PSE&G Public Service Electric and Gas Company

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Robert L. Mittl General Manager
Nuclear Assurance and Regulation

June 11, 1985

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, MD 20814

Attention: Mr. Walter Butler, Chief
Licensing Branch 2
Division of Licensing

Gentlemen:

SER OUTSTANDING ISSUE NO. 2
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

Pursuant to Hope Creek Generating Station Safety Evaluation Report (SER) Outstanding Issue No. 2, described in SER Section 3.10, Public Service Electric and Gas Company is incorporating the requested information, which was provided in a previous letter (R. L. Mittl to A. Schwencer dated August 20, 1984), into FSAR Sections 3.9, 3.10 and 3.11. It should be noted, the information being incorporated into the FSAR has been revised to reflect the comments received on February 11, 1985 (A. Schwencer to R. L. Mittl letter) with the exception of including the extent to which the draft standards ANSI/ASME QNPE-1 (N551.1), QNPE-2 (N551.2), QNPE-3 (N551.3), QNPE-4 (N551.4) and N41.6 and issued standard ANSI/ASME B.16.41 are used. This information will be provided by August 15, 1985. The attached FSAR changes will be incorporated into Amendment 11 of the HCGS FSAR.

Should you have any questions in this regard, please contact us.

Very truly yours,

R L Mittl

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C D. H. Wagner
USNRC Licensing Project Manager

A. R. Blough
USNRC Senior Resident Inspector

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Following adoption of any corrective measure, the piping system is again tested under the same conditions and evaluated for compliance with the acceptance criteria.

3.9.2.3 Seismic Qualification of Safety-Related NSSS Mechanical Equipment

This section describes the criteria for seismic qualification of safety-related mechanical equipment and the qualification testing and/or analyses applicable to this plant for all the major components on a component-by-component basis. In some cases, a module or assembly of mechanical and electrical equipment is qualified as a unit, e.g., the emergency core cooling system (ECCS) pumps. These modules are generally discussed in this section. Seismic qualification testing for active pumps and valves is also discussed in Section 3.9.3.2. Electrical supporting equipment, such as control consoles, cabinets, and panels, that are part of the NSSS, are discussed in Section 3.10. The seismic test and/or evaluation results for safety-related mechanical equipment are maintained in a permanent file by GE and are readily auditable in all cases.

3.9.2.3.1 Tests and Analysis Criteria and Methods

The ability of equipment to perform its safety-related function during and after an earthquake is demonstrated by tests and/or analyses. Selection of testing, analysis, or a combination of the two is determined by the type, size, shape, and complexity of the equipment being considered. When practical, the safety-related operations are performed simultaneously with vibratory testing. Where this is not practical, operability is demonstrated by mathematical analysis.

> INSERT 1

Equipment that is large, simple, and/or consumes large amounts of power is usually qualified by analysis or static test to show that the loads, stresses, and deflections are less than the allowable maximums. Analysis and/or testing are also used to show there are no natural frequencies below 33 hertz. If a natural frequency lower than 33 hertz is discovered, dynamic tests may be conducted and, in conjunction with mathematical analysis, used to verify operability and structural integrity at the required seismic input conditions.

INSERT 1

The NSSS seismic qualification program for HCGS utilizes seismic data generated over a number of years. Since it was not a licensing requirement at the time, most of these data were developed in earlier years without pre-aging or sequential testing of the equipment. However, NSSS equipment located in harsh environments that has been qualified in recent years has generally been pre-aged and sequentially tested in accordance with the guidelines of IEEE 323-1974.

NSSS equipment on HCGS is being seismically evaluated using pre-aged and sequential testing data where it is available. Otherwise, the earlier data wihout pre-aging and sequential testing are being used.

The aging requirement is described in Section 3.11.2.7.2. Maintenance and surveillance program requirements given in Section 3.11.2.7.6 incorporate the results of testing, as applicable.

When the equipment is qualified by dynamic test, the response spectrum or the time-history of the attachment point is used in determining input motion.

Natural frequency may be determined by running a continuous sweep frequency search using a sinusoidal steady-state input of low magnitude. Seismic conditions are simulated by testing using random vibration input or single frequency input within equipment capability at frequencies up to 33 hertz. Whichever method is used, the input motion during testing envelops the actual input motion expected during earthquake conditions.

The equipment being dynamically tested is mounted on a fixture that simulates the intended service mounting and causes no dynamic coupling to the equipment.

Equipment having an extended structure, such as a valve operator, is analyzed by applying static equivalent seismic safe shutdown earthquake (SSE) loads at the center of gravity of the extended structure. In cases where the equipment structural complexity makes mathematical analysis impractical, a static bend test is used to determine spring constant and operational capability at maximum equivalent seismic load conditions.

> INSERT 2

3.9.2.3.1.1 Random Vibration Input

When random vibration input is used, the actual input motion envelops the appropriate floor input motion at the individual modes. However, single frequency input, such as sine waves, can be used provided one of the following conditions are met:

a. The characteristics of the required input motion are dominated by one frequency

b. The anticipated response of the equipment is adequately represented by one mode

c. The input has sufficient intensity and duration to excite all modes to the required magnitude, such that the testing response spectra envelops the corresponding response spectra of the individual modes.

INSERT 2

RPV and attached piping and pipe-mounted equipment are analyzed for annulus pressurization loads in the range of 60 to 100 Hz frequency depending on the dynamic characteristics of the equipment and its installation. The effect of hydrodynamic loads is limited to the torus and torus attached piping in accordance with the Mark I Containment Long-Term Program (NUREG 0661). The qualification test frequencies, in general, range up to 50 Hz, which is the upperbound hydrodynamic loading frequency.

Non-ASME B&PV code components are qualified by tests that address the "strong motion" phase of seismic (and, if applicable, SRV) dynamic motion sufficient to generate the maximum equipment response. This testing generally consists of five OBE tests and one SSE test of 30 seconds each. Non-ASME B&PV code components are also qualified by analyses that have not considered vibration fatigue-cycle effects.

Some equipment is shown to be qualified by single-axis and/or single-frequency testing. However, all essential equipment is reevaluated for seismic qualification according to the requirements or recommendations of IEEE 344-1975, Regulatory Guides 1.92 and 1.100, and Standard Review Plans 3.9.2, 3.10, and HCGS specific requirements.

In most instances, use of single-axis test data is restricted to equipment with a response that shows a predominant single mode of vibration in each direction with minimal cross coupling. In some cases, if the response shows a single mode of vibration in each direction but also has cross coupling, the existing single-axis test data are still used if the test response spectra (TRS) can be shown to exceed the required response spectra (RRS) by a factor of 1.4 over all frequencies.

In most instances, use of single-frequency test data is restricted to cases where the required input motion is dominated by one frequency, where response of the equipment is adequately represented by one mode, or where the input motion has sufficient intensity and duration to produce sufficiently high levels of stress to assure structural integrity where structural integrity is the determinant requirement. In some cases, if the input motion is sufficiently high so as to excite secondary modes, such that modal responses can be shown to occur out of phase and at high enough levels, existing single-frequency test data are also used to demonstrate operability.

INSERT 2 (Continued)

The determination of which dynamic loads to address in a qualification program is made on the basis of both load evaluations made on similar designed facilities and on plant-specific assessments. From this basis, those loads which are considered to be significant are then selected and used in the qualification demonstration program. As described in the NRC approved NEDE-24326-1-P operational aging, vibration aging for pipe-mounted equipment, applicable dynamic event aging, etc. are all considered. Specific loads, such as those generated for the sudden closure of valves, have been considered when they are determined to be critical (i.e., loads from the closing of the SRVs and turbine stop valve are considered, but loads from the closure of a MSIV are not because of the relatively slow closure time of the MSIV).

Vibration fatigue-cycle effects for NSSS equipment designed to ASME B&PV Code requirements are evaluated in a manner found satisfactory to NRC consultants. The approach taken encompasses OBE, SRV where applicable, thermal, and pressure cycles (see References 3.9-18, 3.9-19 and 3.9-20).

Table 3.9-27 (SQRT devices) provides a listing of typical NSSS equipment showing the methods used for their qualification.

accelerations caused by the OBE and the SSE in conjunction with other normal operating loads.

Seismic qualification criteria used for the Seismic Category I mechanical equipment, with the exception of pumps and active valves, are in compliance with Regulatory Guide 1.100 and IEEE 344-1975. The seismic qualification of pumps and active valves is discussed more fully in Section 3.9.3.2.

> INSERT 3

The criteria for selecting a qualification method, by analysis and/or by test, is based on the practicality of the method for the function, type, size, shape, and complexity of the equipment.

Table 3.9-7 list all non-NSSS Seismic Category I mechanical equipment, equipment locations and qualification methods.

3.9.2.4.2 Methods and Procedures for Qualifying Non-NSSS Mechanical Equipment

Seismic Category I equipment is shown to be capable of withstanding the horizontal and vertical accelerations of five OBEs and one SSE by dynamic analysis, dynamic testing, or a combination of dynamic analysis and testing.

