52-001

GE Nuclear Energy

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July 22, 1992

TO: DISTRIBUTION

FROM: S. L. Kirberg
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SUBJECT: Amendment 21 Reprinted Pages to Correct Disconnects/Discrepancies

Included in this package are copies of non-proprietary page corrections which are to replace those mailed earlier in the Amendment 21 transmittal. The enclosed pages are reprinted back-to-back and/or single sided depending on what was necessary to correct the disconnect/discrepancy. No text changes are included in this mailing.

Following is a list of reprinted non-proprietary pages:

Insert	Comment
3.2-16, 17	3.2-17 - omitted from printing; back-to-back
3.2-18, 18.1	3.2-18.1 - omitted from printing; back-to-back
3.6-5, 5.1	3.6-5 - omitted from printing; back-to-back
6.7-1, 2	6.7-2 - omitted from printing; back-to-back
8.1-5	Stand-alone; one-sided
8.1-6	Stand-alone; one-sided
8.2-5	Stand-alone; one-sided
8.2-6	Stand-alone; one-sided
14.2-ii, iii	Correct page sequence; back-to-back
14.2-viii, ix	Correct page sequence; back-to-back
14.2-3, 3.1	Back-to-back
14.2-12, 12.1	Back-to-back
14.2-66	Page number corrected from 14.2-60; stand-alone; one-sided
20.3-355 - 386	Omitted from printing; stand-alone; one-sided

Note: Pages 7.7-89 - 90, 91 will be processed in Amendment 22, printed back-to-back. Information on Page 7.7-91 will indicate "This page intentionally left blank", Figure 7.7-12, Sheet 3 has been deleted.

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TABLE 3.2-1

CLASSIFICATION SUMMARY (Continued)

		Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Notes
	E3	Leak Detection and Isolation System (Continued)						
260.4		4. Fission Product M	N	SC	---	E	I	
		5. Isolation Valves	2/N	SC	B/C	P/E	I	
		6. Instrument lines	3	C,SC	B	B	I	
430.223		7. Sample lines*	2/N	C,SC	C/D/---	B/E	I/---	
260.4		8. Flow transmitters	N	SC	---	E	---	
		9. Electrical modules	3/N	SC,RZ,X	---	B/E	I/---	
		10. Cables	3/N	SC,RZ,X	---	B/E	I/---	
	E4	RCIC System						
210.20		1. Piping including supports within outermost isolation valves	1/2	C,SC	A/B	B	I	(g)
260.4		2. Piping including supports - discharge line from vacuum pump to containment isolation valves, and discharge line from condensate pump to the first globe valve	N	SC	D	E	---	(g)
210.20		3. Piping including supports beyond outermost isolation valves up to the turbine exhaust line to the suppression pool, including turbine inlet and outlet drain lines	2/3	C,SC	B/C	B	I	(g)

* *These sample lines are totally within containment and the fission product monitor provides no isolation function.*

TABLE 3.2-1

CLASSIFICATION SUMMARY (Continued)

		Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Notes
	E4	**RCIC System** (Continued)						
260.4		4. RCIC Pump and piping including support, CST suction line from the first RCIC motorized valve, S/P suction line to the pump, discharge line up to the FW line "B" thermal sleeve	2	SC	B	B	I	(g)
260.4		5. Pump motors	N	SC	---	E	I	
		6. Valves - outer isola- tion and within	/2	C,SC	A/B	B	I	(g)
260.4		7. Valves - outside the PCV*	2	SC	B	B	I	(g)
		8. Valves - beyond turbine inlet second shutoff	3	SC	C	B	I	(g)
260.4		9. Turbine including supports	2	SC	---	B	I	(m)
		10. Electrical modules with safety-related function	3	C,SC,X	---	B	I	
		11. Cable with safety function	3	C,SC,X	---	B	I	
		12. Other mechanical and electrical modules	N	SC,X	---	E	---	
260.4	F1	**Fuel Servicing Equipment**	N/2	SC	---	E	---	
	F2	**Miscellaneous Servicing Equipment**	N	SC,RZ	---	E	---	

