GENERAL ELECTRIC

NUCLEAR POWER

SYSTEMS DIVISION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125
MC 682 (408) 925-5040

MFN 091-83
JNF 035-83

May 24, 1983

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

Attention: Mr. D.G. Eisenhut
Division of Licensing

Gentlemen:

SUBJECT: IN THE MATTER OF 238 NUCLEAR ISLAND
GENERAL ELECTRIC STANDARD SAFETY ANALYSIS REPORT (GESSAR II)
DOCKET NO. STN 50-447

SUPPLEMENTAL RESPONSES TO POWER SYSTEMS BRANCH QUESTIONS

Attached please find supplemental responses to selected Power Systems Branch questions. These responses will be included with Amendment Number 15.

Sincerely,

Glenn G. Sherwood, Manager
Nuclear Safety & Licensing Operation

Attachments

cc: F.J. Miraglia (w/o attachments)
D.C. Scaletti
C.O. Thomas (w/o attachments)
L.S. Gifford (w/o attachments)

E003
S
1/1

Limited Dist

Table 8.2-1

NUCLEAR ISLAND AC POWER SYSTEM/BOP INTERFACES

Interface Number*	Interface Description	Maximum Allowable Steady State Load	Actual Inrush kVA (2)	Actual SS Load (3)	Maximum Allowable SC MVA Momentary	INT
E-1 (A-C)	Normal Feeder from BOP to AB 6900-480V XFMR	2550 kVA(1)	3,400	1775 kVA	433	409
E-2 (A-F)	Normal Feeder from BOP to Bus C	7935 HP(4)	51,578	7935 HP	475	450
E-3 (A-C)	Normal Feeder from BOP to AB 6900-480V XFMR	2550 kVA(1)	3,400	1780 kVA	426	402
E-4 (A-F)	Normal Feeder from BOP to Bus D	7935 HP(4)	51,578	7935 HP	490	461
E-5 (A-C)	Normal Preferred or Alternate Preferred Feeder from BOP to HPCS Bus G SWGR	3560 kVA	17,444	83	490	461
E-13 (A-F)	Normal Preferred Feeder from BOP to Bus E SWGR	8750 kVA(5)	10.423	5907	433	409
E-14 (A-F)	Alternate Preferred Feeder from BOP to Bus E SWGR	8750 kVA(5)	10.423	5907	433	409
E-15 (A-F)	Normal Preferred Feeder from BOP to Bus F SWGR	8750 kVA(5)	10.423	4403	426	402
E-16 (A-F)	Alternate Preferred Feeder from BOP to Bus F SWGR	8750 kVA(5)	10.423	4403	426	402
E-41 (A-C)	Normal Feeder from BOP to RW 6900-480V XFMR	1275 kVA(1)	1,700	684.1	433	409
E-43 (A-C)	Normal Feeder from BOP to RW 6900-480V XFMR	1275 kVA(1)	1,700	250.5	426	402
E-58 (A-B)	250 VDC Feeder to Inverter and SS "K"	50 kVA	---			

*See Figure 8.3-1 for interfaces identified in accordance with these numbers. These interfaces are nondivisional.

Voltage variation = ±5% at the 6900-volt level

Frequency variation = 60 Hz±2

Table 8.2-1

NUCLEAR ISLAND AC POWER SYSTEM/BOP INTERFACES

NOTES:

(1) Value represents 85% of the transformer "AA" rating. Each transformer has an additional 30% capacity (continuous) under forced air cooling conditions.

(2) For unit subtransformer loads, actual inrush kVA is considered as 85% of the transformer "FA" rating. For pumps, inrush kVA = 6.5 x rated horsepower.

(3) Values taken from load summary calculations under normal operating conditions (Mode 2). Exceptions: Interfaces E-13, 14, 15 and 16 LPCS and RHR loads are included.

(4) Pump nameplate rating.

(5) Diesel generator nameplate rating.