The seismic qualification methods and procedures are in compliance with the requirements of IEEE 344-1975 and Regulatory Guide 1.100.

Pipe-mounted equipment is qualified by analysis and/or testing to the acceleration levels allowed for piping systems. These levels include gravity and operation loading, as well as loading that is due to seismic or any other accident-related excitation, if applicable.

> INSERT 4

~~Wetwell to drywell vacuum breakers inside the torus are also qualified for hydrodynamic loads for frequencies up to 50 Hz.~~

3.9.2.4.2.1 Dynamic Analysis

Dynamic analysis without testing is used if structural integrity alone ensures the intended design function. Included is

INSERT 3

Where applicable, all equipment is pre-aged prior to seismic testing as part of the test sequence. The aging requirement is described in Section 3.11.2.7.2. Maintenance and Surveillance program requirements given in Section 3.11.2.7.6 incorporate the results of testing, as applicable.

INSERT 4

Applicable transient loads caused by sudden valve actuation (e.g., main steam turbine trips, HPCI turbine stop valve closure, MSSRV discharge, etc.) are considered in the design loading of non-NSSS ASME components as specified in Table 3.9-8. Force time histories of transient loads are developed using one of the computer codes referenced in Section 3.9.1.2. These forcing functions are then input to the finite element piping analysis along with the applicable seismic response spectra. The combined seismic and transient piping responses are evaluated against the equipment allowables specified for the appropriate service level. Selected systems are subsequently subjected to in-plant dynamic transient testing to confirm the acceptability of the analysis.

All pipe-mounted valve operators and accessories are qualified by using a single axis, single frequency testing (required input motion (RIM) test). This is justified on the grounds that the seismic floor motion is filtered through the piping system, which generally has one predominant structural mode. Thus the resulting motion that reaches the line-mounted equipment is predominantly a single frequency and single-axis motion. The test is performed by using RIM in each of the three axes, independently.

In accordance with the Mark I Containment Long-Term Program (NUREG-0661), non-NSSS equipment attached to the torus has been evaluated for appropriate hydrodynamic loads, including fatigue effects.

Wetwall-to-drywell vacuum breakers inside the torus are also qualified for hydrodynamic loads for frequencies up to 50 Hz.

on the allowable stresses set forth in the applicable codes.

d. The allowable shear on anchor bolts set in concrete are in accordance with Table Number 26-1 of the Uniform Building Code.

Table 3.9-5d shows the calculated stress values and allowable stress limits for the heat exchangers.

3.9.3.1.20 Non-NSSS ASME B&PV Code Constructed Items

The design loading combinations categorized with respect to plant operating conditions identified as normal, upset, emergency, and faulted for the non-NSSS ASME B&PV Code constructed items are presented in Table 3.9-8.

The design criteria and stress limits associated with each of the plant operating conditions for each type of ASME B&PV Code constructed item are presented in Tables 3.9-9 through 3.9-15.

The component operating condition is the same as the plant operating condition, except for active pumps or valves, for which the emergency or faulted plant condition is considered normal.

3.9.3.2 NSSS Pump and Valve Operability Assurance

The NSSS active pumps are listed in Table 3.9-16 and the NSSS active valves are listed in Table 3.9-17. Table 3.9-28 lists examples of PVORT NSSS Equipment qualification methodology.

Active mechanical equipment classified as Seismic Category I is designed to perform its function during the life of the plant under postulated plant conditions. Equipment with faulted condition functional requirements include active pumps and valves in fluid systems such as the RHR system and the core spray system. Active equipment must perform a mechanical motion during the course of accomplishing a safety function.

> INSERT 5

Operability is ensured by satisfying the requirements of the following programs. Safety-related active valves are qualified by prototype testing and analysis, and safety-related active

INSERT 5

The only NSSS active valves subjected to hydrodynamic loads are the safety relief valves (B21-F013) and the main steam isolation valves (B21-F022). Both of these valve types are being dynamically qualified by test up to 100 Hz.

The load and conditions considered in the qualification of safety-related pumps and valves are given in Tables 3.9-5 and 3.9-5(a).

Deflections due to piping loads and dynamic loads are addressed for active essential pumps and valves by several methods depending on the situation. Methods used include static deflection analysis, dynamic deflection analysis, and dynamic seismic testing.

The method of qualification for soft parts of safety-related pumps and valves is addressed in Section 3.11.2.6. In addition, maintenance and surveillance program requirements are given in Section 3.11.2.7.6.

Periodic inspection and operational testing is performed as per the requirements in Chapter 16. See Section 3.9.6 for operational testing outline.

of the absence of natural frequencies below 33 hertz, and the ability to remain operable under a horizontal seismic coefficient of 6.5g and a vertical seismic coefficient of 4.5g at 33 hertz.

3.9.3.2.7 Non-NSSS Pump and Valve Operability Assurance

3.9.3.2.7.1 Non-NSSS Active Pumps

The non-NSSS active pumps are tabulated in Table 3.9-18. Non-NSSS active pumps are subjected to testing both in the manufacturer's shop and following their installation to verify that they meet the criteria required by the respective design specifications.

INSERT 6

During manufacture, nondestructive test procedures including liquid penetrant examination, radiographic examination, magnetic particle inspection, and ultrasonic inspection are applied to the pumps. All of these procedures are performed in accordance with the ASME B&PV Code, Section III.

See Section 3.9.6 for operational testing outline.

After the pumps have been assembled, they are hydrostatically and performance tested in the manufacturer's shop in accordance with Hydraulic Institute standards. After the pumps are installed, they undergo functional tests. Provisions are made for inspection and operational testing per the requirements in Chapter 16. All of these tests demonstrate that the pumps are reliable and will function as specified.

INSERT 7

In addition to the tests and procedures referred to above, the pumps are seismically analyzed to ensure that they will be capable of operating both during and after OBE and SSE events.

INSERT 8

In performing these analyses, conservative seismic accelerations and stress criteria are used; this ensures that critical parts of the pump are not damaged during a seismic event, and that the pump still operates following such an event.

INSERT 9

Each pump/motor combination is designed to rotate at a constant speed under all conditions, unless the rotor becomes completely seized, i.e., fails to rotate at all. Motors are designed to withstand short periods of severe overload and, typically, the rotor can be seized a short period of time before a circuit breaker shuts down the pump. However, the high rotary inertia in

INSERT 6

Table 3.9-29 provides examples of Non-NSSS active pumps, indicating their qualification method and the industry standards met.

INSERT 7

The method of qualification for soft parts of safety-related pumps is addressed in Section 3.11.2.6. In addition, maintenance and surveillance program requirements are given in Section 3.11.2.7.6.

INSERT 8

Information on loading combinations, system operating transients, and stress limits for pumps is given in the response to Question 210.52.

INSERT 9

Deflection due to piping loads and dynamic loads is addressed for active essential pumps by several methods depending on the situation. Methods used include static deflection analysis, dynamic deflection analysis, static bend testing, and dynamic seismic testing. These methods account for pump deflection due to the application of nozzle allowable loadings and demonstrate component operability.

the operating pump rotor and the nature of the random, short-duration loading characteristics of the seismic event, will prevent the rotor from becoming seized. In actuality, the seismic loadings will cause only a slight increase in the torque, i.e., motor current, necessary to drive the pump at the constant design speed. Therefore, the pump will not shut down during the event and will operate at the design speed, despite the seismic loads.

From previous discussions, it is evident that the pump/motor units will withstand seismic loadings and perform their intended functions. These proposed requirements take into account the complex characteristics of the pump, and they are sufficient to demonstrate and ensure the seismic operability of these pumps. Post-seismic condition operating loads will be no worse than the normal plant operating limits.

3.9.3.2.7.2 Non-NSSS Active Valves

Non-NSSS active valves are tabulated in Table 3.9-19. See Sections 3.9.3.2.5 and 3.9.3.2.6 for a discussion of operability assurance of active valves supplied by the NSSS vendor. INSERT 10

Safety-related non-NSSS active valves are subjected to a series of stringent tests prior to service and during the plant life. Before installation, the following tests are performed: the shell hydrostatic test, in accordance with ASME B&PV Section III requirements; backseat and main seat leakage tests; the disc hydrostatic test; functional tests which verify that the valve opens and closes within the specified time limits; and the operability qualification of motor, air, and hydraulic operators for environmental conditions over the installed life, i.e., aging, radiation, accident environment simulation, etc, in accordance with IEEE 382-1972. After installation, cold hydrostatic tests, functional tests (in accordance with the requirements of Chapter 14), and periodic inservice operation (in accordance with the requirements of Chapter 16) are performed to verify and ensure the functional ability of the valve. See Section 3.9.6 for operational testing outline

INSERT 11

The valves are designed using either stress analyses or pressure-containing minimum wall thickness requirements. For all active valves with extended topworks, an analysis is also performed for static equivalent SSE loads applied at the extended structure's center of gravity. The maximum stress limits allowed in the analyses demonstrate structural integrity and are equal to the limits recommended by ASME for the particular ASME class of valve

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Table 3.9-29 provides examples of non-NSSS active valves, indicating their qualification method and the industry standards met.