* *Except item 8.*

TABLE 3.2-1

CLASSIFICATION SUMMARY (Continued)

Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Notes
F3 RPV Servicing Equipment	N/2	SC	---	E	---	
F4 RPV Internal Servicing Equipment	N	SC	---	E	---	
F5 Refueling Equipment						
1. Refueling equipment platform assembly	N	SC	---	E	I	(bb) 210.13 430.198a
2. Refueling bellows	N	SC	---	E	---	
F6 Fuel Storage Equipment						
1. Fuel storage racks - new and spent	N	SC	---	E	I	(bb) 210.15
2. Defective fuel storage	N	SC	---	E	---	(bb)
3. Spent fuel pool liner	N	SC	---	E	I	
F7 Under-Vessel Servicing Equipment	N	SC	---	E	---	(bb)
F8 CRD Maintenance Facility	N	SC	---	E	---	
F9 Internal Pump Maintenance Facility	N	SC	---	E	---	
F10 Fuel Cask Cleaning Facility	N	SC	---	E	---	
F11 Plant Start-up Test Equipment	N	M	---	E	---	

26C.4

TABLE 3.2-1

CLASSIFICATION SUMMARY (Continued)

	Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Notes
F12	**Inservice Inspection Equipment**	N	M	---	E	---	
G1	**Reactor Water Cleanup System**						
	1. Vessels including supports (filter/deminrealizer)	N	SC	C	E	---	
	2. Regenerative heat exchangers including supports carrying reactor water	N	SC	C	E	---	
	3. Cleanup recirculation pump, motors	N	SC	C	E	---	

260.4

210.20

requirement for redundant separation is met. Other redundant divisions are available for safe shutdown of the plant and no further evaluation is performed.

(4) If damage could occur to more than one division of a redundant essential system within 30 ft of any high energy piping, other protection in the form of barriers, shields, or enclosures is used. These methods of protection are discussed in Subsection 3.6.1.3.2.3. Pipe whip restraints as discussed in Subsection 3.6.1.3.2.4 are used if protection from whipping pipe is not possible by barriers and shields.

3.6.1.3.2.3 Barriers, Shields, and Enclosures

Protection requirements are met through the protection afforded by the walls, floors, columns, abutments, and foundations in many cases. Where adequate protection is not already present due to spatial separation or existing plant features, additional barriers, deflectors, or shields are identified as necessary to meet the functional protection requirements.

Barriers or shields that are identified as necessity by the use of specific break locations in the drywell are designed for the specific loads associated with the particular break location.

The steam tunnel is made of reinforced concrete 2m thick. A steam tunnel subcompartment analysis was performed for the postulated rupture of a mainsteam line and for a feedwater line (see Subsection 6.2.3.3.1). The peak pressure from a mainsteam line break was found to be 11 psig. The peak pressure from a feedwater line break was found to be 3.9 psig. The steam tunnel is designed for the effects of an SSE coincident with high energy line break inside the steam tunnel. Under this conservative load combination, no failure in any portion of the steam tunnel was found to occur; therefore, a high energy line break inside the steam tunnel will not effect control room habitability.

The MSIVs and the feedwater isolation and check valves located inside the tunnel shall be designed for the effects of a line break. The details of how the MSIV and feedwater isolation and check valves functional capabilities are protected against the effects of these postulated pipe failures will be provided by the applicant referencing the ABWR design (see Subsection 3.6.4.1, item 4 and 6).

Barriers or shields that are identified as necessary by the HELSA evaluation (i.e., based on no specific break locations), are designed for worst-case loads. The closest high-energy pipe location and resultant loads are used to size the barriers.

3.6.1.3.2.4 Pipe Whip Restraints

Pipe whip restraints are used where pipe break protection requirements could not be satisfied using spatial separation, barriers, shields, or enclosures alone. Restraints are located based on the specific break locations determined in accordance with Subsections 3.6.2.1.4.3 and 3.6.2.1.4.4. After the restraints are located, the piping and essential systems are evaluated for jet impingement and pipe whip. For those cases where jet impingement damage could still occur, barriers, shields, or enclosures are utilized.

The design criteria for restraints is given in Subsection 3.6.2.3.3.

