety-related instrument sensors that were not addressed in the NUREG-0588 submittal. The three (3) safety-related instrument sensors identified were:

1.) Main Steam Line Flow (C34-N002) - Rosemount Model 1151 transmitter

2.) RCIC Turbine RPM

3.) Main Condenser Vacuum (N19-PT-N005) - Rosemount Model 1151 transmitter

1. Main Steam Line Flow

The main steam line flow transmitter is located at elevation 113' of the turbine building. This location is non-harsh per the NUREG-0588 review. The output of the tranmitter goes to a recorder in the control room. There is no safety-related function performed by this transmitter.

The Grand Gulf Emergency Procedures will be revised to include a precautionary note to warn the operator that the indication may be erroneous post-accident.

2. RCIC Turbine RPM

The RCIC turbine rpm sensor is covered by the Grand Gulf NUREG-0588 submittal as part of the RCIC turbine electronic/governor control. The RCIC turbine electronic/governor control is not qualified to NUREG-0588.

The RCIC turbine electronic/governor control will be qualified by test by June 1982 or as soon thereafter as possible.

3. Main Condenser Vacuum

The main condenser vacuum transmitter is located at elevation 133' of the turbine building. This location is non-harsh per the NUREG-0588 review. The output of the transmitter goes to an indicator in the control room. There is no safety-related function performed by the transmitter.

The Grand Gulf Emergency Procedures will be revised to include a precautionary note to warn the operator that the indication may be erroneous post-accident.

ATTACHMENT NO. 5

TMI LESSON LEARNED EQUIPMENT

NON-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

b. Hydrogen Ignition System Components-Specification 9645-M-198.0

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

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

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

f. Containment Water Level-Specification 9645-J-301.0A

g. Containment Temperature Monitors-Specification 9645-J-561.0

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 Response to NUREG-0588 covers the only NSSS (GE) TMI item requiring new equipment. This new item was the Safety Relief Valve Monitoring System. This item has been qualified to the NUREG-0588 criteria.

ATTACHMENT NO. 6

NSSS WORKSHEET/EQ TABLE UPDATE

The following changes have been made to the NSSS NUREG-0588 submittal:

1. Replacement of Rosemount Model 1151 transmitters with Rosemount Model 1152 transmitters. This change occurred due to IE Bulletin 80-16.

2. Category "A" to Category "B" for various Rosemount Model 1151 transmitters and Rosemount temperature elements. The reasons for these changes is given below.

3. Replacement of a single Rosemount Model 1151 transmitter with a Gould Model PD-3018 transmitter.

4. Error in PPD No. 169C8968 (EQ Table 144). Should be PPD No. 169C8969.

5. Error in PPD No. 169C8391 (EQ Table 29). Should be PPD No. 169C8392.

1. Replacement of Rosemount Model 1151

The following MPL's have been replaced with Rosemount Model 1152 transmitters:

A. PPD No. 163C1558:
E32-N051 (EQ Table 56)
E32-N056 (EQ Table 57)
C71-N050 (EQ Table 3)

B. PPD No. 163C1560:
C34-N003 (EQ Table 77)
E31-N080 (EQ Table 82)
E31-N081 (EQ Table 81)

C. PDD No. 163C1561:
E12-N052 (EQ Table 100)
E21-N051 (EQ Table 102)
E22-N054 (EQ Table 104)
E22-N056 (EQ Table 105)
E31-N083 (EQ Table 106)
E51-N051 (EQ Table 115)

D. PPD No. 163C1563:
E22-N050 (EQ Table 87)

E. PPD No. 163C1564:
E12-N055 (EQ Table 119)
E12-N056 (EQ Table 120)
E21-N052 (EQ Table 124)
E21-N053 (EQ Table 125)
E32-N055 (EQ Table 127)
E51-N053 (EQ Table 131)
E51-N055 (EQ Table 132)

ATTACHMENT NO. 6

NSSS WORKSHEET/EQ TABLE UPDATE

2. Category "A" to Category "B"

The following MPL's have been changed from Category "A" to Category "B":