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The method of qualification for soft parts of safety-related valves is addressed in Section 3.11.2.6. In addition, maintenance and surveillance program requirements are given in Section 3.11.2.7.6.

INSERT 12

analyzed. Limits for each of the loading combinations are presented in Tables 3.9-10 and 3.9-15.

In addition to the foregoing, a representative valve of each type is factory-tested to verify operability during a simulated seismic event. The factory qualification testing procedures are as described below.

INSERT 13

The valve is mounted in a manner that conservatively represents typical valve installations. The valve unit includes the actuator and all appurtenances normally attached to the valve in service. The operability of the valve during an SSE is demonstrated by satisfying the following criteria:

a. All active valves with topworks must have a first natural frequency greater than 33 Hz. This is proven by analyses. For valves mounted on lines connected directly or indirectly to the RPV or the biological shield, resonant frequencies up to 100 hertz are determined. Such frequencies are used as input to the dynamic analysis of the piping systems for annulus pressurization effects. Because of the unique and heavier loads imposed by hydrodynamic forces on piping attached to the suppression chamber, all active valves sized 6 inches and larger installed in such piping up to the first anchor subjected to hydrodynamic loads are additionally analyzed to determine all resonant frequencies between 0 and 100 hertz. These valves are listed in Table 3.9-30. Such frequencies are used as input to the dynamic analysis of these piping systems.

b. While in the shop and installed in a suitable test rig, the extended topworks of the valve are subjected to a statically applied equivalent seismic load. The load, specified as 4.5 g times the weight of the topworks, is applied at the center of gravity of the topworks in the direction of the weakest axis of the yoke. The design pressure of the valve is simultaneously applied to the valve during the static load tests.

c. The valve is then operated at the minimum specified actuation supply voltage or air pressure, with the equivalent seismic static load applied. The valve must perform its safety related function within the specified operating time limits.

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The loads and conditions considered in the qualification of Class 1 valves are given in Table 3.9-10. The loads and conditions considered for Class 2 and 3 valves are given in Table 3.9-15.

INSERT 13

Deflection due to piping loads and dynamic loads are addressed for active essential valves by several methods depending on the situation. Methods used include static deflection analysis, dynamic deflection analysis, static bend testing, and dynamic seismic testing.

3.9-16 General Electric, Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50, Appendix K, NEDO-20566, April 1977.

3.9-17 General Electric, Boiling Water Reactor Feedwater Nozzle/Sparger Final Report, NEDO-21821, March 1978.

Add Insert 14

INSERT 14

3.9-18 Letter from W. G. Gang (GE) to R. Bosnak (NRC) dated January 15, 1981 on the subject of "GE Position and Fatigue Analysis ".

3.9-19 Letter from R. J. Bosnak (NRC) to W. G. Gang (GE) dated Feruary 19, 1981 on the subject of "Fatigue Analysis".

3.9-20 Letter from R. B. Johnson (GE) to R. Bosnak (NRC) dated June 29, 1981 on the subject of "GE Position on Fatigue Analysis".

TABLE 3.9-7

SEISMIC ANALYSIS FOR NON-NSSS MECHANICAL EQUIPMENT

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method[1]	STANDARDS (2)
Containment hydrogen recombiner control panel	1A, 1B-C633	Aux	137' 0"	Rockwell	M047A	DT	A, I
~~Reactor building [illegible]~~	~~[illegible]~~	~~Reac~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~DA~~	
~~Reactor building [illegible]~~	~~[illegible]~~	~~Reac~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~DA~~	
RHR blowout panel to torus compartment	1A, 1B-S204	Reac	54' 0"	W.J. Woolley	M177	~~DA~~ SA	A, I
RCIC blowout panel to torus compartment	1C-S204	Reac	54' 0"	W.J. Woolley	M177	~~DA~~ SA	A, I
HPCI blowout panel to torus compartment	1D-S204	Reac	54' 0"	W.J. Woolley	M177	~~DA~~ SA	A, I
Diesel generator	1A, 1B-G400, 1C, 1D-G400	Aux	102' 0"	Colt/FMED	M018	DA	A, F, I
Service water traveling screen control panel	1A, 1B-C515, 1C, 1D-C515	Intake struct	107' 0"	Royce	M020	~~DA~~ DT	A, I
Service water strainer	1A, 1B-F509, 1C, 1D-F509	Intake struct	93' 0"	Zurn Ind Inc	M076	~~DA~~ SA	A, I
Station service water pump	1A, 1B-P502, 1C, 1D-P502	Intake struct	93' 0"	Hayward Tyler	M080	~~DA~~ SA	A, F, I
Spray water booster pump	1A, 1B-P507, 1C, 1D-P507	Intake struct	~~93' 0"~~ 79' 0"	Hayward Tyler	M082	~~DA~~ SA	A, F, I
Service water traveling screen	1A, 1B-S501, 1C, 1D-S501	Intake struct	114' 0"	Royce	M020	DA	A, I
Service water pump lubrication water tank	10-T543 10-T544	~~Yard~~ ~~Yard~~ Intake Struct	122' 0" 122' 0"	CVI CVI	M707 M707	~~DA~~ SA ~~DA~~ SA	A, F, I

Equipment Identification			Location				
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method[1]	STANDARDS (2)
SACS heat exchanger	1A1E, 1A2E 201, 1B1E, 1B2E 201	Reac	102' 0"	Graham	M069	DA	A, I
SACS pump	1A, 1B-P210, 1C, 1D-P210	Reac	102' 0"	Ingersoll Rand	M070	~~DA~~ SA	A, F, I
SACS expansion tank	1A, 1B-T205	Reac	201' 0"	CVI	M707	DA	A, F, I
~~Combustion air cooling water heat exchanger~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~DA~~	
Diesel generator lube oil heat exchanger	1A, 1B-E404, 1C, 1D-E404	Aux	102' 0"	Colt/FMED	M018	DA	F
Diesel generator jacket water heat exchanger	1A, 1B-E405, 1C, 1D-E405	Aux	102' 0"	Colt/FMED	M018	DA	F
Diesel generator exciter panel	1A, 1B-C420, 1C, 1D-C420	Aux	102' 0"	Colt/FMED	M018	~~DA~~ DT	A, I
Diesel generator local engine control panel	1A, 1B-C421, 1C, 1D-C421	Aux	102' 0"	Colt/FMED	M018	~~DA~~ DT	A, I
Diesel generator remote control generator panel	1A, 1B-C422, 1C, 1D-C422	Aux	130' 0"	Colt/FMED	M018	~~DA~~ DT	A, I
Diesel generator remote engine control panel	1A, 1B-C423, 1C, 1D-C423	Aux	130' 0"	Colt/FMED	M018	~~DA~~ DT	A, I
Diesel generator load sequencer panel	1A, 1B-C428 1C, 1D-C428	Aux	130' 0"	~~Later~~ Consollited Control	J810	~~Later~~ DT	A, I
~~Diesel generator pneumatic barring device~~	~~[illegible]~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~[illegible]~~	~~DA~~	
Diesel fuel oil filter	1A, 1B-F405, 1C, 1D-F405	Aux	102' 0"	Colt/FMED	M018	DA	F

Equipment Identification: Description	Equipment Number	Bldg	Location: Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
Diesel fuel oil strainer	1A, 1B-F406, 1C, 1D-F406	Aux	102' 0"	Colt/FMED	M018	DA	F
Diesel fuel oil transfer pump	1A, 1B-P401, 1C, 1D-P401, 1E, 1F-P401, 1G, 1H-P401	Aux	~~102' 0"~~ 54' 0"	Crane-Chempump	M092	~~DA~~ SA	A, F, I
Motor-driven fuel oil pump	1A, 1B-P402, 1C, 1D-P402	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Engine-driven fuel oil pump	1A, 1B-P404, 1C, 1D-P404	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Diesel fuel oil storage tank	1A, 1B-T403, 1C, 1D-T403, 1E, 1F-T403, 1G, 1H-T403	Aux	54' 0"	Buffalo Tank	~~[illegible]~~ M106	~~DA~~ SA	A, F, I
Diesel fuel oil day tank	1A, 1B-T404 1C, 1D-T404	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Jacket water keep-warm heater	1A, 1B-E407, 1C, 1D-E407	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Combustion air intercooler	1A, 1B-E408, 1C, 1D-E408	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Combustion air intake filter	1A, 1B-F413, 1C, 1D-F413	Aux	130' 0"	Colt/FMED	M018	DA	F
Intake silencer	1A, 1B-F414, 1C, 1D-F414	Aux	102' 0"	Colt/FMED	M018	DA	F
Diesel generator exhaust silencer	1A, 1B-F415, 1C, 1D-F415	Aux	102' 0"	Colt/FMED	M018	DA	F
Diesel engine jacket water pump	1A, 1B-P408, 1C, 1D-P408	Aux	102' 0"	Colt/FMED	M018	DA	F
Jacket water keep-warm pump	1A, 1B-P410, 1C, 1D-P410, ~~1A, 1B-P409, 1C, 1D-P409~~	Aux	102' 0"	Colt/FMED	M018	~~DA~~	F