3.6.1.3.3 Specific Protection Measures

(1) Nonessential systems and system components are not required for the safe shutdown of the reactor, nor are they required for the limitation of the offsite release in the event of a pipe rupture. However, while none of this equipment is needed during or following a pipe break event, pipe whip protection is considered where a resulting failure of a nonessential system or component could initiate or escalate the pipe break event in an essential system or component, or in another nonessential system whose failure could affect an essential system.

(2) For high energy piping systems penetrating through the containment, isolation valves are located as close to the containment as possible.

(3) The pressure, water level, and flow sensor instrumentation for those essential systems,

which are required to function following a pipe rupture, are protected.

(4) High-energy fluid system pipe whip restraints and protective measures are designed so that a postulated break in one pipe could not, in turn, lead to a rupture of other nearby pipes or components if the secondary rupture could result in consequences that would be considered unacceptable for the initial postulated break.

(5) For any postulated pipe rupture, the structural integrity of the containment structure is maintained. In addition, for those postulated ruptures classified as a loss of reactor coolant, the design leak tightness of the containment fission product barrier is maintained.

(6) Safety/relief valves (SRV) and the reactor core isolation cooling (RCIC) system steamline are located and restrained so that a pipe failure would not prevent depressurization.

6.7 HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM

6.7.1 Functions

The high pressure nitrogen gas supply system is divided into two independent divisions, with each division containing a safety-related emergency stored nitrogen supply. The essential stored nitrogen supply is Safety Class 3, Seismic Category I, designed for operation of the main steam S/R valve ADS function accumulators.

The function of the nonsafety-related, makeup nitrogen gas supply system is.

(1) relief function accumulators of main steam S/R valves,

(2) pneumatically operated valves and instruments inside the PCV,

(3) leak detection system radiation monitor calibration

(4) ADS function accumulators to compensate for the leakage from main steam S/R solenoid valves during normal operation

6.7.2 System Description

Nitrogen gas for the essential system is supplied from high pressure nitrogen gas storage bottles. Nitrogen gas for the nonessential makeup system is supplied from the nitrogen gas evaporator via the makeup line to the atmospheric control (AC) system. The nitrogen supply system shall supply nitrogen which is oil-free with a moisture content of less than 2.5 ppm. The essential system is separated into two divisions. There are tielines between the nonessential and each division of the essential system. Each tieline has a motor operated shutoff valve. For details, see Figure 6.7-1 and Table 6.7-1.

Each division of the essential system has ten bottles. Normally, outlet valves from five of the ten bottles are kept open. Each division has a pressure control valve to depressurize the nitrogen gas from the bottles.

The bottles are mechanically restrained to preclude generation of high-pressure missiles during an SSE. The bottles are also covered by a heavy steel plate, which serves as a barrier to potential missiles.

Flow rate and capacity requirements are divided into an initial requirement and a continuous supply. An initial requirement for each ADS SRV provides for actuations of the valve against drywell pressure. Fifty gallon accumulators supplied for each main steam ADS SRV actuator fulfill the steam valve requirement. The continuous supply is divided into safety and nonsafety portions.

Compressed nitrogen at a rate adequate to make up the nitrogen leakage of each serviced valve is provided by the safety portion. This assumes an air leakage rate for each valve of 1 scfh for a period of at least seven days. The essential system with associated lines, valves and fittings are classified as Safety Class 3, Seismic Category I.

The nonsafety portion provides compressed nitrogen at a rate adequate to recharge the ADS SRV accumulators. The nonessential system has two pressure control valves to depressurize the nitrogen gas from the AC system. One is to depressurize to 200 psi for the SRV accumulators and the other is to depressurize to 100 psi for other pneumatic uses.

The continuous supply portion of the pneumatic system, extending from the AC system to the isolation valve prior to the essential system is not safety related.

Nonsafety piping and valves of the system are designed to ANSI B31.1, Power Piping Code, and the requirements of Quality Group D of Regulatory Guide 1.26. Pressure vessels and heat exchangers are designed to ASME Section VIII, Division I.