A.	PPD No. 145C3046:	G41-N006	This device performs a active function to assure proper operation of the fuel pool cooling system. This device serves no function relative to LOCA/HELB mitigation. This device is located in a mild environment.
B.	PPD No. 159C4520:	B21-N040 B33-N029 B33-N030	These devices (temperature element) serves no function during an accident but are located in the pressure boundary piping. The thermowelds are required to maintain pressure boundary integrity. This pressure boundary integrity is demonstrated by a static stress analysis.
C.	PPD No. 163C1560:	B21-N027	Shutdown range level indicator system used for refueling. Has no trip function.
		B21-N032	Measures core plate pressure differential (pressure from the inlet plenum to the core region). Has no active safety function.
		B21-N044	Level indication that measures level from 150" below the active fuel to 50" above the active fuel. No trip function. Not an active safety function.
		B33-N011	Provides flow signal for the recirc automatic control valve. The control valve is non-essential.
		B33-N037	Non calibrated jet pump delta "P" which is run through conditioning unit to convert to flow for comparison with pressure under the core plate
		B33-N038	Double tap within selected jet pumps to measure flow.
		C34-N004 C34-N017	The feedwater system is not a safety system and the pressure transmitters do not provide any active safety function. They are passive since the instruments are connected to the primary pressure boundary.

ATTACHMENT NO. 6

NSSS WORKSHEET/EQ TABLE UPDATE

2. Category "A" to Category "B" (cont'd.)

C. PPD No. 163C1560: E12-N013 Measures differential pressure in the reactor head spray line. Used only in the RHR shutdown cooling mode. Use of head spray during shutdown cooling is an optional mode; therefore, it is a non-safety function.

D. PPD No. 163C1561: B21-N099 Level indication for Recirc. Pump Trip on Level 2. This sensor is not the one used for RPT for the end of cycle (EOC) function. (This sensor will be upgraded to active for ATWS implementation.)

E. PPD No. 163C1563: C34-N005, C34-N008 The feedwater system is not a safety system and the pressure transmitters do not provide any active safety function. They are passive since the instruments are connected to the primary pressure boundary.

E12-N026, E12-N028 Used only in the Steam Condensing Mode of the RHR. The steam condensing mode of the RHR system is a non-safety mode.

C41-N004 Measures the discharge pressure of the Standby Liquid Control pump. The pump is not required to mitigate the consequences of a LOCA/HELB.

F. PPD No. 163C1564: E12-N050, E12-N051 Used only in the Steam Condensing Mode of the RHR. The steam condensing mode of the RHR system is a non-safety mode.

G. PPD No. 163C1915: G41-N026 This device performs active functions to assure proper operation of the fuel pool cooling system. This device serves no function relative to LOCA/HELB mitigation.

H. PPD No. 169C8392: C34-N003 The feedwater system is not a safety system and the pressure transmitter does not provide any active safety function. It is passive since the instrument is connected to the primary pressure boundary.

3. Replacement of Rosemount Model 1151

The following MPL was replaced with a Gould Model PD-3018 transmitter:

A. PPD No. 163C1559: C11-N012 (EQ Table 191)

MPL No. E12-C002A/B/C

ENVIRONMENTAL QUALIFICATION TABLE 205

A. TYPE OF EQUIPMENT: Residual Heat Removal (RHR) Motor

B. LOCATION: Auxiliary Building (Rooms 1A103, 1A105, 1A118)

C. MANUFACTURER: Motor: GE

D. MODEL NUMBER: Motor: 5K6339XC186A

E. ABNORMAL ENVIRONMENT:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
0-30 seconds	320	18 psia max	100%	Normal: 5.3×10^3 Rads
30 sec-20 mins	220	18 psia max	100%	DBA: 2.97×10^7 Rads
20 mins-100 days	105	Atmospheric	100%	TID: 2.97×10^7 Rads

F. ENVIRONMENT TO WHICH QUALIFIED:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
*0-6 hrs.	212 (ambient)	--	Steam	5.5×10^6 Rads
*0-6 hrs.	212 (ambient)	--	Steam	
**175 hrs.	311 (winding)	--	100%	

*Test motor was subjected to two 6-hour transients.
**Simulated 100-day test as shown in 491HA988, described in H below.

