NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

January 16, 1986

Docket No. 50-423
B11953

Director of Nuclear Reactor Regulation
Attn: Mr. V. Noonan, Director
PWR Project Directorate #5
Division of PWR Licensing - A
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

References: (1) J. F. Opeka letter to B. J. Youngblood, Responses to Seismic Qualification Review Team (SQRT) Audit Questions, dated October 8, 1985.

(2) J. F. Opeka letter to B. J. Youngblood, Revised Responses to Seismic Qualification Review Team (SQRT) Audit Questions, dated November 19, 1985.

(3) B. J. Youngblood letter to J. F. Opeka, Supplement 4 to NUREG-1031, Millstone Nuclear Power Station, Unit No. 3, dated December 6, 1985.

Dear Mr. Noonan:

Millstone Nuclear Power Station, Unit No. 3
Revised Responses to Seismic Qualification Review Team (SQRT)
Audit Questions

Representatives from Northeast Nuclear Energy Company (NNECO) and Stone & Webster met with the Staff on November 1, 1985 to discuss the Staff's concerns regarding our submittal (Reference 1). In Reference (2), NNECO transmitted the revised responses to certain SQRT audit questions that remained open at the November 1, 1985 meeting. In Reference (3), the Staff concluded that the responses to all questions were acceptable except three. Attachment I provides responses to those three questions.

A001
1/10

We believe that this information fully responds to the Staff's concerns, however, if you have any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

By NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

J. F. Opeka

J. F. Opeka
Senior Vice President

By: R. W. Bishop
Secretary

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me R. W. Bishop, who being duly sworn, did state that he is Secretary of Northeast Nuclear Energy Company, a Licensee herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Licensees herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Sheila M. Oates

Notary Public

My Commission Expires March 31, 1986

BOP-2 3ENS*SWGA

Question 1.1:

The test fixture supports the equipment horizontally; how does this simulate the inservice condition in both SS and FB directions?

Response:

The test fixture has a vertical frame which supports the bus duct exiting the top of the switchgear. This simulates the inservice condition. The bus duct is supported from the floor above the switchgear. Since relative displacements between floors are small (.027" N-S, .026" E-W, .0018" Vert) the test fixture accurately represents in-situ conditions.

Question 1.2:

Is there any device located on the extended structure?

Response:

The 20" aluminum rear cell extension is provided to accommodate the large number of cables entering through the rear of the switchgear. No equipment is mounted in the extension.

Questions 1.3 and 1.4:

Were relays tested with the switchgear? Justify the weight and dimensional differences between the tested and installed specimens.

Response:

The discussion in the summary report regarding the Wyle tests and how they are used to qualify the supplied equipment is somewhat confusing. GE has indicated that Wyle test report 43581-1 qualifies a 26" wide unit and Wyle test report 44365-1 qualifies a 36" wide unit with bus duct. Both of these tests are stand alone qualifications. In each case relays were mounted in the switchgear and monitored in the operating mode, with the exception of two relays (PVD and IJCV). These relays are qualified generically as described in GEZ-6675 "General Electric Company, Relays and Accessories, Seismic Capabilities", to levels far in excess of those anticipated for their application at Millstone 3 (see Attachment I). Since both a 26" and a 36" unit were fully tested no significant differences exist between the tested equipment and the installed equipment.

Question 1.5:

Is the device qualification valid when tested in a different cabinet?

Response:

As stated above both the 26" unit and the 36" unit had a full compliment of relays installed and monitored during testing. Further, G.E. protective relays

are type tested to fragility levels (GEZ-6675, see Attachment II - Test Plan). Therefore, comparisons between the 26" unit and the 36" unit are not required to establish qualification of either unit.

Question 1.6:

Justify the qualification by similarity of the HFC relay.

Response:

Both the IFC and HFC relays are generically qualified to fragility levels (GEZ-6675) which greatly exceed required qualification levels (see Attachment I).

Question 1.7:

Was there any modification of the specimen during testing?