System design pressure is 200 psig with the system design temperature at 150^{o}F.

6.7.3 System Evaluation

Vessels, piping and fittings of the safety portion of the system are designed to Seismic

Category I, ASME Code III, Class 3, Quality Group C and Quality Assurance B requirements, except for the piping and valves for the containment and drywell penetrations which are designed to Seismic Category I, ASME Code III, Class 2, Quality Group B and Quality Assurance B requirements.

The essential high pressure nitrogen gas supply is separated into two independent divisions, with each division capable of supplying 100% of the requirements of the division being serviced. Each division is mechanically and electrically separated from the other. The system satisfies the components' nitrogen demands during all plant operation conditions (normal through faulted).

Safety grade portions of the high pressure nitrogen gas supply system are capable of being isolated from the nonsafety parts and retaining their function during LOCA and/or seismic events under which any nonsafety parts may be damaged.

Pipe routing of Division 1 and Division 2 nitrogen gas is kept separated by enough space so that a single fire, equipment dropping accident, strike from a single high energy whipping pipe, jet force from a single broken pipe, internally generated missile or wetting equipment with spraying water cannot prevent the other division from accomplishing its safety function. Separation is accomplished by spatial separation or by a reinforced concrete barrier, to ensure separation of each pneumatic air division from any systems and components which belong to the other pneumatic air division.

6.7.4 Inspection and Testing Requirements

Periodic inservice inspection of components, in accordance with ASME Section XI, to ensure the capability and integrity of the system is mandatory. Nitrogen quality shall be tested periodically to assure compliance with ANSI MC11.1.

The nitrogen isolation valves are capable of being tested to assure their operational integrity by manual actuation of a switch located in the control room and by observation of associated position indication lights. Test and vent connections are provided at the containment isolation valves in order to verify their leaktightness. Operation of valves and associated equipment used to switch from the nonsafety to safety nitrogen supply can be tested to assure operational integrity by manual actuation of a switch located in the control room and by observation of associated position indication lights. Periodic tests of the check valves and accumulators shall be conducted to assure valve operability

6.7.5 Instrumentation Requirements

A pressure sensor is provided for the safety nitrogen supply, and an alarm signals low nitrogen pressure.

A remote manual switch and open-closed position lights are provided in the control room for valve operation and position indication.

8.1.3.1.2.3 Branch Technical Positions

(1) BTP ICSB 4 (PSB) - Requirements on Motor-Operated Valves in the ECCS Accumulator Lines;

This BTP is written for Pressurized Water Reactor (PWR) plants only and is therefore not applicable to the ABWR.

(2) BTP ICSB 8 (PSB) - Use of Diesel generator Sets for Peaking;

The diesel generator sets are not used for peaking in the ABWR design. Therefore, this criteria is satisfied.

(3) BTP ICSB 11 (PSB) - Stability of Offsite Power Systems;

(4) BTP ICSB 18 (PSB) - Application of the Single Failure Criterion to Manually-Controlled Electrically-Operated Valves;

(5) BTP ICSB 21 - Guidance for Application of Regulatory Guide 1.47;

(6) BTP PSB 1 - Adequacy of Station Electric Distribution System Voltages;
[See Subsection 8.3.1.1.7 (8)]

(7) BTP PSB 2 - Criteria for Alarms and Indications Associated with Diesel- Generator Unit Bypassed and Inoperable Status;

8.1.3.1.2.4 Other SRP Criteria

(1) NUREG/CR 0660 - Enhancement of Onsite Diesel Generator Reliability;

Operating procedures and the training of personnel are outside the scope of the ABWR Standard Plant. NUREG/CR 0660 is therefore imposed as an interface requirement for the applicant. See Subsection 8.1.4.2 for interface requirement.

(2) TMI Action Item II.E.3.1. - Emergency Power Supply for Pressurizer Heater;

This criteria is applicable only to PWRs and does not apply to the ABWR.

(3) TMI Action Item II.G.1-Emergency Power for Pressurizer Equipment;

This criteria is applicable only to PWRs and does not apply to the ABWR.