G. OPERABILITY REQUIREMENTS: Operation for 100 days following event initiation.

H. OPERABILITY DEMONSTRATED: Motor: The 100 days of operation were simulated in actual test for 175 hours at a winding temperature of 383°F, which is equivalent to 100 days at 311°F. The motor successfully passed high potential test and teardown inspection plus full load test during qualification.

I. ACCURACY/RESPONSE TIME REQUIRED:

Not applicable/not specified.

J. ACCURACY AND RESPONSE TIME DEMONSTRATED:

Not applicable/not specified.

ENVIRONMENTAL QUALIFICATION TABLE 205

K. QUALIFICATION METHOD:

Type Test: Equipment was operated for two 6-hour transients at 212°F steam and for 7 days at 383°F, 100% humidity.

Thermal Aging: 56 days at 392°F

Radiation Aging: 5.5×10^6 rads dose

L. QUALIFICATION REPORT:

456HA898 Revision 8
VPF 3929-31-1

491HA988, Revision 0
VPF 3855-25-1

M. CONCLUSION:

The Grand Gulf motor was qualified by similarity to a qualification test motor that was subjected to the environmental qualification test specified herein. The test report referenced includes a similarity analysis. However, Grand Gulf environment exceeds test environment in pressure temperature and radiation for this location. Based on available data, the devices E12-C002A/B/C, does not meet NUREG-0588 Category II requirements.

N. SUPPORTING EVALUATION

Note 1: The abnormal temperature only exceeds the tested temperature for 30 sec. and only 9°F, for such a large motor (1250 hp) this small temperature difference will not have any adverse effects.

Note 2: The abnormal pressure only exceeds the normal pressure for 20 min. and only 4 psi. For such a large motor (1250 hp) this small pressure difference will not have any adverse effects.

Note 3: The abnormal radiation exceeds the tested and normal radiation levels experienced by two of the three RHR motors. Further investigation will be made to try and qualify those motors by analysis. If this cannot be done, the motors will have to be tested.

Note 4: The oil lubricated bearings are not temperature sensitive; the oil can withstand radiation of $2X10^8$ rad based on Mobil tests.

FCR:rf/8F
8/25/81

RHR EQUIPMENT EVALUATION WORKSHEET

Facility: GRAND GULF NUCLEAR STATION
Unit: 1
Docket No.: 50/416

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	SPECIFICATION	QUALIFICATION	SPECIFICATION	QUALIFICATION		
SYSTEM: Residual Heat Removal (RHR)	Operating Time	100 Days	Simulation of 100 days by 175 hour test at 383°F	E12 C002 See Introduction	456HA898	Type Test and Analysis	None
PLANT ID NO.: E12-C002A/B/C	Temperature (°F)						
COMPONENT: Motors	0-30 Sec 30 Sec-20 Min 20 Min-100-Days	320 220 105	0-6 hr. 212°F 100 days @ 150°F	Figure B30	456HA898	Type Test	See Note 1 EQ Table 205
MANUFACTURER: Motor: General Electric	Pressure (PSIA)	18 Max	14.7	Figure B28	456HA898	Type Test	See Note 2 EQ Table 205
MODEL NO.: 5K6339XC186A	Relative Humidity (%)	100	100	Table B6	456HA898	Type Test	None
FUNCTION: Emergency Core Cooling	Flooding Froth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACCURACY: N/A SPEC: N/A	Radiation (Rads)	2.97×10^7	5.5×10^6	Table B8	456HA898	Type Test	See Note 3 EQ Table 205
DEMON: N/A	Aging	Not applicable	Temperature & radiation	Not applicable	456HA898	Type Test	None
SERVICE: Pump Drive							
LOCATION: ROOMS, 1A103, 1A105, & 1A118, Auxiliary Bldg	Containment Spray	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
FLOOD LEVEL ELEV.: Not applicable							
ABOVE FLOOD LEVEL: YES___ NO___							

