C. Poslusny

52-001

GE Nuclear Energy

ABWR

Date 6/4/92

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This page plus 29 page(s)

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Subject Response to Question 3 of ACRS letter and exemption requests from SDC 56

Message

As we discussed

D050
1/1

Comment In Letter From ACRS To NRC On GE ABWR DSER (04/18/92)

8. Protection of Environmentally Sensitive Equipment

The ABWR makes extensive use of environmentally sensitive equipment (including solid-state electronic components) for essential protection, control, and data transmission functions. Such components are known to be susceptible to adverse environmental changes, particularly temperature extremes. We are concerned that a number of these components may be located in plant areas where postulated events such as pipe breaks, fire, internal flooding, or loss of room cooling may create an adverse environment. The response of such components to the environmental change may be unpredictable and lead to unacceptable system interactions or responses. Such environments need to be identified in the SSAR to ensure appropriate environmental qualification of the equipment.

Response to Item 3, Protection of Environmentally Sensitive Equipment

The design philosophy for essential digital equipment of the ABWR emphasizes the development of qualified and tested equipment that is proven to be protected against thermal effects and other failure causes for the intended HVAC environment with an added margin for safety. The attached Tables 1, 2, 3, and 4 list the identity and location of this environmentally sensitive equipment (other than the main operator control console and process computer).

The SSAR, in Section 3.11, defines the environmental conditions with respect to limiting design conditions for safety-related electrical equipment, and documents the qualification methods and procedures employed to demonstrate the capability of this equipment to perform safety-related functions when exposed to the environmental conditions in their respective locations. Appendix 3I of the SSAR gives the equipment qualification environmental design criteria and describes the environmental condition parameters for the various plant zones.

ABWR equipment that performs essential protection functions is installed only in areas with mild environments. However, to ensure reliable operation under unfavorable conditions, essential ABWR equipment activated by microprocessor-based or other solid-state electronic components utilizes a defense-in-depth concept that results in several levels of protection against the effects of adverse environments.

Separation and Distribution of Components

At the system level, four separated, independent and redundant divisions of protection logic and sensors are established. In the Reactor Building, the data acquisition electronics and actuator control electronics for each division are located in separate, "clean", areas with controlled environments. In the main control room area, the divisions of protection logic are also separated and operate in a controlled environment. All data communications between the main control room area and Reactor Building is via fiber optic cables [final trip outputs to the scram pilot valve solenoids and Main Steam Isolation Valve (MSIV) solenoids are hardwired]. The fiber optic cables will have a fire-retarding protective covering per IEEE 383.

Separation of essential divisional instrumentation conforms to IEEE 384 and Regulatory Guide 1.75. Three-hour fire barriers are provided between equipment rooms in the Reactor Building. These fire barriers are not provided in the main control room; there is, however, considerable separation provided by the location of the divisional back panels around the main control area and non-divisional panels (see Figure 1). In addition, the effect of total equipment loss is minimized by the availability of the Remote Shutdown System.

All critical actuation functions for safety-related systems depend on a 2-out-of-4 voting scheme in each of the four divisions. The trip status of the four redundant sensors for each measured variable is transmitted among all divisions of logic over electrically-independent, fiber optic cables. For reactor trip (scram) and MSIV closure, the trip outputs of each division of logic are also voted as 2-out-of-4 so that only a confirmed trip results in action by the final actuators.

In both cases of 2-out-of-4 voting, a failed or degraded channel can be removed from service by manually bypassing the logic to a 2-out-of-3 condition. Operation in the presence of various degraded environments is as follows:

a. If adverse conditions, such as fire, flood or loss of HVAC occur in one protection division in the Reactor Building, the division will be isolated from the trip logic by means of the bypass function.
b. Loss of any one divisional equipment cabinet in the main control room would not disable all safety functions. The fail-safe (de-energize-to-operate) reactor trip and MSIV closure functions would still be available after loss of power or signal transmission. Even if the failure caused the trip output devices to stick closed, the system would effectively remain in a 2-out-of-3 condition. Loss of ECCS initiation outputs in any one division is mitigated by the availability of other emergency cooling systems (independent ECCS in Div. 1, 2, and 3).
c. In a control room accident that results in the failure of multiple protection divisions, the Remote Shutdown System and manual scram capability separate from the electronic instrumentation provide emergency backup capability.