8.1.4 COL License Information

8.1.4.1 Diesel Generator Reliability

NUREG/CR 0660 pertaining to the enhancement of onsite diesel generator reliability through operating procedures and training of personnel will be addressed by the applicant (see Subsection 8.1.3.1.2.4(1)).

8.1.5 References

IEEE Std 944, Recommended Practice for the Application and Testing of Uninterruptible Power Supplies for Power Generating Stations.

TABLE 8.1-1

ON SITE POWER SYSTEM SRP CRITERIA APPLICABLE MATRIX

APPLICABLE CRITERIA	REF. IEEE STD	Offsite Power System	AC PowerSystems (Onsite)	DC Power Systems (Onsite)
GDC 2			X	X
GDC 4			X	X
GDC 5**				
GDC 17		X	X	X
GDC 18		X	X	X
GDC 50			X	X
RG 1.6			X	X
RG 1.9	387		X	
RG 1.32	308	X	X	X
RG 1.47		X	X	X
RG 1.63	317		X	X
RG 1.75	384		X	X
RG 1.81**				
RG 1.106			X	X
RG 1.108			X	
RG 1.118	338		X	X
RG 1.128	484			X
RG 1.129	450			X
RG 1.153	603		X	X
RG 1.155***	NUMARK 8700		X	X
BTP ICSB 4*	279			
BTP ICSB 8	308		X	
BTP ICSB 11		X		
BTP ICSB 18			X	
BTP ICSB 21		X	X	X
BTP PSB 1			X	
BTP PSB 2			X	
NUREG CR0660			X	
II. E. 3.1*				
II. G. 1*				

* PWR only; not applicable to ABWR

** Multi-unit plants only; not applicable to single-unit ABWR

*** See Subsection 19E.2.1.2.2

(11) Although unit synchronization is normally through the low voltage generator circuit breaker, provisions shall be made to synchronize the unit through the switching station's circuit breakers. This makes it possible to re-synchronize with the system following a load rejection within the steam bypass capability of the generating unit.

(12) All relay schemes used for protection of the offsite power circuits and of the switching station's equipment shall be redundant and include backup protection features. All breakers shall be equipped with dual trip coils. Each redundant protection circuit which supplies a trip signal shall be connected to a separate trip coil. All equipment and cabling associated with each redundant system shall be physically separated.

(13) The dc power needed to operate redundant protection and control equipment of the offsite power system shall be supplied from two separate, dedicated switchyard batteries, each with a battery charger fed from a separate ac bus. Each battery shall be capable of supplying the dc power required for normal operation of the switching station's equipment.

(14) Two redundant low voltage ac power supply systems shall be provided to supply ac power to the switching station's auxiliary loads. Each system shall be supplied from separate, independent ac buses. The capacity of each system shall be adequate to meet the ac power requirements for normal operation of the switching station's equipment.

(15) Each transformer shall have primary and backup protective devices. DC power to the primary and backup devices shall be supplied from separate dc sources.

(16) The requirements of IEEE Std 765, Preferred Power Supply for Nuclear Generating Stations, as modified by Section 8.2.2.1(9) of this SSAR shall be met.

8.2.4 Scope Split (Interfaces Requirements)

The interface point between the ABWR design and the COL applicant design for the main generator output is at the connection of the isolated phase bus to the main power transformer low voltage terminals. The rated conditions for this interface is 1500 MVA at a power factor of 0.9 and a voltage of 26.325 kV plus or minus 10 per cent. It is a requirement that the COL applicant provide sufficient impedance in the main power transformer and the high voltage circuit to limit the primary side maximum available fault current contribution from the system to no more than 275 kA symmetrical and 340 kA asymmetrical at 5 cycles from inception of the fault. These values should be acceptable to most COL applicants. When all equipment and system parameters are known, a refined calculation based on the known values with a fault located at the generator side of the generator breaker may be made. This may allow a lower impedance for the main power transformer, if desired.

The second power scope split interface occurs at the high voltage terminals of the reserve auxiliary transformer. The rated load is 37.5 MVA at a 0.9 power factor. The voltage and frequency will be the COL applicants standard with the actual values to be determined at contract award. Tolerances are plus or minus 10 per cent of nominal for voltage and plus or minus 2 per cent of nominal for frequency. Frequency may vary plus or minus 2 cycles per second during periods of recoverable system instability. The maximum allowable voltage dip during the starting of large motors is 20 %.