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
~~Diesel generator air inlet adapter assembly~~	~~1A, 1B-G400, 1C, 1D-G400~~ [illegible]	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Diesel generator exhaust adapter assembly~~	~~1A, 1B-G402, 1C, 1D-G402~~ [illegible]	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Crankcase vacuum oil separator~~	~~1A, 1B-G403, 1C, 1D-G403~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Crankcase vacuum ejector~~	~~1A, 1B-G404, 1C, 1D-G404~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Jacket water expansion tank~~	~~1A, 1B-T400, 1C, 1D-T400~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
Lube oil keep-warm heater	1A, 1B-E406, 1C, 1D-E406	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
~~Starting air supply filter/separator for diesel generator~~	~~1A, 1B-F402, 1C, 1D-F402~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
Rocker arm lube oil filter	1A, 1B-F403, 1C, 1D-F403	Aux	102' 0"	Colt/FMED	M018	DA	F
Lube oil filter	1A, 1B-F404, 1C, 1D-F404	Aux	102' 0"	Colt/FMED	M018	DA	F
Lube oil strainer	1A, 1B-F407, 1C, 1D-F407	Aux	102' 0"	Colt/FMED	M018	DA	F
~~Right bank air start filter~~	~~1A, 1B-F405, 1C, 1D-F405~~ [illegible]	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Left bank air start filter~~	~~1A, 1B-F406, 1C, 1D-F406~~ [illegible]	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method[1]	STANDARDS (2)
[illegible]	[illegible]	[illegible]	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
ROCKER ARM LUBE OIL PUMP	[illegible] DIST	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Engine-driven lube oil pump	1A, 1B-P405, 1C, 1D-P405	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Rocker arm motor-driven prelube pump	1A, 1B-P406, 1C, 1D-P406	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Lube oil keep-warm pump	1A, 1B-P407, 1C, 1D-P407	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~DA~~	
Lube oil makeup tank	1A, 1B-T406, 1C, 1D-T406	Aux	102' 0"	Colt/FMED	M018	~~DA~~ SA	F
Start air receiver tank	1A, 1B-T408, 1C, 1D-T408, 1E, 1F-T408, 1G, 1H-T408	Aux	102' 0"	Colt/FMED	M018	DA	F
SRV control air supply accumulator	1A, 1B-T210, 1C, 1D-T210, 1E, 1F-T210, 1G, 1H-T210, 1J, 1K-T210, 1L, 1M-T210, 1P, 1R-T210	~~Drywell~~ Reac	~~120' 0"~~ 102' 0"	CVI	M707	~~DA~~ SA	A, F, I
MSIV control air supply accumulator	1A, 1B-T211, 1C, 1D-T211,	~~Drywell~~ Reac	~~[illegible]~~ 102' 0"	CVI	M707	DA	A, F, I
	1A, 1B-T212, 1C, 1D-T212	~~Drywell~~ Reac	102' 0"	CVI	M707	DA	A, F, I
[illegible]	[illegible]	[illegible]	[illegible]	Later	[illegible]	Later	
[illegible]	[illegible]	[illegible]	[illegible]	Later	[illegible]	Later	

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
ECCS jockey pump	1A, 1B-P228, 1C, 1D-P228	Reac	54' 0"	Hayward Tyler	M082	~~DT~~ SA	A, F, I
Fuel pool heat exchanger	1A, 1B-E202	Reac	162' 0"	Alfa-Laval	M071	DA	A, I
Fuel pool cooling pump	1A, 1B-P211	Reac	162' 0"	Hayward Tyler	M082	~~DT~~ SA	A, F, I
High density spent fuel storage rack	10-S287	Reac	~~[illegible]~~ 168' 0"	~~Later~~ GCA	M178	~~Later~~ DA	I
Air accumulator for torus isolation vacuum relief valve	1A, 1B-T277	Reac	77' 0"	CVI	M707	~~DT~~ SA	A, F, I
Instrument gas compressor skid	1A, 1B-S934	Reac	132' 0"	CVI	M048	DT	A, I
Instrument gas receiver	1A, 1B-T201	Reac	132' 0"	CVI	M048	~~DT~~ SA	A, I
Control room return air fan	1A, 1B-V415	Aux	~~[illegible]~~ 0" 158'	Buffalo	M719	~~DT~~ SA	A, I
Technical support center emergency filter fan	00-V314	Aux	153' 0"	Buffalo	M713	~~DA~~ DT	A, I
Technical support center emergency filter unit	00-VH313	Aux	153' 0"	AAF	M786	~~DT~~ DA	A, I
Technical support center supply unit	00-VH314	Aux	153' 0"	AAF	M711	DA	A, I
Service area air handling unit	00-VH316	Aux	137' 0"	AAF	M711	DA	A, I
~~Traveling screen unit heaters~~	~~[illegible]~~	~~Intake struct~~	~~114' 0"~~	~~Trane~~	~~[illegible]~~	~~DA~~	
Traveling screen fans	0A, 0B-V558	Intake struct	114' 0"	Joy	M719A	~~DT~~ SA	A, I

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
Reactor building FRVS recirculation system fan	1A, 1C-V213	Reac	132' 0"	Buffalo	M713	~~DT~~ DT	A,I
	1B, 1F-V213	Reac	178' 0"	Buffalo	M713	~~DA~~ DT	A,I
	1D, 1E-V213	Reac	162' 0"	Buffalo	M713	~~DT~~ DT	A,I
RCIC pump room unit cooler	1A, 1B-VH208	Reac	54' 0"	AAF	M711	DA	A,I
HPCI pump room unit cooler	1A, 1B-VH209	Reac	54' 0"	AAF	M711	DA	A,I
RHR pump room unit cooler	1A, 1B-VH210,	Reac	54' 0"	AAF	M711	~~DA~~ DA	A,I
	1C, 1D-VH210,	REAC	54'0"			DA	A,I
	1E, 1F-VH210,	REAC	77'0"			DA	A,I
	1G, 1H-VH210	REAC	54'0"			DA	A,I
Core spray pump room unit cooler	1A, 1B-VH211, 1C, 1D-VH211, 1E, 1F-VH211, 1G, 1H-VH211	Reac	54' 0"	AAF	M711	DA	A,I
Reactor building FRVS recirculation filter system	1A-VH213	Reac	132' 0"	AAF	M786	~~DT~~ DA	A,I
	1B-VH213	Reac	178' 0"	AAF	M786	~~DT~~ DA	A,I
	1C-VH213	Reac	132' 0"	AAF	M786	~~DT~~ DA	A,I
	1D, 1E-VH213	Reac	162' 0"	AAF	M786	~~DT~~ DA	A,I
	1F-VH213	Reac	178' 0"	AAF	M786	~~DT~~ DA	A,I
SACS pump room unit cooler	1A, 1B-VH214, 1C, 1D-VH214	Reac	102' 0"	AAF	M711	DA	A,I
Emergency area cooling system cooler control panel	1A, 1B-C281	Reac	102' 0"	Comsip	M780A	~~DT~~ DA	A,I
	1C, ~~[illegible]~~ 1O-C281	REAC	77' 0"	Comsip	M118	DA	A,I
Reactor building FRVS control panel	1A, 1~~B~~E-C285, 1~~C~~B, 1D-C285	~~Reac~~ AUX AUX	178'0" ~~102' 0"~~ 124'0"	Comsip	M780A	~~DT~~ DA	A,I
Reactor building FRVS vent filter	1A, 1B-VH206	Reac	145' 0"	AAF	M786	~~DT~~ DA	A,I
RCIC pump room duct heater	1O-VE-259	Reac	54' 0"	AAF	M786	~~DT~~ DA	A,I
HPCI pump room duct heater	1O-VE260	Reac	54' 0"	AAF	M786	~~DT~~ DA	A,I