Error Detection

Microprocessor-based equipment can fail in complex and subtle ways, but only errors in the critical data path must be trapped in order to prevent false outputs to the equipment actuators.

Continuous, on-line, self-diagnostics within each microprocessor-based controller provide error detection of lost or corrupted data or broken cables throughout the safety system channels. If a fire or flood in a Reactor Building area damages the data transmission capability of a division of instrumentation, the errors are detected and the failure is annunciated in the control room.

Error detection capability includes data checks (reasonableness, bounds checking), RAM and ROM checks, program flow checks and program timing via watchdog timers. System hardware is also monitored for shorted, open, and oscillating inputs and outputs, and high or low power supply voltages.

In addition to direct detection of data errors, fire detection devices (smoke detectors and product-of-combustion detectors) located in the divisional Emergency Electrical Equipment Rooms in the Reactor Buildingwill alert the operator in the main control room to fire in the area.

Robust Component Design

All solid-state components for the protection systems will be qualified for Class 1E service and a 190 year qualified radiation life in the location where they are installed. Low power semiconductor technology (CMOS, low-power Schottky, etc.) will be employed to the maximum extent possible. All equipment will be designed to operate with loss of HVAC; cooling fans are not specified as part of the cabinet design. Normal operation is presently specified from 5-50 °C (75 °C test) and 0-90% RH, non-condensing. However, all Class 1E equipment will be designed with MIL-SPEC semiconductors that meet MIL-STD 883C. These components are hermetically-sealed and will operate to 110 °C (125 °C test).

Table 1. Division I Essential I&C Equipment

Equipment	Location	Environment
Remote Multiplexing Units with: - Analog signal conditioning - A/D converter - Contact closure inputs and outputs - Mux control interface	Reactor Building Div. I Emergency Electrical Equipment Room (outside secondary containment).	Cooled by essential Div. I HVAC. Non-radioactive area. No piping through area. Protected by 3-hour fire barriers.
Fiber optic multiplexing cables	Between Reactor Building and main control room in Div. I cable trays or conduit.	Non-radioactive areas. No cables run in primary containment.
Control Room Multiplexing Units with: - Serial I/O - Parallel I/O - Mux control interface	Main control room Div. I back panel area.	Cooled by two redundant safety-related HVAC systems.
Safety System Logic and Control cabinets with: - Digital Trip Modules - Trip Logic Unit - Safety System Logic - Units - Output Logic Units - Load Drivers - Bypass Control Unit - Surveillance Test Controller	Main control room Div. I back panel area. Separated from other divisions by main control area and non-divisional panels.	Cooled by two redundant safety-related HVAC systems.
Fiber optic interdivisional data links	Main control room - optical transmission medium provides electrical and physical isolation.	Cooled by two redundant safety-related HVAC systems.

Table 2. Division II Essential I&C Equipment

Equipment	Location	Environment
Remote Multiplexing Units with: - Analog signal conditioning - A/D converter - Contact closure inputs and outputs - Mux control interface	Reactor Building Div. II Emergency Electrical Equipment Room (outside secondary containment).	Cooled by essential Div. II HVAC. Non-radioactive area. No piping through area. Protected by 3-hour fire barriers.
Fiber optic multiplexing cables	Between Reactor Building and main control room in Div. II cable trays or conduit.	Non-radioactive areas. No cables run in primary containment.
Control Room Multiplexing Units with: - Serial I/O - Parallel I/O - Mux control interface	Main control room Div. II back panel area.	Cooled by two redunda safety-related HVAC systems.
Safety System Logic and Control cabinet with: - Digital Trip Modules - Trip Logic Unit - Safety System Logic - Units - Output Logic Units - Load Drivers - Bypass Control Unit - Surveillance Test Controller	Main control room Div. II back panel area. Separated from other divisions by main control area and non-divisional panels.	Cooled by two redundant safety-related HVAC systems.
Fiber optic interdivisional data links	Main control room - optical transmission medium provides electrical and physical isolation.	Cooled by two redundant safety-related HVAC systems.