Equipment is qualified to NUREG 0588

GE/Date

Equipment is not qualified to NUREG 0588

H F Williams 8/26/81
GE/Date

MP&L/Date

Rufus A Brown 8/4/81
MP&L/Date

FCR:rf/BH

ENVIRONMENTAL QUALIFICATION TABLE 206

A. TYPE OF EQUIPMENT: Low Pressure Core Spray (LPCS) Motor

B. LOCATION: Auxiliary Building (Room 1A119)

C. MANUFACTURER: Motor: GE

D. MODEL NUMBER: Motor: 5K6348XC94A

E. ABNORMAL ENVIRONMENT:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
0-100 days	150	Atm.(1)	90%(1)	Normal: 5.3×10^3 Rad DBA: 1.04×10^6 Rads TID: 1.04×10^6 Rads

F. ENVIRONMENT TO WHICH QUALIFIED:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
*0-6 hrs.	212 (ambient)	--	Steam	5.5×10^6 Rads
*0-6 hrs.	212 (ambient)	--	Steam	
**175 hrs.	311 (winding)	--	100%	

*Test motor was subjected to two 6-hour transients.
**Simulated 100-day test as shown in 491HA988, described in H. below.

G. OPERABILITY REQUIREMENTS: Operation for 100 days following event initiation.

H. OPERABILITY DEMONSTRATED: Motor: The 100 days of operation were simulated in actual test for 175 hours at a winding temperature of 383°F, which is equivalent in 100 days at 311°F. The motor successfully passed high potential test and teardown inspection plus full load test during qualification.

I. ACCURACY/RESPONSE TIME REQUIRED:

Not applicable/not specified.

J. ACCURACY AND RESPONSE TIME DEMONSTRATED:

Not applicable/not specified.

(1) Pressure and humidity are non-harsh for this location.

ENVIRONMENTAL QUALIFICATION TABLE 206

K. QUALIFICATION METHOD:

Type Test: Equipment was operated for two 6-hour transients at 212°F steam and for 7 days at 383°F, 100% humidity.

Thermal Aging: 56 days at 392°F

Radiation Aging: 5.5×10^6 Rads

L. QUALIFICATION REPORT:

456HA898 Revision 8
VPF 3929-31-1

491HA988, Revision 0
VPF 3855-25-1

M. CONCLUSION:

The Grand Gulf motor was qualified by similarity to a qualification test motor that was subjected to the environmental qualification test specified herein. The test report referenced includes a similarity analysis. Based on available data, the device, E21-C001, does meet NUREG-0588, Category II requirements.

FCR:rf/8J
8/25/81

LPCS EQUIPMENT EVALUATION WORKSHEET

Facility: GRAND GULF NUCLEAR STATION
Unit: 1
Docket No.: 50/416

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	SPECIFICATION	QUALIFICATION	SPECIFICATION	QUALIFICATION		
SYSTEM: Low Pressure Core Spray (LPCS) PLANT ID NO.: E21-C001 COMPONENT: Motor MANUFACTURER: Motor: General Electric MODEL NO.: 5K6348XC94A FUNCTION: Emergency Core Cooling ACCURACY: N/A SPEC: N/A DEMON: N/A SERVICE: Pump Drive LOCATION: ROOMS, 1A119 Auxiliary Bldg FLOOD LEVEL ELEV.: Not applicable ABOVE FLOLD LEVEL: YES___ NO___	Operating Time	100 Days	Simulation of 100 days by 175 hour test at 383°F	E12 C002 See Introduction	456HA898	Type Test and Analysis	None
	Temperature (°F)	150	0-6 hrs 212°F 100 days @ 150°F	Table B2	456HA898	Type Test and Analysis	None
	Pressure (PSIA)	14.7	14.7	Table B2	456HA898	Type Test	None
	Relative Humidity (%)	90	100	Table B2	456HA898	Type Test	None
	Flooding Froth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
	Radiation (Rads)	1.04×10^6	5.5×10^6	Table B8	456HA898	Type Test	None
	Aging	Not applicable	Temperature & radiation	Not applicable	456HA898	Type Test	None
	Containment Spray	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Equipment is qualified to NUREG 0588 — GE/Date — MP&L/Date