Table 8.3-10

NUCLEAR ISLAND ONSITE AC AND DC POWER SYSTEM/BOP INTERFACES

Interface Number	Interface Description	Reference Figure	Maximum Allowable SS HP/kVA	Actual Inrush kVA	Nom Volt.	Freq Hz	Max Allowable SOP VD	Maximum Available SC Current
E-8 (A-C)	6900V Feeder from Bus E, SWGR to BOP Div 1 ESWS SWGR	Figure 8.3-2	2335*	7590	6900	60±2%	8%	41.8 kA
E-11 (A-C)	6900V Feeder from Bus F, SWGR to BOP Div 2 ESWS SWGR	Figure 8.3-2	2335*	7590	6900	60±2%	8%	41.8 kA
E-12 (A-C)	480V Feeder from Bus G1-2 to BOP Div 3 (HPCS) ESWS Pump	Figure 8.3-16S	60	296	480	60±2%	3.75%	25 kA
E-17	480V Feeder from Bus E1-2, MCC to BOP Div 1 DG Fuel Oil Transfer Pump	Figure 8.3-16P	3	25.5	480	60±2%	3.5%	15 kA
E-18	480V Feeder from Bus E1-2, MCC to BOP Div 1 Back up DG Fuel Oil Transfer Pump	Figure 8.3-16P	3	25.5	480	60±2%	3.5%	15 kA
E-20	480V Feeder from Bus F1-2, MCC to BOP Div 2 DG Fuel Oil Transfer Pump	Figure 8.3-16P	3	25.5	480	60±2%	3.5%	15 kA
E-21	480V Feeder from Bus F1-2, MCC to BOP Div 2 Back up DG Fuel Oil Transfer Pump	Figure 8.3-16P	3	25.5	480	60±2%	3.5%	15 kA
E-23	480V Feeder from Bus G1-2, MCC to BOP Div 2 (HPCS) DG Fuel Oil Transfer Pump	Figure 8.3-16S	3	25.5	480	60±2%	3.75%	15 kA
E-24	480V Feeder from Bus G1-2, MCC to BOP Div 3 (HPCS) Back up DG Fuel Oil Transfer Pump	Figure 8.3-16S	3	25.5	480	60±2%	3.75%	15 kA
E-25	480V Feeder from Bus G1-2, MCC to BOP Div 3 (HPCS) ESWS Strainer Motor	Figure 8.3-16S	1	8	480	60±2%	3.75%	15 kA
E-44	480V Feeder from Bus G1-2, MCC to BOP Div 3 (HPCS) ESWS Backwash Strainer Valve	Figure 8.3-16S	3	25.5	480	60±2%	3.75%	15 kA
E-49	480V Feeder from Bus G1-2, MCC to BOP Div 3 (HPCS) ESWS Return Header Isolation Valve	Figure 8.3-16S	1	8	480	60±2%	3.75	15 kA

*This figure includes an allowance for an additional ESW Pump (1133 HP) which can be connected manually by the operator. Actual steady state load for 6900V feeder from buses E and F is 1202 for each feeder.

Table 8.3-10 (Continued)

NUCLEAR ISLAND ONSITE AC AND DC POWER SYSTEM/BOP INTERFACES

Interface Number	Interface Description	Reference Figure	SS HP/kVA	Inrush kVA	Nom Volt.	Freq Hz	Max Allowable BOP VD	Maximum Available SC Current
E-59	480V Feeder from Bus E1-2, MCC to BOP Div 1 Fuel Oil Storage Tank Receptacle	Figure 8.3-16P	15	--	480	60±2%	3.5%	25 kA
E-60	480V Feeder from Bus F1-2, MCC to BOP Div 2 Fuel Oil Storage Tank Receptacle	Figure 8.3-16P	15	--	480	60±2%	3.5%	25 kA
E-61	480V Feeder from Bus G1-2, MCC to BOP Div 3 (HPCS) DG Fuel Oil Storage Tank Receptacle	Figure 8.3-16S	15	--	480	60±2%	3.5%	25 kA
E-50 - E-55	480V Feeder from MCC B1-1 to Steam-line Drain Valves	Figure 8.3-16C & D	7.5	48	480	60±2%	3.5%	35 kA
E-74	From Recirc Pump "A" Current Transformer to BOP Switchgear Device	Figure 8.3-3a	5A	--	--	60±2%	--	--
E-76	From Recirc Pump "B" Current Transformer to BOP Switchgear Device	Figure 8.3-3a	5A	--	--	60±2%	--	--
E-82	ESW Pump Station Div 3 Area Supply from GE Div 3 MCC-G1-2	Figure 8.3-16S	2	20	480	60±2%	3.75%	15 kA
E-84 (95)	Power Feed for Excess Water Pump A, (B) (Radwaste) G17 from MCC A3-1	Figure 8.3-16F	25	140	480	60±2%	5%	35 kA
E-86 (87)	Power Feed for MOV "A" ("B") G17 from MCC A3-1	Figure 8.3-16F	0.5	5	480	60±2%	3.75%	15 kA
E-93 - E-111	120 Volt AC Feeder from Bus J1 to Audio Alarms	I211	Signal	--	120 (AC)	--	--	--
E-34 (A-D)	125 VDC Battery Test Feeder from Div 1 Battery (E) to BOP	Figure 8.3-18	350A	--	125 VDC	--	4%	20 kA
E-35 (A-B)	125 VDC Battery Test Feeder from Div 4 Battery (H) to BOP	Figure 8.3-19	150A	--	125 VDC	--	4%	15 kA
E-36 (A-D)	125 VDC Battery Test Feeder from Div 2 Battery (F) to BOP	Figure 8.3-18	250A	--	125 VDC	--	4%	15 kA