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
Standby liquid control room duct heater	1A, 1B-VE261	Reac	162' 0"	AAF	M786	~~DT~~ DA	A,I
Diesel generator area HVAC	1A, 1B-C483, 1C, 1D-C483	Aux	~~160' 0"~~ 178' 0"	Comsip	M780A	~~DT~~ DA	A,I
Diesel area battery room exhaust fan	1A, 1B-V406, 1C, 1D-V406	Aux	163' 6"	Buffalo	M713	~~DA~~ DT	A,I
Diesel generator room recirculation fan	1A, 1B-V412, 1C, 1D-V412, 1E, 1F-V412, 1G, 1H-V412	Aux	77' 0"	Buffalo	M719	DA	A,I
Diesel generator room cooling coil	1A, 1B-VE412, 1C, 1D-VE412, 1E, 1F-VE412, 1G, 1H-VE412	Aux	77' 0"	Trane	M731	DA	A,I
Switchgear room unit cooler	1A, 1B-VH401, 1C, 1D-VH401	Aux	163' 6"	AAF	M711	~~DA~~ DT	A,I
Class 1E panel room supply air unit	1A, 1B-VH408	Aux	163' 6"	AAF	M711	DA	A,I
Battery room duct heater	1A, 1B-VE420, 1C, 1D-VE420	Aux	146' 0"	AAF	M786	~~DT~~ SA	A,I
Control room emergency air supply fan	1A, 1B-V400	Aux	155' 3"	Buffalo	M713	~~DA~~ DT	A,I
Control area battery room heat exchanger fan	1A, 1B-V410	Aux	178' 0"	Buffalo	M713	~~DA~~ DT	A,I
Control room emergency supply unit	1A, 1B-VH400	Aux	155' 0"	AAF	M786	~~DT~~ DA	A,I
Control room supply unit	1A, 1B-VH403	Aux	155' 0"	AAF	M711	DA	A,I

Equipment Identification: Description	Equipment Number	Bldg	Location: Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
Control equipment room supply unit	1A, 1B-VH407	Aux	178' 0"	AAF	M711	DA	A, I
~~Control room water chiller panel~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
Control room water chiller	1A, 1B-K400	Aux	155' 0"	Carrier	M723	DA	A, I
Control room chilled water system head tank	1A, 1B-T410	Aux	178' 0"	CVI	M707	DA	A, I, F
~~Control room water chiller oil [illegible]~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
Control room chilled water circulation pump	1A, 1B-P400	Aux	155' 0"	Hayward Tyler	M082	~~DA~~ SA	A, I, F
~~Control room water chiller oil pump~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
~~Control room water chiller pumpout pump~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
~~Control room water chiller oil pump~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
Control room water chiller pumpout unit	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~Carrier~~	~~[illegible]~~	~~DA~~	
Control room chilled water head tank	1A, 1B-T413	Aux	~~[illegible]~~ 178' 0"	CVI	M707	DA	A, I, F
Intake structure supply fan	1A, 1B-V503, 1C, 1D-V503	Intake struct	122' 0"	Joy	M719A	~~DA~~ SA	A, I
Intake structure exhaust fan	1A, 1B-V504, 1C, 1D-V504	Intake struct	122' 0"	Joy	M719A	~~DA~~ SA	A, I
~~Generator space heater~~	~~[illegible]~~	~~Aux~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~DA~~	

TABLE 3.9-7 (cont)

Equipment Identification		Location					
Description	Equipment Number	Bldg	Elevation	Vendor	PO	Qualification Method(1)	STANDARDS (2)
~~Air-start distributor filter~~	~~1A, 1D-F400, 1C, 1D-F400, 1B, 1E-F400, 4D, 1E-F400~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Start air compressor intake filter~~	~~1A, 1D-F401, 4D, 1D-F401~~	~~Aux~~	~~102' 0"~~	~~Colt/FMED~~	~~M018~~	~~DA~~	
~~Service water pump bearing cooling line filter~~	~~1A, 1D20540, 1B, 1D20541, 1C, 1D20540, 1D, 1D20543~~	~~Intake struct~~	~~93' 0"~~	~~Hayward Tyler~~	~~M000~~	~~DA~~	
Class 1E channel diesel generator grounding transformer	1A, 1D-G403, 1C, 1D-G403	Aux	102' 0"	Colt/FMED	M018	~~DA~~ DT	F
Chilled water circulation pump	1A, 1B-P418	Aux	178' 0"	Hayward Tyler	M082	DA	A, I, F

(1) DA - dynamic analysis.
DT - dynamic testing.

SA - STATIC ANALYSIS

(2) A - IEEE 344-1975
F - ASME CODE, SECTION III
I - NRC R.G. 1.100, REV. 1
J - APPENDIX D OF SRP 3.8.4

HCGS FSAR TABLE 3.9-27

TYPICAL NSSS SQRT EQUIPMENT QUALIFICATION METHODOLOGY

MPL Number	Equipment	Qualification Methodology
E11-B001	RHR heat exchanger	Response spectrum dynamic analysis
E11-C002	RHR pump motor	Response spectrum dynamic analysis
E21-C001	Reactor core spray pump	Response spectrum dynamic analysis
C41-C001	Standby liquid control pump	Static analysis/Dynamic test - IEEE 344-1975
C41-A003	SLC accumulator	Static analysis
C41-A001	SLC tank	Static analysis to 1.75g
E41-C002	HCPI turbine	Dynamic test
E51-C002	RCIC turbine	Dynamic test
145C3103	Thermometer	Static analysis
145C3224	Temperature element	Multi-frequency, multi-axis test
159C4361	Level switch	Single axis, single frequency test
163C1303	Limit switch	Single frequency - multi-axis test

HCGS FSAR TABLE 3.9-28

EXAMPLES OF NSSS PVORT EQUIPMENT QUALIFICATION METHODOLOGY

MPL Number	Equipment	Qualification Methodology
E91-C001	HPCI pump	Static analysis for dynamic analysis
C51-J004	Guide tube valve	Single frequency - static analysis
B21-F013	SRV	Static analysis, comparison to other
B21-F022/ F028	MSIV	Single axis/multi-axis test
C11-F009/ F182	CRD solenoid valve	Single axis/multi-axis test

HCGS FSAR TABLE 3.9-29

EXAMPLES OF Non-NSSS PVORT EQUIPMENT QUALIFICATION METHODOLOGY

Equipment Number	Description	Qualification Method	Standards (1)
1A, 1B-P210 1C, 1D-P210	SACS Pump	Static Analysis	A, F, I
1A, 1B-P211	Fuel Pool Cooling Pump	Static Analysis	A, F, I
1A, 1B-P402 1C, 1D-P402	Motor Driven Diesel Fuel Oil Pump	Static Analysis	F
1A, 1B-P228 1C, 1D-P228	ECCS Jockey Pump	Static Analysis	A, F, I
1A, 1B-P414	Chilled Water Circulation Pump	Dynamic Analysis	A, F, I
1A, 1B-P408 1C, 1D-P408	Engine-Driven Jacket Water Pump	Dynamic Analysis	F
1A, 1B-P507 1C, 1D-P507	Spray Water Booster Pump	Static Analysis	A, F, I
1-BC-HV-F047A	18"-GBB-GT-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-BE-HV-F031A	4"-GBB-GB-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-FC-HV-F059	10"-HBB-GT-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-EE-HV-4655	6"-HBC-GT-AO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-AB-HV-F019	3"-DBA-GT-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-AE-HV-F074A	24"-DLA-CK-AO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I

HCGS FSAR TABLE 3.9-29 (Cont'd)

EXAMPLES OF Non-NSSS PUMP EQUIPMENT QUALIFICATION METHODOLOGY

Equipment Number	Description	Qualification Method	Standards (1)
1-BD-HV-F046	2"-CBA-GB-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-EG-HV-2522A	30"-HBC-BF-HYDRAU	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-EG-HV-2395A	8"-HBC-BF-AO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I
1-EA-HV-2356A	20"-HBC-BF-MO	Static Analysis & Dynamic Testing & Pull Test	A, E, F, I

(1) Standards

A - IEEE-344-1975
F - ASME B&PV Code, Section III
I - NRC Regulatory Guide 1.100, Rev. 1
E - IEEE 382, 1972

HCGS FSAR TABLE 3.9-30

Non-NSSS VALVES SUBJECTED TO HYDRODYNAMIC LOADS

1-BE-HV-F001A to D
1-FC-HV-F059
1-BJ-HV-F042
1-FD-HV-F071
1-EE-HV-4680
1-EE-HV-4681
1-BD-HV-F031
1-BC-HV-F004A to D
1-EE-HV-4652
1-EE-HV-4679
1-GS-HV-4958
1-BE-HV-F015A and B
1-BC-HV-F024A and B
1-BC-HV-4421
1-BC-HV-4420A and B
1-BE-HV-F031A
1-BJ-HV-F012
1-FD-HV-F079
1-FD-HV-F075
1-BC-HV-F007C
1-AB-PSV-F037A to H
1-AB-PSV-F037J to M
1-AB-PSV-F037P, Q, R
1-AB-PSV-4500A to H
1-AB-PSV-4500J to M
1-AB-PSV-4500P, Q, R
1-BD-SV-F019
1-GS-PSV-4946A to H
1-BJ-HV-4865
1-BJ-HV-4866
1-BJ-HV-4804
1-FC-HV-F060

3.10.1.1.2 Seismic Category I Non-NSSS Equipment Identification

Non-NSSS safety-related instrumentation and Class 1E electrical equipment that requires seismic qualification are identified in Tables 3.10-1 and 3.10-2, respectively.