Table 3. Division III Essential I&C Equipment

Equipment	Location	Environment
Remote Multiplexing Units with: - Analog signal conditioning - A/D converter - Contact closure inputs and outputs - Mux control interface	Reactor Building Div. III Emergency Electrical Equipment Room (outside secondary containment).	Cooled by essential Div. III HVAC. Non-radioactive area. No piping through area. Protected by 3-hour fire barriers.
Fiber optic multiplexing cables	Between Reactor Building and main control room in Div. III cable trays or conduit.	Non-radioactive areas. No cables run in primary containment.
Control Room Multiplexing Units with: - Serial I/O - Parallel I/O - Mux control interface	Main control room Div. III back panel area.	Cooled by two redundant safety-related HVAC systems.
Safety System Logic and Control cabinets with: - Digital Trip Modules - Trip Logic Unit - Safety System Logic - Units - Output Logic Units - Load Drivers - Bypass Control Unit - Surveillance Test Controller	Main control room Div. III back panel area. Separated from other divisions by main control area and non-divisional panels.	Cooled by two redundant safety-related HVAC systems.
Fiber optic interdivisional data links	Main control room - optical transmission medium provides electrical and physical isolation.	Cooled by two redundant safety-related HVAC systems.

Table 4. Division IV Essential I&C Equipment

Equipment	Location	Environment
Remote Multiplexing Units with: - Analog signal conditioning - A/D converter - Contact closure inputs and outputs - Mux control interface	Reactor Building Div. IV area (outside secondary containment, adjacent to, but physically isolated from, Div. 1 Emergency Electrical Equipment Room).	Cooled by essential Div. II HVAC. Non-radioactive area. No piping through area. Protected by 3-hour fire barriers.
Fiber optic multiplexing cables	Between Reactor Building and main control room in Div. IV cable trays or conduit.	Non-radioactive areas. No cables run in primary containment.
Control Room Multiplexing Units with: - Serial I/O - Parallel I/O - Mux control interface	Main control room Div. IV back panel area.	Cooled by tw redundant safety-related HVAC systems.
Safety System Logic and Control cabinets with: - Digital Trip Module - Trip Logic Unit - Output Logic Units - Load Drivers - Bypass Control Unit - Surveillance Test Controller	Main control room Div. IV back panel area. Separated from other divisions by main control area and non-divisional panels.	Cooled by two redundant safety-related HVAC systems.
Fiber optic interdivisional data links	Main control room - optical transmission medium provides electrical and physical isolation.	Cooled by two redundant safety-related HVAC systems.

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

CONTAINMENT ATMOSPHERE MONITORING

Valve No.	D23-F001A/B	D23-F004A/B	D23-F005A/B	D23-F006A/B	D23-F007A/B	D23-F008A/B
SSAR Fig	7.6-7c	7.6-7c	7.6-7c	7.6-7c	7.6-7c	7.6-7c
Applicable Basis	GDC 56(x) RG 1.11	GDC 56(x)	GDC 56(x)	GDC 56(x)	GDC 56(x)	GDC 56(x)
Fluid	DW Atmos	DW Atmos	DW Atmos	WW Atmos	WW Atmos	WW Atmos
Line Size	20A	20A	20A	20A	20A	20A
ESF	No	No	No	No	No	No
Leakage Class	(a)	(a)	(a)	(a)	(a)	(a)
Location	O	O	O	O	O	O
Type C Leak Test	No(m)	No(f)	No(f)	No(f)	No(f)	No(f)
Valve Type	Gate	Globe	Globe	Globe	Globe	Globe
Operator	Solenoid	Manual	Manual	Manual	Manual	Manual
Pri. Actuation	Elec.	Elec.	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	N/A	N/A	N/A	N/A	N/A	N/A
Normal Position	Open	Shut	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut	Shut	Shut
Post Acc Position	Open	Open	Open	Open	Open	Open
Pwr Fail Position	As is	As is	As is	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A	N/A	N/A	N/A
Pwr Source (Div)	I/II	I/II	I/II	I/II	I/II	I/II

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

CONTAINMENT ATMOSPHERE MONITORING (Continued)