Protective relaying scope split interfaces for the two power system interfaces are to be defined during the detail design phase following contract award.

8.2.5 References

(1) ANSI Std C37.06, Preferred Ratings and Related Capabilities for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

(2) ANSI Std C57.12.00, General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.

Table 8.2-1
ADDITIONAL REQUIREMENTS
IEEE STD 765

IEEE STD765 Reference	Requirement or Explanatory Note
4.1 General	SSAR Figure 8.3-1 should be used as the reference single line instead of the IEEE Std example, Figures 2, (a), (b) and (c).
4.2 Safety Classification	The redundancy, independence, separation and application of single failure criteria called for in this chapter of the SSAR must be met.
4.3 Function	The ABWR design utilizes direct connection of the two preferred power circuits to the Class 1E buses. One circuit automatically supplies power to the Class 1E buses following an accident.
5.1.2 Transmission System Reliability	Additional analysis is required per Section 8.2.3.1.
5.1.3 Transmission System Independence	
5.1.3.2	Specific requirements for tolerance to equipment failures are stated in the SSAR and must be met.
5.1.3.3	Since a separation of at least 50 feet is required for the exposed circuits, it is not likely that a common takeoff structure will be used.
5.3.2 Class 1E Power System Interface Independence	See 5.1.3.3 comments.
5.3.3 Connections with Class 1E Systems	
5.3.3.2	Manual and automatic dead-bus transfers are used. Automatic live-bus transfers are not required and are not used.
5.3.3.3	Only standby power sources may be paralleled with the preferred power sources for load testing. The available fault current must be less than the rating of the breakers. It is not required and not allowed for the normal and alternate preferred power supply breakers for a bus to be closed simultaneously so there is no time that the available fualt current at a bus exceeds the equipment rating.
7.0 Multi-Unit Considerations	The ABWR is a single unit design, therefore there is no sharing of preferred power supplies between units.

SECTION 14.2

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SECTION 14.2

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SECTION 14.2

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TABLES

ILLUSTRATIONS

designs. During the construction and testing phases of the plant cycle GE personnel are onsite to offer consultation and technical direction with regard to GE supplied systems and equipment. The GE resident site manager is responsible for all GE supplied equipment disposition and as the senior NSSS vendor representative onsite is the official site spokesman for GE. He coordinates with the plant owner's normal and augmented plant staff for the performance of his duties which are as follows:

(1) reviewing and approving all test procedures, changes to test procedures, and test results for equipment and systems within the GE scope of supply;

(2) providing technical direction to the station staff;

(3) managing the activities of the GE site personnel in providing technical direction to shift personnel in the testing and operation of GE supplied systems;

(4) liaison between the site and the GE San Jose home office to provide rapid and effective solutions for problems which cannot be solved onsite; and

(5) participating as a member of the Startup Coordinating Group (SCG). [Note: The official designation of this group may differ for the plant owner/operator referencing the ABWR Standard Plant design and SCG is used throughout this dicussion for illustrative purposes only.]

14.2.2.4 Others

Other concerned parties, outside the plant staff organization, such as the architect-engineer, the constructor, the turbine-generator supplier, and vendors of other system and equipment, will be involved in the testing program to various degrees. Such involvement may be in a direct role in the startup group as discussed above or in an indirect capacity offering consultation or technical direction concerning the testing, operation, or resolution of problems or concerns with equipment and systems for which they are responsible or are uniquely familiar with.

14.2.2.5 Interrelationships and Interfaces

Effective coordination between the various site organizations involved in the test program is achieved through the SCG which is composed of representatives of the plant owner/operator, GE, and others. The duties of the SCG are to review and approve project testing schedules and to effect timely changes to construction or testing in order to facilitate execution of the preoperational and initial startup test programs.