Table 8.3-10 (Continued)

NUCLEAR ISLAND ONSITE AC AND DC POWER SYSTEM/BOP INTERFACES

Interface Number	Interface Description	Reference Figure	SS HP/kVA	Inrush kVA	Nom Volt.	Freq Hz	Max Allowable BOP VD	Maximum Available SC Current
E-38 (A-D)	125 VDC Battery Test Feeder from Div 3 Battery (G) to BOP	Figure 8.3-18	100A	--	125 VDC	--	4%	
E-79	ESW Pump Station Div 3 Area Supply Fan "D" from GE Div 3 MCC G1-2	Figure 8.3-16S	2	20	480	60±2%	3.75%	15 kA
E-80	FDR to ESW Pump Station Div 3 CPT FDR	Figure 8.3-16S	5	--	480	60±	3.75%	
E-6 (A-B)	125 VDC Control FDR from Bus DC-E SWGR to ESWS SWGR	Figure 8.3-18	6	31	125	--	8%	20 kA
E-9 (A-B)	125 VDC Control FDR from Bus DC-F SWGR to WSWS SWGR	Figure 8.3-18	6	31	125	--	8%	15 kA

19.3.8.5 QUESTION/RESPONSE 8.5 (430.04) (Continued)

and isolate these buses from the BOP. The feeder undervoltage relaying provides a second level of undervoltage protection which satisfy the following requirements as stated in PSB-1.]

B.1.a The selection of undervoltage and time delay setpoints will be determined from an analysis of the voltage requirements of the Class 1E loads at all onsite system distribution levels;

B.1.b.1) The GESSAR II design provides a time delay setting for the feeder undervoltage relaying to ensure the existence of a sustained degraded voltage condition.

Following this delay, an alarm in the control room will alert the operator to the degraded condition. The operator would have the option, if necessary, to separate the Class 1E distribution system from the degraded offsite power system and perform a manual bus transfer to the other offsite power source or the diesel-generator. A second time delay is initiated by the first alarm. If the undervoltage still exists at the end of the second time delay, the system will be automatically separated from the off-site power system. Receipt of a LOCA signal at any time during the second timing period will result in an immediate trip of the supply breaker from the off-site power source.]

Note that there are two time delays associated with the degraded voltage protection. The first time delay allows transient undervoltages to clear before initiating the second time delay. If the degraded]

19.3.8.5 QUESTION/RESPONSE 8.5 (430.04) (Continued)

voltage still persists at the time end of the first time delay, the second time delay before tripping is initiated to allow the operator to take manual corrective action.

19.3.8.5 QUESTION/RESPONSE 8.5 (430.04) (Continued)

B.1.b.2) The GESSAR II provides a second time delay.

B.1.C.1 &2) GESSAR II complies. Refer to Figure 8.3-2 "6900 volt Single Line Buses E & F," and Figure 8.3-14a, "HPCS Power System Simplified - One Line Diagram."

B.1.C.3 ~~Division 1 and 2~~

GESSAR II complies. (Design details will be provided before the first Applicant references GESSAR II.)

B.1.C.4 The voltage sensors (feeder undervoltage relaying) automatically initiate the disconnection of the offsite power sources whenever the voltage setpoint and the second time delay limits have been exceeded.

B.1.C.5 The GESSAR II design provides means for device testing and calibrating during plant operation.

B.1.C.6 GESSAR II complies.

B.1.d The Technical Specifications will include limiting conditions for operations, surveillance requirements and will be provided by the Applicants.

The trip setpoints and the allowable values for the second level voltage protection sensors and associated time delay devices are plant-unique items, which will be provided by the Applicant.

19.3.8.5 QUESTION/RESPONSE 8.5 (430.04) (Continued)

Paragraph B.2

The GESSAR II design complies. For Division 1 and 2, the load shedding scheme is never bypassed. Bus transfer is always initiated at a bus voltage of 70% of rated by tripping the supply breaker. Load shed is then initiated at 30% of rated. This complies with the second paragraph of Section B.2 of PSB-1. There is no load shedding for the HPCS. It block starts the entire connected load.

Paragraph B.3

A voltage drop calculation was performed which shows that all safety related buses down to the 480V level provide full load operation voltages for safe continuous operation of all energized loads, based on a BOP supply voltage of 6.9KV $\pm$5%.

These calculations must be confirmed and checked when data for the actual electrical equipment to be used is available. The results of the final calculations will be provided by the Applicant.

Ppargraph B.4

This recommended testing procedure will be addressed by the Applicant in the pre-operational test procedures in accordance with the requirements of PSB-1, Section B.4.