Valve No.	D23-F009A/B	D23-F010A/B	D23-F011A/B	D23-F012A/B	D23-F013A/B	D23-F014A/B
SSAR Fig	7.6-7c	7.6-7c	7.6-7c	7.6-7c	7.6-7c	7.6-7c
Applicable Basis	GDC 56(×)	GDC 56(×)	GDC 56(×)	GDC 56(×)	GDC 56(×)	GDC 56(×)
Fluid	DW Atmos	DW Atmos	DW Atmos	WW Atmos	WW Atmos	WW Atmos
Line Size	20A	20A	20A	20A	20A	20A
ESF	No	No	No	No	No	No
Leakage Class	(a)	(a)	(a)	(a)	(a)	(a)
Location	O	O	O	O	O	O
Type C Leak Test	No(f)	No(f)	No(f)	No(f)	No(f)	No(f)
Valve Type	Globe	Globe	Globe	Globe	Globe	Globe
Operator	N/A	N/A	N/A	N/A	N/A	N/A
Pri. Actuation	Manual	Manual	Manual	Manual	Manual	Manual
Sec. Actuation	N/A	N/A	N/A	N/A	N/A	N/A
Normal Position	Open	Open	Open	Open	Open	Open
Shutdown Position	Open	Open	Open	Open	Open	Open
Post Acc Position	Open	Open	Open	Open	Open	Open
Pwr Fail Position	N/A	N/A	N/A	N/A	N/A	N/A
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A	N/A	N/A	N/A
Pwr Source (Div)	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

RESIDUAL HEAT REMOVAL SYSTEM
WETWELL SPRAY

Valve No.	E11-F019B	E11-F019C
SSAR Fig	5.4-10e	5.4-10g
Applicable Basis	GDC 56(२)	GDC 56(२)
Fluid	Water	Water
Line Size	100A	100A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	No(g)	No(g)
Valve Type	Gate	Gate
Operator	Motor	Motor
Pri. Actuation	Elec.	Elec.
Sec. Actuation	Manual	Manual
Normal Position	Closed	Closed
Shutdown Position	Closed	Closed
Post Acc Position	Closed	Closed
Pwr Fail Position	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A
Closure Time (sec)	20	20
Pwr Source (Div)	II	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

RESIDUAL HEAT REMOVAL SYSTEM (Continued)
DRYWELL SPRAY

Valve No.	E11-F017B	E11-F018B	E11-F017C	E11-F018C
SSAR Fig	5.4-10e	5.4-10e	5.4-10g	5.4-10g
Applicable Basis	GDC 56(f)	GDC 56(f)	GDC 56 (f)	GDC 56 (f)
Fluid	Water	Water	Water	Water
Line Size	250A	250A	250A	250A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(g)	No(g)	No(g)	No(g)
Valve Type	Globe	Gate	Globe	Gate
Operator	Motor	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual	Manual
Normal Position	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut	Shut
Pwr Fail Position	As is	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A
Closure Time (sec)	50	50	50	50
Pwr Source (Div)	II	II	III	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

RESIDUAL HEAT REMOVAL SYSTEM (Continued)
MINIMUM FLOW LINE

Valve No.	E11-F021A	E11-F021B	E11-F021C
SSAR Fig	5.4-10c	5.4-10d	5.4-10f
Applicable Basis	GDC 56(y)	GDC 56 (y)	GDC 56 (y)
Fluid	Water	Water	Water
Line Size	100A	100A	100A
ESF	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)
Location	O	O	O
Type C Leak Test	No(h)	No(h)	No(h)
Valve Type	Gate	Gate	Gate
Operator	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual
Normal Position	Open	Open	Open
Shutdown Position	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut
Pwr Fail Position	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A
Closure Time (sec)	20	20	20
Pwr Source (Div)	I	II	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

RESIDUAL HEAT REMOVAL SYSTEM (Continued)
S/P COOLING

Valve No.	E11-F008A	E11-F031A	E11-F008B	E11-F031B	E11-F008C	E11-F031C
SSAR Fig	5.4-10e	5.4-10c	5.4-10d	5.410d	5.4-10f	5.4-10f
Applicable Basis	GDC 56(y)	GDC 56(y)	GDC 56(y)	GDC 56(y)	GDC 56(y)	GDC 56(y)
Fluid	Water	Water	Water	Water	Water	Water
Line Size	200A	100A	200A	100A	200A	100A
ESF	Yes	Yes	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)	(a)	(a)
Location	O	O	O	O	O	O
Type / Leak Test	No(j)	No(j)	No(j)	No(j)	No(j)	No(j)
Valve Type	Globe	Globe	Globe	Globe	Globe	Globe
Operator	Motor	Motor	Motor	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual	Manual	Manual	Manual
Normal Position	Shut	Shut	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut	Shut	Shut	Shut
Pwr Fail Position	As is	As is	As is	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A	N/A	N/A
Closure Time (sec)	50	20	50	20	50	20
Pwr Source (Div)	I	I	II	II	III	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