3.10.1.2 Seismic Design Criteria

3.10.1.2.1 Seismic Design Criteria (NSSS)

>INSERT 15

Seismic Category I instrumentation and electrical equipment are designed to withstand the safe shutdown earthquake (SSE) defined in Section 3.7.1.

The seismic criteria used in the design and subsequent qualification of all Class 1E instrumentation and electrical equipment supplied by GE are as described below.

The Class 1E equipment is capable of performing all safety-related functions during normal plant operation, anticipated transients, design basis accidents (DBAs), and post-accident operation, while being subjected to, and after the cessation of, the accelerations resulting from the SSE at the point of attachment of the equipment to the building or supporting structure.

The criteria for each of the devices used in the Class 1E systems depend on the use in a given system. For example, a relay in one system may, as its safety function, have to deenergize and open its contacts within a certain time, while in another system, it must energize and close its contacts. Since General Electric (GE) supplies many devices for many applications, the approach taken was to test the device in the worst-case configuration. In this way, the capability of protective action initiation and the proper operation of safety-failure circuits are ensured.

From the basic input ground motion data, a series of response curves at various building elevations are developed after the building layout is completed. This information is included in the purchase specifications for Seismic Category I equipment. Suppliers for equipment such as batteries and racks, instrument racks, control consoles, etc, are required to submit test data,

INSERT 15

The NSSS seismic qualification program for HCGS utilizes seismic data generated over a number of years. Since it was not a licensing requirement at the time, most of these data were developed in earlier years without pre-aging or sequential testing of the equipment. However, NSSS equipment located in harsh environments that has been qualified in recent years has generally been pre-aged and sequentially tested in accordance with the guidelines of IEEE 323-1974.

NSSS equipment on HCGS is being seismically evaluated using pre-aged and sequential testing data where it is available. Otherwise, the earlier data wihout pre-aging and sequential testing are being used. The aging requirement is described in Section 3.11.2.7.2.

demonstrate compliance with Regulatory Guide 1.100. However, the seismic qualification requirements used for this plant ensure an adequate degree of equipment performance and thereby represent an acceptable basis for qualifying the equipment.

> INSERT 16

3.10.2.1.1 Procedures

GE-supplied Class 1E equipment meets the requirement that the qualification should demonstrate the capability to perform the required function during and after the effects of the safe shutdown earthquake (SSE). Both analysis and testing are used, but most equipment is tested. Analyses are primarily used to determine the adequacy of mechanical strength, e.g., mounting bolts, etc, after operating capability is established by testing as follows:

a. Analysis - GE-supplied Class 1E equipment performing primarily a mechanical safety function, e.g., pressure boundary devices, etc, is analyzed since the passive nature of their critical safety role usually makes testing impractical. Analytical methods sanctioned by IEEE 344-1971 are used in such cases. See Table 3.10-3 for indication of which items were qualified by analysis.

b. Testing - GE-supplied Class 1E equipment having primarily an active electrical safety function is tested in compliance with IEEE 344-1971, Section 3.2.

3.10.2.1.2 Documentation

Available documentation verifies that the seismic qualification of GE-supplied Class 1E equipment is in accordance with the requirements of IEEE 344-1971, Section 4.

3.10.2.2 <u>Testing Procedures for Qualifying NSSS Electrical Equipment and Instrumentation, Excluding Motors and Valve-Mounted Equipment</u>

The test procedures require that the device be mounted on the table of the vibration machine in a manner similar to the actual mounting condition. The device is tested in the operating states as if it were performing its Class 1E functions. These states

INSERT 16

Some equipment is shown to be qualified by single-axis and/or single-frequency testing. However, all essential equipment is reevaluated for seismic qualification according to the requirements or recommendations of IEEE 344-1975, Regulatory Guides 1.92 and 1.100, and Standard Review Plans 3.9.2, 3.10, and HCGS specific requirements.

In most instances, use of single-axis test data is restricted to equipment with response that shows a predominant single mode of vibration in each direction with a minimal cross coupling. In some cases, if the response shows a single mode of vibration in each direction but also has cross coupling, the existing single-axis test data are still used if the test response spectra (TRS) can be shown to exceed the required response spectra (RRS) by a factor of 1.4 over all frequencies.

In most instances, use of single-frequency test data is restricted to cases where the required input motion is dominated by one frequency, where response of the equipment is adequately represented by one mode, or where the input motion has sufficient intensity and duration to produce sufficiently high levels of stress to assure structural integrity where structural integrity is the determinant requirement. In some cases, if the input motion is sufficiently high so as to excite secondary modes, such that modal responses can be shown to occur out of phase and at high enough levels, existing single-frequency test data are also used to demonstrate operability.

The summary of the tests on the devices used in Class 1E applications given in Table 3.10-3 includes the qualification limit for each device tested.

The above procedures are required of purchased devices as well as those made by GE. Vendor test results are reviewed, and if unacceptable, the tests are repeated either by GE or the vendor. If the vendor tests were adequate, the device is considered qualified to the limits of the test.

3.10.2.3 Methods and Procedures for Qualifying Non-NSSS Instrumentation and Electrical Equipment

>INSERT 17

The analysis and testing for the seismic qualification of non-NSSS Class 1E instrumentation and electrical equipment are in compliance with the appropriate project seismic specifications that meet the requirements of IEEE 344-1975 and Regulatory Guide 1.100.

Pipe-mounted instrumentation is qualified by analysis and/or testing to the acceleration levels allowed for piping systems. These levels include gravity and operation loading, as well as loading that is due to seismic or any other accident-related excitation, if applicable.

>INSERT 18

Seismic Category I equipment is shown to be capable of withstanding the horizontal and vertical accelerations of five OBEs and one SSE by dynamic analysis, dynamic testing, or a combination of dynamic analysis and testing.

>INSERT 19

~~Thermowells provided on the torus shell for temperature monitoring are also qualified for hydrodynamic loads for frequencies up to 50 Hz.~~

3.10.2.3.1 Dynamic Analysis

Dynamic analysis without testing is performed as a basis for qualification only if the necessary functional operability of the equipment is ensured by its structural integrity alone.

For this analysis, equipment is idealized using a mathematical model in which frequencies and mode shapes are determined for vibration in the vertical direction and two orthogonal horizontal directions. For each direction of vibration, the spectral accelerations per mode are obtained from the appropriate response spectrum curve corresponding to the location and damping of the equipment.

INSERT 17

Where applicable, all equipment is pre-aged prior to seismic testing as part of the test sequence. The aging requirement is described in Section 3.11.2.7.2. Maintenance and surveillance program requirements given in Section 3.11.2.7.6 incorporate the results of testing, as applicable.

INSERT 18

All pipe-mounted control valve operators and accessories are qualified by using a single axis, single frequency test (required input motion (RIM) test). This is justified on the grounds that the seismic floor motion is filtered through the piping system, which generally has one predominant structural mode. Thus the resulting motion that reaches the line-mounted equipment is predominantly a single-frequency and single-axis motion. The test is performed by using RIM in each of the three axes, independently.

INSERT 19

In accordance with the Mark I Containment Long-Term Program (NUREG-0661), non-NSSS equipment attached to the torus has been evaluated for appropriate hydrodynamic loads, including fatigue effects.

Thermowells provided on the torus shell for temperature monitoring are also qualified for hydrodynamic loads for frequencies up to 50 Hz, including fatigue effects.