Equipment is not qualified to NUREG 0588 — GE/Date — MP&L/Date

FCR:rf/8N

ENVIRONMENTAL QUALIFICATION TABLE 207

A. TYPE OF EQUIPMENT: High Pressure Core Spray (HPCS) Motor

B. LOCATION: Auxiliary Building (Room 1A[illegible])

C. MANUFACTURER: Motor: GE

D. MODEL NUMBER: Motor: 5K6357XC17A

E. ABNORMAL ENVIRONMENT:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
0-100 days	150	Atm.(1)	90%(1)	Normal: 5.3×10^3 Rads DBA: 2.29×10^5 Rads TID: 2.29×10^5 Rads

F. ENVIRONMENT TO WHICH QUALIFIED:

DURATION	TEMP °F	PRESS.	HUMIDITY	RADIATION
*0-6 hrs.	212 (ambient)	--	Steam	5.5×10^6 Rads
*0-6 hrs.	212 (ambient)	--	Steam	
**175 hrs.	311 (winding)	--	100%	

*Test motor was subjected to two 6-hour transients.
**Simulated 100-day test as shown in 491HA988, described in H. below.

G. OPERABILITY REQUIREMENTS: Operation for 100 days following event initiation.

H. OPERABILITY DEMONSTRATED: Motor: The 100 days of operation were simulated in actual test for 175 hours at a winding temperature of 383°F, which is equivalent to 100 days at 311°F. The motor successfully passed high potential test and teardown inspection plus full load test during qualification.

I. ACCURACY/RESPONSE TIME REQUIRED:

Not applicable/not specified.

J. ACCURACY AND RESPONSE TIME DEMONSTRATED:

Not applicable/not specified.

(1) Pressure and humidity are non-harsh for this location.

ENVIRONMENTAL QUALIFICATION TABLE 207

K. QUALIFICATION METHOD:

Type Test: Equipment was operated for two 6-hour transients at 212°F steam and for 7 days at 383°F, 100% humidity.

Thermal Aging: 56 days at 392°F

Radiation Aging: 5.5×10^6 Rads dose

L. QUALIFICATION REPORT:

456HA898 Revision 8
VPF 3929-31-1

491HA988, Revision 0
VPF 3855-25-1

M. CONCLUSION:

The Grand Gulf motor was qualified by similarity to a qualification test motor that was subjected to the environmental qualification test specified herein. The test report referenced includes a similarity analysis. Based on the available data, the device E22-C001, meets NUREG-0588, Category II requirements.

FCR:rf/8P
8/25/81

HPCS EQUIPMENT EVALUATION WORKSHEET

Facility: GR[illegible] GULF NUCLEAR STATION
Unit: 1
Docket No.: 50/416

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
	PARAMETER	SPECIFICATION	QUALIFICATION	SPECIFICATION	QUALIFICATION		
SYSTEM: High Pressure Core Spray (HPCS)	Operating Time	100 Days	Simulation of 100 days by 175 hour test at 383°F	E12 C002 See Introduction	456HA898	Type Test and Analysis	None
PLANT ID NO.: E22-C001 COMPONENT: Motor	Temperature (°F)	150	0-6 hrs. 212°F 100 days @ 150°F	Table B2	456HA898	Type Test and Analysis	None
MANUFACTURER: Motor: General Electric	Pressure (PSIA)	14.7	14.7	Table B2	456HA898	Type Test	None
MODEL NO.: 5K6357XC17A	Relative Humidity (%)	90	100	Table B2	456HA898	Type Test	None
FUNCTION: Emergency Core Cooling	Flooding	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACCURACY. N/A SPEC: N/A	Froth Radiation (Rads)	2.29×10^6	5.5×10^6	Table B8	456HA898	Type Test	None
DEMON: N/A SERVICE: Pump Drive	Aging	Not applicable	Temperature & radiation	Not applicable	456HA898	Type Test	None
LOCATION: ROOM 1A109 Auxiliary Bldg FLOOD LEVEL ELEV.: Not applicable ABOVE FLOOD LEVEL: YES___ NO___	Containment Spray	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Equipment is qualified to NUREG 0588 [signature] 8/?/81 GE/Date — Rufus? Brown 8/31/81 MP&L/Date