RESIDUAL HEAT REMOVAL SYSTEM (Continued)
S/P SUCTION (LPFL)

Valve No.	E11-F001A	E11-F001B	E11-F001C
SSAR Fig	5.4-10c	5.4-10d	5.4-10f
Applicable Basis	GDC 56 (y)	GDC 56 (y)	GDC 56 (y)
Fluid	Water	Water	Water
Line Size	450A	450A	450A
ESF	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)
Location	O	O	O
Type C Leak Test	No(i)	No(i)	No(i)
Valve Type	Gate	Gate	Gate
Operator	Motor	Motor	Motor
Prl. Actuation	Elec.	Elec.	Elec
Sec. Actuation	Manual	Manual	Manual
Normal Position	Open	Open	Open
Shutdown Position	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut
Pwr Fail Position	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A
Closure Time (sec)	90	90	90
Pwr Source (Div)	I	II	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

HIGH PRESSURE CORE FLOODER SYSTEM
S/P SUCTION

Valve No.	E22-F006B	E22-F006C
SSAR Fig	6.3-7b	6.3-7b
Applicable Basis	GDC 56 (4)	GDC 56 (4)
Fluid	Water	Water
Line Size	400A	400A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	No(i)	No(i)
Valve Type	Gate	Gate
Operator	Motor	Motor
Prl. Actuation	Elec.	Elec.
Sec. Actuation	Manual	Manual
Normal Position	Shut	Shut
Shutdown Position	Shut	Shut
Post Acc Position	Shut	Shut
Pwr Fail Position	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A
Closure Time (sec)	80	80
Pwr Source (Div)	II	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

HIGH PRESSURE CORE FLOODER SYSTEM (Continued)
TEST AND MINIMUM FLOW

Valve No.	E22-F009B	E22-F010B	E22-F009C	E22-F010C
SSAR Fig	6.3-7b	6.3-7b	6.3-7b	6.3-7b
Applicable Basis	GDC 56 (y)	GDC 56 (y)	GDC 56 (y)	GDC 56 (y)
Fluid	Water	Water	Water	Water
Line Size	100A	75A	100A	75A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(h)	No(h)	No(h)	No(h)
Valve Type	Globe	Gate	Globe	Gate
Operator	Motor	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual	Manual
Normal Position	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut	Shut
Pwr Fail Position	As is	As is	As is	As is
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A
Closure Time (sec)	20	20	20	20
Pwr Source (Div)	II	II	III	III

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

REACTOR CORE ISOLATION COOLING SYSTEM (Continued)
MIN. FLOW AND TEST RETURN

Valve No.	E51-F011	E51-F009
SSAR Fig	5.4-6a	5.4-8a
Applicable Basis	GDC 56(4)	GDC 56(4)
Fluid	Water	Water
Line Size	50A	100A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	No(h)	No(h)
Valve Type	Globe	Globe
Operator	Motor	Motor
Pri. Actuation	Elec.	Elec.
Sec. Actuation	Remote Manual	Remote Manual
Normal Position	Shut	Shut
Shutdown Position	Shut	Shut
Post Acc Position	Shut	Shut
Pwr Fail Position	As is	As is
Cont. Iso. Sig.(c)	RM	RM
Closure Time (sec)	<5	<60
Pwr Source (Div)	1	1

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

REACTOR CORE ISOLATION COOLING SYSTEM (Continued)
S/P SUCTION

Valve No.	E51-F006
SSAR Fig	5.4-8a
Applicable Basis	GDC 56 (4)
Fluid	Water
Line Size	200A
ESF	Yes
Leakage Class	(a)
Location	O
Type C Leak Test	No(i)
Valve Type	Gate
Operator	Motor
Pri. Actuation	Elec.
Sec. Actuation	Remote Manual
Normal Position	Shut
Shutdown Position	Shut
Post Acc Position	Shut
Pwr Fail Position	As is
Cont. Iso. Sig.(c)	RM
Closure Time (sec)	<30
Pwr Source (Div)	I