TABLE 3.10-1

SEISMIC QUALIFICATION TEST SUMMARY
NON-NSSS INSTRUMENTS

Item Number	Description	Area/Elevation	Supplier	Qualification Method	Standards (1)
J-200Q	Main control panels	Main Control rm/137ft, Control eqpt rm/102ft	Bailey	Test & analysis	A,I
J-201Q	Remote control panels	Various	Comsip/ Customline	Test & analysis	A,I
J-301Q	Electronic field transmitters	Various	Tobar	Test	A,I
J-305Q	Panel-mounted instruments	Various	Westinghouse	Test	A,I
J-359Q	H_2, O_2 analyzer	React bldg/162 ft	Comsip Delphi	Test & analysis	A,I
J-371Q	Radiation monitoring	Various	TEC	Test	A,I
J-483Q	Flood alarms	Various	Fluid C (FCI)	Test	A,I
J-525Q	Pressure indicators	Various	Dresser	Test	A,I
J-556Q	Temp Wells, RDTs	Various	Thermo Electric	Test & analysis	A,I
J-601Q	Control valves	Various	Masoneilan	Test & analysis	A,F,I
J-603Q	Solenoid valves	Various	Valcor	Test & analysis	D,F
J-605Q	Control butterfly valves	Various	Fisher	Test & analysis	F
J-610Q	Pressure regulators	Various	Marotta	Test	A,I
J-703Q	Excess flow check valves	Various	Dragon	Test	F

Item Number	Description	Area/Elevation	Supplier	Qualification Method	Standards (1)
J-705Q	Bypass maifolds	Various	Dragon	Analysis	F
J-730Q	Flexible metal hose	Various	Metal Bellows	Test	A,I
J-810Q	Emergency load sequence	Aux 130' 0"	Consolidated Controls	Test	A,I

(1) STANDARDS

A - IEEE 344-1975
D - IEEE 382-1980
F - ASME code - section III
I - NRC REG. GUIDE 1.100, Rev 1

TABLE 3.10-2

SEISMIC QUALIFICATION TEST SUMMARY

NON-NSSS ELECTRICAL EQUIPMENT

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-109	1AN205	1E 5kV SWGR	BROWN	RB102	TEST	A, I
E-109	1BN205	1E 5kV SWGR	BOVERI	RB102		
E-109	1CN205	1E 5kV SWGR	ELECTRIC	RB102		
E-109	1DN205	1E 5kV SWGR		RB102		
E-109	10A401	1E 4.16kV SWGR		DG130		
E-109	10A402	1E 4.16kV SWGR		DG130		
E-109	10A403	1E 4.16kV SWGR		DG130		
E-109	10A404	1E 4.16kV SWGR		DG130		
E-112A	1AP210	SACS MOTORS	WESTINGHOUSE	RB102	ANALYSIS	A, I
E-112A	1BP210	SACS MOTORS	LLD MOTOR	RB102		
E-112A	1CP210	SACS MOTORS		RB102		
E-112A	1DP210	SACS MOTORS		RB102		
E-112B	1AP502	SVC WTR PP MTR	GE	IS093	ANALYSIS	A, I
E-112B	1BP502	SVC WTR PP MTR		IS093		
E-112B	1CP502	SVC WTR PP MTR		IS093		
E-112B	1DP502	SVC WTR PP MTR		IS093		
E-117	10B410	480V UNIT SUB	GE	DG130	TEST & ANALYSIS	A, I
E-117	10B420	480V UNIT SUB		DG130		
E-117	10B430	480V UNIT SUB		DG130		
E-117	10B440	480V UNIT SUB		DG130		
E-117	10B450	480V UNIT SUB		DG130		
E-117	10B460	480V UNIT SUB		DG130		
E-117	10B470	480V UNIT SUB		DG130		
E-117	10B480	480V UNIT SUB		DG130		
E-118	10B242	480V MCC	CUTLER	RB077	TEST & ANALYSIS	A, I
E-118	10B212	480V MCC	HAMMER	RB102		
E-118	10B222	480V MCC	UNITROL	RB102		
E-118	10B232	480V MCC		RB102		

TABLE 3.10-2 (Cont)

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-118	10B411	480V MCC	CUTLER	DG130	TEST & ANALYSIS	A, I
E-118	10B421	480V MCC	HAMMER	DG130		
E-118	10B431	480V MCC	UNITROL	DG130		
E-118	10B441	480V MCC		DG130		
E-118	10B451	480V MCC		DG130		
E-118	10B461	480V MCC		DG130		
E-118	10B471	480V MCC		DG130		
E-118	10B481	480V MCC		DG130		
E-118	10B553	480V MCC		IS093		
E-118	10B563	480V MCC		IS093		
E-118	10B573	480V MCC		IS093		
E-118	10B583	480V MCC		IS093		
E-120	1AD417	125VDC DIST PNL	BROWN	DG130	TEST	A, I
E-120	1BD417	125VDC DIST PNL	BOVERI	DG130		
E-120	1CD417	125VDC DIST PNL		DG130		
E-120	1DD417	125VDC DIST PNL		DG130		
E-121	10D410	125VDC SWGR	GE	DG130	TEST & ANALYSIS	A, I
E-121	10D420	125VDC SWGR		DG130		
E-121	10D430	125VDC SWGR		DG130		
E-121	10D436	125VDC SWGR		DG163		
E-121	10D440	125VDC SWGR		DG130		
E-121	10D446	125VDC SWGR		DG163		
E-121	10D470	125VDC SWGR		CR054		
E-121	10D480	125VDC SWGR		CR054		
E-121	10D476	125VDC SWGR		DG163		
E-121	10D486	125VDC SWGR		DG163		
E-121	10D450	250VDC SWGR		CR054		
E-121	10D460	250VDC SWGR		CR054		
E-121	10D251	250VDC MCC		RB054		
E-121	10D261	250VDC MCC		RB054		
E-122	1AC680A/B	AUX CAB (SKIN)	COMSIP	DG163	TEST & ANALYSIS	A, I
E-122	1BC680A/B	AUX CAB (SKIN)		DG163		
E-122	1CC680A/B	AUX CAB (SKIN)		DG163		
E-122	1DC680A/B	AUX CAB (SKIN)		DG163		
E-122	1AC680C/D	AUX CAB (SKIN)		DG163		
E-122	1BC680C/D	AUX CAB (SKIN)		DG163		
E-122	1CC680C/D	AUX CAB (SKIN)		DG163		
E-122	1DC680C/D	AUX CAB (SKIN)		DG163		
E-122	1(A-D)C680	PNL DEVICE		DG163		

TABLE 3.10-2 (Cont)

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-135	1AM201	M.V. PEN.	WESTINGHOUSE	RB114	TEST & ANALYSIS	A, I
E-135	1BM201	M.V. PEN.	↓	RB114	↓	↓
E-135	1CM201	M.V. PEN.	↓	RB114	↓	↓
E-135	1DM201	M.V. PEN.	↓	RB114	↓	↓
E-135	1EM201	M.V. PEN.	↓	RB114	↓	↓
E-135	1FM201	M.V. PEN.	↓	RB114	↓	↓
E-135	1AM200	L.V. PEN.	↓	RB114	↓	↓
E-135	1BM200	L.V. PEN.	↓	RB114	↓	↓
E-135	1CM200	L.V. PEN	↓	RB117	↓	↓
E-135	1DM200	L.V. PEN.	↓	RB108	↓	↓
E-135	1AM202	L.V. PEN.	↓	RB111	↓	↓
E-135	1BM202	L.V. PEN	↓	RB117	↓	↓
E-135	1BM205	L.V. PEN	↓	RB117	↓	↓
E-135	1JM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1AM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1BM204	L.V. PEN	↓	RB108	↓	↓
E-135	1CM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1DM204	L.V. PEN.	↓	RB108	↓	↓
E-135	1EM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1FM204	L.V. PEN	↓	RB115	↓	↓
E-135	1GM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1HM204	L.V. PEN.	↓	RB115	↓	↓
E-135	1KM204	L.V. PEN.	↓	RB111	↓	↓
E-135	1AM203	L.V. PEN	↓	RB108	↓	↓
E-135	1DM202	L.V. PEN.	↓	RB111	↓	↓
E-135	1BM203	L.V. PEN.	↓	RB115	↓	↓
E-135	1CM202	L.V. PEN.	↓	RB111	↓	↓
E-135	1CM205	L.V. PEN	↓	RB117	↓	↓
E-135	1AM205	L.V. PEN.	↓	RB115	↓	↓
E-135	1DM205	L.V. PEN.	↓	RB117	↓	↓
E-135	1EM205	L.V. PEN.	↓	RB115	↓	↓
E-135	1FM205	L.V. PEN	↓	RB115	↓	↓
E-135	1GM205	L.V. PEN.	↓	RB117	↓	↓
E-135	1HM205	L.V. PEN.	↓	RB117	↓	↓
E-135	1AM206	L.V. PEN.	↓	RB115	↓	↓
E-135	1BM206	L.V. PEN	↓	RB117	↓	↓
E-135	1CM206	L.V. PEN.	↓	RB115	↓	↓
E-135	1AM207	L.V. PEN.	↓	RB079	↓	↓
E-135	1BM207	L.V. PEN.	↓	RB078	↓	↓
E-135	1CM207	L.V. PEN	↓	RB078	↓	↓
E-135	1DM207	L.V. PEN.	↓	RB079	↓	↓
E-135	1AM208	L.V. PEN.	↓	RB078	↓	↓
E-135	1AM209	L.V. PEN.	↓	RB075	↓	↓

TABLE 3.10-2 (Cont)