Equipment is not qualified to NUREG 0588 ________ GE/Date ________ MP&L/Date

MPL No. E32-N053
PFD No. 169C8339

ENVIRONMENTAL QUALIFICATION TABLE 183

A. TYPE OF EQUIPMENT: Flow Transmitter

B. LOCATION: Auxiliary Building, MSIV Leakage Control (1A201)

C. MANUFACTURER: Schutte and Koerting (S&K)

D. MODEL NUMBER: 91X-16

E. ABNORMAL ENVIRONMENT:

DURATION	TEMP °F	PRESS. (psi)	HUMIDITY	RADIATION
0-100 day	80(1)	14.7(1) (± 1.0" Wg)	50%(1)	DBA: 2.13×10^5 Rad Normal: 5.3×10^3 Rad TID: 2.18×10^5 Rad

F. QUALIFICATION ENVIRONMENT:

DURATION	TEMP °F	PRESS. (psi)	HUMIDITY	RADIATION
0-6 hrs	212	14.7 (+ 7.0"WC)	100%	TID: 1.0×10^6 Rad

G. OPERABILITY REQUIREMENTS: Device transmits a signal proportional to MSIV leakage flow during bleed-off phase. This device is matched with flow meter E32-N006 (169C8338). It is required for safety and must operate for accident mitigation up to 100 days. (Cat A, FT=I)

H. OPERABILITY DEMONSTRATED: Operability of similar device (163C1107) was demonstrated.

I. ACCURACY/RESPONSE TIME REQUIREMENTS: Electrical output to flow (with 169C3338) ± 2%. Full scale reading, between 10-100% F.S. @ 80°F.

J. ACCURACY/RESPONSE TIME DEMONSTRATED:

Accuracy: ± 1% of full scale at 40°F
± 3% of full scale at 150°F

Note: (1) Temperature, pressure and humidity are non-harsh for this location.

ENVIRONMENTAL QUALIFICATION TABLE 183

(continued)

K. QUALIFICATION METHOD: Tests on similar (See Index A of DV 169C8339) device 163CI107 were conducted. The device passed hydrostatic test at 1800 psig for 10 min duration. Functional tests were conducted at 400F and 1500F with accuracy of ± 1% and ± 3% respectively. GE drawing requires that the device meet environmental conditions listed in item F. In addition, a radiation test was conducted at a level of 1.0×10^6 Rads with no reported failures.

L. QUALIFICATION REPORT: General Electric File DV 169C8339, DRF A00-1043-13, and 163CI107 due to similarity.

M. CONCLUSION: While qualification environment as listed in item F envelopes accident temperature, radiation, pressure and humidity conditions, it is found that it is lacking in duration. Abnormal temperature of 800F for 100 days actually corresponds to normal operating conditions because radiation is the only harsh environment for this device location. IEEE-STD-500 recommends an average value of 2.3×10^{-6} failures/hour (page 475 of Ref. 1). This translates into an expected life of 49 years. Therefore, it is concluded that the device is capable of operating for the accident duration specified in item E. Housing construction for the flow transmitter meets NEMA 4 standards, and hence humidity of 50% will have no effect on the device.

The device is located in the auxiliary building. There is no flood, froth or spray requirement for this device location.

Based upon the available data, the flow transmitter E32-N053 meets NUREG-0588, Category II requirement.

References

1. IEEE-STD-500, "IEEE Guide to the Collection and Presentation of Electrical, Electronic, and Sensing Component Reliability Data for Nuclear Power Generating Stations," published by IEEE, 1977.