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

REACTOR CORE ISOLATION COOLING SYSTEM (Continued)
TURBINE EXHAUST

Valve No.	E51-F039	E51-F038
SSAR Fig	5.4-8a	5.4-8a
Applicable Basis	GDC 56(iv)	GDC 56(iv)
Fluid	Steam	Steam
Line Size	350A	350A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	Yes(e)(f)	Yes(f)
Valve Type	Gate	Check
Operator	Motor	Self Actuating
Pri. Actuation	Elec	N/A
Sec. Actuation	Manual	N/A
Normal Position	Locked Open	Shut
Shutdown Position	Open	Open
Post Acc Position	Shut	Shut
Pwr Fail Position	As is	N/A
Cont. Iso. Sig.[c]	RM	N/A
Closure Time (sec)	< 70	Inst.
Pwr Source (Div)	1	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

REACTOR CORE ISOLATION COOLING SYSTEM - (Continued)
VACUUM PUMP DISCHARGE

Valve No.	E51-F047	E51-F046
SSAR Fig	5.4-8a	5.4-8a
Applicable Basis	GDC 56(y)	GDC 56(y)
Fluid	Steam	Steam
Line Size	50A	50A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	No(l)	No(l)
Valve Type	Gate	Check
Operator	Motor	Self-Actuating
Pri. Actuation	Elec.	N/A
Sec. Actuation	Manual	N/A
Normal Position	Locked Open	Shut
Shutdown Position	Open	Open
Post Acc Position	Shut	Shut
Pwr Fail Position	As is	N/A
Cont. Iso. Sig.(c)	RM	N/A
Closure Time (sec)	<10	Inst.
Pwr Source (Div)	I	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM

Valve No.	T31-F001	T31-F002	T31-F003	T31-F004	T31-F005	T31-F006
SSAR Fig	6.2-39a	6.2-39a	6.2-39a	6.2-39a	6.2-39a	6.2-39a
Applicable Basis	GDC 56 (a)	GDC 56 (a)	GDC 56 (a)	GDC 56 (a)	GDC 56 (a)	GDC 56 (a)
Fluid	Air	Air or N2	Air or N2	DW ATMOS	DW ATMOS	WW ATMOS
Line Size (mm)	550A	550A	550A	550A	50A	550A
ESF	Yes	Yes	Yes	Yes	Yes	Yes
Leakage Class	(b)	(b)	(b)	(b)	(b)	(b)
Location	O	O	O	O	O	O
Type C Leak Test	Yes	Yes(e)	Yes(e)	Yes(e)	Yes(e)	Yes(e)
Valve Type	Butterfly	Butterfly	Butterfly	Butterfly	Globe	Butterfly
Operator	Pneum	Pneum	Pneum	Pneum	Pneum	Pneum
Pri. Actuation	Air	Air	Air	Air	Air	Air
Sec. Actuation	N/A	N/A	N/A	N/A	N/A	N/A
Normal Position	Shut	Shut	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut	Shut	Shut	Shut
Pwr Fail Position	Shut	Shut	Shut	Shut	Shut	Shut
Cont. Iso. Sig.(c)	A,K	A,K	A,K	A,K	A,K	A,K
Closure Time (sec)	< 30	< 30	< 30	< 30	< 15	< 30
Pwr Source (Div)	I	II	II	II	II	II

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM (Continued)

Valve No.	T31-F008	T31-F009	T31-F025	T31-F039	T31-F040	T31-F041	T31-F720A/B
SSAR Fig	6.2-39a	6.2-39a	6.2-39a	6.2-39a	6.2-39a	6.2-39a	6.2-39b
Applicable Basis	GDC 56	GDC 56	GDC 56	GDC 56	GDC 56	GDC 56	GDC 57
Fluid	PCV ATMOS	PCV ATMOS	N2	N2	N2	N2	N2
Line Size	250A	550A	400A	50A	50A	50A	20A
ESF	Yes	Yes	Yes	Yes	Yes	Yes	No
Leakage Class	(b)	(b)	(b)	(b)	(b)	(b)	(b)
Location	O	O	O	O	O	O	O
Type C Leak Test	Yes	Yes	Yes	Yes	Yes(e)	Yes(e)	Yes
Valve Type	Butterfly	Butterfly	Butterfly	Globe	Globe	Globe	Gate
Operator	Pneum	Pneum	Pneum	Pneum	Pneum	Pneum	Solenoid
Pri. Actuation	Air	Air	Air	Air	Air	Air	Elec.
Sec. Actuation	-	-	-	-	-	-	-
Normal Position	Shut	Shut	Shut	Open	Open	Open	Shut
Shutdown Position	Shut	Shut	Shut	Shut	Shut	Shut	Shut
Post Acc Position	Shut	Shut	Shut	Shut	Shut	Shut	Shut
Pwr Fail Position	Shut	Shut	Shut	Shut	Shut	Shut	Shut
Cont. Iso. Sig.(c)	A,K	A,K	A,K	A,K	A,K	A,K	A,K
Closure Time (sec)	<30	<30	<30	<15	<15	<15	<5
Pwr Source (Div)	I	I	I	I	II	II	II