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-139	10X201	15kVa XFMR	SQUARE D	RB102	TEST	A, I
E-139	10X202	15kVa XFMR		RB102		
E-139	10X203	15kVa XFMR		RB102		
E-139	10X204	15kVa XFMR		RB077		
E-139	10X411	30kVa XFMR		DG130		
E-139	10X412	30kVa XFMR		DG130		
E-139	10X413	30kVa XFMR		DG130		
E-139	10X414	30kVa XFMR		DG130		
E-139	10X421	15kVa XFMR		DG130		
E-139	10X422	15kVa XFMR		DG130		
E-139	10X423	15kVa XFMR		DG130		
E-139	10X424	15kVa XFMR		DG130		
E-139	10X501	15kVa XFMR		IS093		
E-139	10X502	15kVa XFMR		IS093		
E-139	10X503	15kVa XFMR		IS093		
E-139	10X504	15kVa XFMR		IS093		
E-139	10Y201	120VAC DIST PNL	BROWN	RB102		
E-139	10Y202	120VAC DIST PNL	BOVERI	RB102		
E-139	10Y203	120VAC DIST PNL		RB102		
E-139	10Y204	120VAC DIST PNL		RB077		
E-139	10Y401	120VAC DIST PNL		RB130		
E-139	10Y402	120VAC DIST PNL		RB130		
E-139	10Y403	120VAC DIST PNL		RB130		
E-139	10Y404	120VAC DIST PNL		RB130		
E-139	10Y411	120VAC DIST PNL		RB130		
E-139	10Y412	120VAC DIST PNL		RB130		
E-139	10Y413	120VAC DIST PNL		RB130		
E-139	10Y414	120VAC DIST PNL		RB130		
E-139	10Y501	120VAC DIST PNL		IS093		
E-139	10Y502	120VAC DIST PNL		IS093		
E-139	10Y503	120VAC DIST PNL		IS093		
E-139	10Y504	120VAC DIST PNL		IS093		
E-150	1AD411	125V BATTERY	C&D	DG146	TEST	A, I
E-150	1BD411	125V BATTERY	C&D	DG146		
E-150	1CD411	125V BATTERY	C&D	DG146		
E-150	1DD411	125V BATTERY	C&D	DG146		
E-150	10D421	125V BATTERY	C&D	CR054		
E-150	10D431	125V BATTERY	C&D	CR054		
E-150	1CD447	125V BATTERY	C&D	DG163		
E-150	1DD447	125V BATTERY	C&D	DG163		
E-150	1AD412	125V BM	PRINGLE	DG146		
E-150	1BD412	125V BM	PRINGLE	DG146		
E-150	1CD412	125V BM	PRINGLE	DG146		
E-150	1DD412	125V BM	PRINGLE	DG146		

TABLE 3.10-2 (Cont)

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-150	1OD422	125V SW	PRINGLE	CR054	TEST	A, I
E-150	1OD432	125V SW	PRINGLE	CR054	↓	↓
E-150	1CD448	125V SW	PRINGLE	DG163	↓	↓
E-150	1DD448	125V SW	PRINGLE	DG163	↓	↓
E-151	1AD413	125V BATT CHGR	C&D	DG146	TEST	A, I
E-151	1BD413	125V BATT CHGR	↓	DG146	↓	↓
E-151	1CD413	125V BATT CHGR	↓	DG146	↓	↓
E-151	1DD413	125V BATT CHGR	↓	DG146	↓	↓
E-151	1AD414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1BD414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1CD414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1DD414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1ED414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1FD414	125V BATT CHGR	↓	DG146	↓	↓
E-151	1CD444	125V BATT CHGR	↓	DG163	↓	↓
E-151	1DD444	125V BATT CHGR	↓	DG163	↓	↓
E-151	1OD423	250V BATT CHGR	↓	CR054	↓	↓
E-151	1OD433	250V BATT CHGR	↓	CR054	↓	↓
E-151	1OD424	250V BATT CHGR	↓	CR054	↓	↓
E-153A	1AJ401	INSTR PWR PNL	SIMMONDS	CR137	TEST & ANALYSIS	A, I
E-153A	1BJ401	INSTR PWR PNL	↓	CR124	↓	↓
E-153A	1CJ401	INSTR PWR PNL	↓	CR137	↓	↓
E-153A	1DJ401	INSTR PWR PNL	↓	CR124	↓	↓
E-153B	1AJ402	1E 225A PNL BD	ECS	DG163	TEST	A, I
E-153B	1BJ402	1E 225A PNL BD	↓	DG163	↓	↓
E-153B	1CJ402	1E 225A PNL BD	↓	DG163	↓	↓
E-153B	1DJ402	1E 225A PNL BD	↓	DG163	↓	↓
E-153B	1YF401	1E 100A FUSE PNL	↓	CR102	↓	↓
E-153B	1YF402	1E 100A FUSE PNL	↓	CR102	↓	↓
E-153B	1YF403	1E 100A FUSE PNL	↓	CR102	↓	↓
E-153B	1YF404	1E 100A FUSE PNL	↓	CR102	↓	↓
E-154	1AD481	20kVa UPS	CYBEREX	CR137	TEST	A, I
E-154	1BD481	20kVa UPS	↓	CR124	↓	↓
E-154	1CD481	20kVa UPS	↓	CR137	↓	↓
E-154	1DD481	20kVa UPS	↓	CR124	↓	↓
E-154	1OD485	20kVa UPS	↓	DG163	↓	↓
E-154	1OD496	20kVa UPS	↓	CR137	↓	↓
E-154	0AD495	20kVa UPS	↓	CR137	↓	↓
E-154	1AD482	20kVa UPS	↓	DG163	↓	↓
E-154	1BD482	20kVa UPS	↓	DG163	↓	↓
E-154	1CD482	20kVa UPS	↓	DG163	↓	↓

TABLE 3.10-2 (Cont)

P.O. NUMBER	EQUIPMENT TAG NUMBER	DESCRIPTION	MANUFACTURER	BLDG AND ELEV (1)	QUALIFICATION	STANDARDS (2)
E-194	1DD482	20kVa UPS	CYBEREX	DG163	TEST	A,I
E-194	1AD492	20kVa UPS		DG163		
E-194	1BD492	20kVa UPS		DG163		
E-194	1CD492	20kVa UPS		DG163		

(1) LOCATION

DG = DIESEL GENERATOR AREA
CR = CONTROL AREA
IS = INTAKE STRUCTURE
RB = REACTOR BUILDING

(2) STANDARDS

A - IEEE 344-1975
I - NRC R.G. 1.100, Rev. 1

Radiation exposures to components will be minor and will be due to two sources: radiation shine, and immersion in airborne radioactivity released in a controlled manner from the reactor building. The TID from both sources will be less than 100 rads for 180 days.

3.11.1.3 Excluded Systems - NSSS and Non-NSSS

Table 3.11-8 shows the systems designated as seismic Category I in Table 3.2-1 that are to be excluded from the HCGS Environmental Qualification Program.

The table identifies each system with correlation to Table 3.2-1 and the reason for exclusion from the HCGS Environmental Qualification Program.

3.11.1.4 Environmental Conditions - NSSS and Non-NSSS

The environmental conditions shown in Table 3.11-1, and the associated figures may be changed at a later date because of continuing evaluations that are being performed on a case by case basis.

3.11.2 QUALIFICATION TESTS AND ANALYSES

3.11.2.1 NSSS Safety-Related Class 1E Electrical Equipment Harsh Environment Qualification

Components of the nuclear steam supply system (NSSS) Class 1E electrical equipment are qualified in accordance with the environmental qualification criteria and guidelines specified as Category II in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," dated December 1979 (for comment), and IEEE-323-1971, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations." However, the HCGS environmental qualification program is attempting to upgrade qualification of equipment to the requirements of NUREG-0588, Category I. and IEEE 323-1974

Components of the NSSS Class 1E electrical equipment in a harsh environment are qualified by test, analyses, or a combination thereof. Those components used in more than one system, which can be or are located in different plant areas, are tested or

3.11.2.2.6 Regulatory Guide 1.40, Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants

Regulatory Guide 1.40 is not applicable to the HCGS because there are no NSSS-supplied continuous-duty, safety-related motors inside the primary containment.

3.11.2.2.7 Regulatory Guide 1.73 - Qualification Tests of Electrical Valve Operators Installed Inside the Containment of Nuclear Power Plants

Regulatory Guide 1.73 is not applicable to HCGS because there are no NSSS-supplied electric motor-operated valves inside the primary containment.

3.11.2.2.8 Regulatory Guide 1.89 - Qualification of Class 1E Equipment for Nuclear Power Plants

Hope Creek Generating Station will attempt to comply on a case by case basis.

3.11.2.3 <u>Non-NSSS Class 1E Electrical Equipment Harsh Environment Qualification</u>

Harsh environment qualification of Class 1E equipment is accomplished by test or analysis (where analysis is supported by test data or otherwise justifiable) for the applicable environmental conditions postulated to exist at the equipment location. These components are qualified to the requirements of IEEE 323-1971 and NUREG-0588, Category II. However, the HCGS environmental qualification program is attempting to upgrade to NUREG-0588 Category I requirements. and IEEE 323-1974

The identification, location, and conditions to which non-NSSS supplied 1E equipment is required to function will be shown in a separate environmental qualification report.

3.11.2.4 <u>Regulatory Guides and General Design Criteria - Non-NSSS Equipment</u>