14.2.3 Test Procedures

In general, testing during all phases of the initial test program is conducted using detailed, step by step written procedures to control the conduct of each test. Such test procedures specify testing prerequisites, describe desired initial conditions, include appropriate methods to direct and control test performance (including the sequencing of testing), specify acceptance criteria by which the test is to be evaluated, and provide for or specify the format by which data or observations are to be recorded. The procedures will be developed and reviewed by personnel with appropriate technical backgrounds and experience. This includes the participation of principal design organizations in the establishment of test performance requirements and acceptance criteria. Specifically, GE will provide the plant/operator referencing the ABWR Standard Plant design with scoping documents (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria applicable to its scope of design responsibility. Such documents shall also include, as appropriate, delineation of specific plant operational conditions at which tests are to be conducted, testing methodologies to be utilized, specific data to be collected, and acceptable data reduction techniques. Available information on operating and testing experiences of operating power reactors will be factored into test procedures as appropriate. Test procedures will be reviewed by the SCG and will receive final approval by designated plant management personnel. Approved test procedures for satisfying the commitments of this chapter will be made available to the NRC staff approximately 60 days prior to their intended use for preoperational tests and 60 days prior to scheduled fuel loading for power ascension tests.

14.2.4 Conduct of Test Program

The initial test program is conducted by the startup group in accordance with the startup administrative manual. This manual contains the administrative procedures and requirements that govern the activities of the startup group and their interfaces with other organizations. The startup administrative manual receives the same level of review and approval as do other plant administrative procedures. It defines the specific format and content of preoperational and startup test procedures as well as the review and approval process for both initial procedures and subsequent revisions or changes. The start- up manual also specifies the process for

(i) proper operation of permissive, prohibit, and bypass functions;

(j) proper system operation while powered from primary and alternate sources, including transfers, and in degraded modes for which the system is expected to remain operational;

(k) acceptability of pump/motor vibration levels and system piping movements during both transient and steady state operation;

(l) proper operation of fine motion motors and drives and associated control units, including verification of acceptable normal insert and withdraw timing;

(m) proper operation of hydraulic control units and associated valves including CRD scram timing demonstrations against atmospheric pressure.

System operation is considered acceptable when the observed/measured performance characteristics, from the testing described above, meet the applicable design specifications.

14.2.12.1.7 Rod Control and Information System Preoperational Test

(1) Purpose

To verify that the rod control and information system (RC&IS) functions as designed.

(2) Prerequisites

The construction tests, including initial check-out of RC&IS software, have been successfully completed and the SCG has reviewed the test procedure and has approved the initiation of testing.

(3) General Test Methods and Acceptance Criteria

Performance shall be observed and recorded during a series of tests to demonstrate the following:

(a) proper operation of rod blocks and associated alarms and annunciators in all combinations of logic and instrument channel trip including all positions of the reactor mode switch;

(b) proper operation of control rod run-in logic including that associated with ARI (ATWS), SCRRI and normal post-SCRAM follow-in;

(c) proper functioning of instrumentation used to monitor CRD system status such as rod position indication instrumentation and that used to monitor continuous full-in and rod/drive separation status;

(d) proper operation of RC&IS software including verification of gang and group assignments and predictor-comparator, rod worth limiter, and banked position withdrawal sequence functions; and

(e) proper communication with interfacing systems such as the power generation control system, the automatic power regulator, and the automatic rod block monitor.

System operation is considered acceptable when the observed/measured performance characteristics, from the testing described above, meet the applicable design specifications.

14.2.12.1.8 Residual Heat Removal System Preoperational Test

(1) Purpose

To verify the proper operation of the residual heat removal (RHR) system under its various modes of operation: core cooling, shutdown cooling, wetwell and drywell spray, suppression pool cooling, and supplemental fuel pool cooling.

(2) Prerequisites

The construction tests have been successfully completed and the SCG has reviewed the test procedure and has approved the initiation of testing. The reactor vessel shall be intact and capable of receiving injection flow from the various modes of RHR. The reactor building cooling water system and other required interfacing systems shall be available, as needed, to support the specified testing and the appropriate system configurations.

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20.3.16 Response to Sixteenth RAI - Reference 16

GE PROPRIETARY - provided under separate cover

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