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM (Continued)

Valve No.	T31-F730	T13-F732A/B	T13-F734A-D
SSAR Fig	6.2-39b	6.2-39b	6.2-39b
Applicable Basis	GDC56(y) RG 1.11	GDC 56(y) RG 1.11	GDC 56(y) RG 1.11
Fluid	DW ATMOS	DW ATMOS	DW ATMOS
Line Size	20A	20A	20A
ESF	No	No	No
Leakage Class	(a)	(a)	(a)
Location	O	O	O
Type C Leak Test	No(m)	No(m)	No(m)
Valve Type	Globe	Globe	Globe
Operator	N/A	N/A	N/A
Pri. Actuation	Manual	Manual	Manual
Sec. Actuation	N/A	N/A	N/A
Normal Position	Open	Open	Open
Shutdown Position	Open	Open	Open
Post Acc Position	Open	Open	Open
Pwr Fail Position	N/A	N/A	N/A
Cont. Iso. Sig.(c)	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A
Pwr Source (Div)	N/A	N/A	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM (Continued)

Valve No.	T31-F736A/B	T31-F738A-D	T31-F740A-D	T31-F742A/B
SSAR Fig	6.2-39b	6.2-39b	6.2-39b	6.2-39b
Applicable Basis	GDC 56(4) RG 1.11	GDC 56(4) RG 1.11	GDC 56(4) RG 1.11	GDC 56(4) RG 1.11
Fluid	WW ATMOS	WW ATMOS	SP H_2O	WW ATMOS
Line Size	20A	20A	20A	20A
ESF	No	No	No	No
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(m)	No(m)	No(m)	No(m)
Valve Type	Globe	Globe	Globe	Globe
Operator	Manual	Manual	Manual	Manual
Pri. Actuation	N/A	N/A	N/A	N/A
Sec. Actuation	N/A	N/A	N/A	N/A
Normal Position	Open	Open	Open	Open
Shutdown Position	Open	Open	Open	Open
Post Acc Position	Open	Open	Open	Open
Pwr Fail Position	N/A	N/A	N/A	N/A
Cont. Iso. Sig.(c)	N/A	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A	N/A
Pwr Source (Div)	N/A	N/A	N/A	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM (Continued)

Valve No.	T31-F744A/B	T31-F800A/B	T31-F802A/B
SSAR Fig	6.2-39b	6.2-39b	6.2-39b
Applicable Basis	GDC 57 RG 1.11	GDC 56 (b) RG 1.11	GDC 56 (b) RG 1.11
Fluid	SP H_2O	DW ATMOS	DW ATMOS
Line Size	20A	20A	20A
ESF	No	No	No
Leakage Class	(b)	(b)	(b)
Location	O	O	O
Type C Leak Test	No(m)	No(m)	No(m)
Valve Type	Globe	Globe	Globe
Operator	Manual	Manual	Manual
Pri. Actuation	N/A	N/A	N/A
Sec. Actuation	N/A	N/A	N/A
Normal Position	Open	Open	Open
Shutdown Position	Open	Open	Open
Post Acc Position	Open	Open	Open
Pwr Fail Position	N/A	N/A	N/A
Cont. Iso. Sig.(c)	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A
Pwr Source (Div)	N/A	N/A	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

ATMOSPHERIC CONTROL SYSTEM (Continued)

Valve No.	T31-F804A/B	T31-D001	T31-D002
SSAR Fig	6.2-39b	6.2-39a	6.2-39a
Applicable Basis	GDC 56(a) RG 1.11	GDC 56(a)	GDC 56(a)
Fluid	WW ATMOS	WW ATMOS	DW ATMOS
Line Size	20A	350A	350A
ESF	No	Yes	Yes
Leakage Class	(a)	N/A	N/A
Location	O	O	O
Type C Leak Test	No(m)	No(o)	No(o)
Valve Type	Globe	Rupture Disk	Rupture Disk
Operator	Manual	Self	Self
Pri. Actuation	N/A	N/A	N/A
Sec. Actuation	N/A	N/A	N/A
Normal Position	Open	Shut	Shut
Shutdown Position	Open	Shut	Shut
Post Acc Position	Open	Open	Open
Pwr Fail Position	N/A	N/A	N/A
Cont. Iso. Sig.(c)	N/A	N/A	N/A
Closure Time (sec)	N/A	N/A	N/A
Pwr Source (Div)	N/A	N/A	N/A

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

FLAMMABILITY CONTROL SYSTEM

Valve No.	T49-F001A	T49-F001B	T49-F002A	T49-F002B
SSAR Fig	6.2-40	6.2-40	6.2-40	6.2-40
Applicable Basis	GDC 56(ㅂ)	GDC 56(ㅂ)	GDC 56(ㅂ)	GDC 56 (ㅂ)
Fluid	DW ATMOS	DW ATMOS	DW ATMOS	DW ATMOS
Line Size	100A	100A	100A	100A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(u)	No(u)	No(u)	No(u)
Valve Type	Gate	Gate	Gate	Gate
Operator	Motor	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual	Manual
Normal Position	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut
Post Acc Position	Open	Open	Open	Open
Pwr Fail Position	As is	As is	As is	As is
Cont. Iso. Sig.(c)	A,K	A,K	A,K	A,K
Closure Time (sec)	<30	<30	<30	<30
Pwr Source (Div)	I	II	I	II

4.9.9 20%d

TABLE 6.2-7 (Continued)

CONTAINMENT ISOLATION VALVE INFORMATION

FLAMMABILITY CONTROL SYSTEM (Continued)

Valve No.	T49-F006A	T49-F006B	T49-F007A	T49-F007B
SSAR Fig	6.2-40	6.2-40	6.2-40	6.2-40
Applicable Basis	GDC 56(y)	GDC 56(y)	GDC 56(y)	GDC 56 (y)
Fluid	WW ATMOS	WW ATMOS	WW ATMOS	WW ATMOS
Line Size	150A	150A	150A	150A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(u)	No(u)	No(u)	No(u)
Valve Type	Gate	Gate	Gate	Gate
Operator	Motor	Motor	Motor	Motor
Pri. Actuation	Elec.	Elec.	Elec.	Elec.
Sec. Actuation	Manual	Manual	Manual	Manual
Normal Position	Shut	Shut	Shut	Shut
Shutdown Position	Shut	Shut	Shut	Shut
Post Acc Position	Open	Open	Open	Open
Pwr Fail Position	As is	As is	As is	As is
Cont. Iso. Sig.(c)	A,K	A,K	A,K	A,K
Closure Time (sec)	< 30	< 30	< 30	< 30
Pwr Source (Div)	I	II	I	II

TABLE 6.2-7 (Continued)

NOTES (Continued)

(r) The outboard side of these valves is always pressurized with nitrogen gas at a pressure higher than the post accident peak containment pressure. The nitrogen supply in these lines is required for post accident mitigating function.

(s) The outboard side of these valves is always filled with water and pressurized above 110% post accident peak containment pressure. These lines are kept charged with cooling water for cooling emergency equipment necessary for post accident mitigation.

(t) Line will be drained and tested with air.

(u) Flammability Control is a closed loop, safety-grade system required to be functional post accident. Whatever is leaking (if any) is returned to the primary containment. In addition, during ILRT, these valves are opened and the lines are subjected to Type-A test.

(v) These lines terminate below the drywell sumps water level and are sealed from the containment atmosphere.

(w) The outboard side of these valves are provide with a water leg. In addition, these valves are subject to ASME Section XI IWV leak tests.

(X) Exemption requested from GDC 56. See note f for justification.

(Y) Exemption requested from GDC 56. See subsection 6.2.4.3.2.2 for justification

(Z) Exemption requested from GDC 56. See note g for justification.