Response:

GE has reviewed the Wyle reports and found that no anomolies were reported.

Question 1.8:

Justify the RRS curve used for qualification.

Response:

As discussed during the audit and in subsequent conversations with the staff, the test response spectra envelopes the amplified floor response spectra for the floor and ceiling of the switchgear area. As discussed above, relative floor movements are insignificant.

Question 1.9:

Indicate whether special bolted mounting configuration used during testing was complied with during installation.

Response:

The review of the as installed versus the tested mounting condition of the equipment was performed in detail during the site audit. This included review of vendor drawings, calculations, S&W structural drawings and S&W/Vendor correspondence. The tested mounting complied as closely as possible to the GE requirements. The installed mounting complies with GE requirements.

Question 2:

Audit did not demonstrate whether there was sufficient clearance between the top point of the switchgear and bus duct to avoid interference.

Response:

This concern, which was raised during the site audit, motivated the installation of a modified bus duct to provide adequate clearance. This work has been completed on E&DCR N-EC-00846 which has been closed out.

NSSS-2 3SIH*P

Question 1

Torsional frequency of assembly must be computed and compared to motor's operational speed.

Response:

This calculation has been performed with the following results:

Operating speed 3570 rpm
1st torsional critical speed 4505 rpm

This is 26% above operating speed and 62% below twice the motor electrical power line frequency of 7200 rpm.

Question 2:

Proximity of the installed switchgear to an adjacent non-Category I cabinet and the possible dynamic interaction between the two cabinets were not addressed in the qualification documents.

Response:

A response to the above question was provided to the NRC in a letter dated November 19, 1985. (B11878).

NRC Position Regarding NNECO Response:

The applicant must confirm adequacy of the modification to preclude dynamic interaction.

Revised Response: (1/86)

The evaluation of mounting a Class 1E reactor trip switchgear to a non-Class 1E rod drive control cabinet (M-G) was completed. The evaluation indicated that the seismic qualification of the Class 1E reactor trip switchgear (RTS) would be retained if the RTS unit was connected to the adjacent rod drive control cabinet. The above conclusion is based on the following study:

1. Review of the structural integrity of the rod drive control cabinet (Reference 1 and 3) to document its adequacy.

   The structural drawings and photographs of the rod drive control cabinet were reviewed. It was concluded that the construction of this cabinet is similar to that of the trip switchgear. It was identified that this cabinet has most of its internal weight located toward the bottom of the cabinet. Therefore based on this review of the cabinet details and its contents, it was concluded that the equipment has sufficient structural integrity to survive the seismic event.

2. Evaluation of the seismic dynamic response characteristics of the combined rod drive/switchgear assembly (Reference 3).

   Calculations were made to estimate the effect of coupling the two units on the natural frequencies of the combined system. It was determined by analysis that the shift in front-to-back frequency would be less than 10 percent when the two cabinets are connected. Due to the broadness of the RRS used to qualify the RTS, this change is insignificant. Likewise the combined side-to-side frequencies were estimated and determined that connecting the cabinet tops will increase the side-to-side natural frequencies of the cabinet assembly.

3. Review of the results of the generic seismic tests performed on the reactor trip switchgear (Reference 2).

The results of the generic seismic test were reviewed to estimate the generic peak interaction force that could be developed between the two cabinets.

4. Design of an interface connection strong enough to transmit the largest likely interaction forces between the two cabinets (Reference 3 and 4).

   Based on the loads defined in Step 3, a generic bracket design was developed. This generic design was then adjusted to fit the as-built mounting conditions present at Millstone Unit No. 3.

References:

1. Calculation, "Evaluation of RD Control Cabinet".

2. Report #SOTAR-80-3, "Seismic Qualification of Reactor Trip Switchgear Assembly with Type DS Model 416 Breakers".

3. Calculation, "RTS/M-G Set Cabinet Interface".

4. Calculation, "MG/RTS Set".

ATTACHMENT I

APPENDIX D

GENERAL ELECTRIC

POWER SYSTEMS
MANAGEMENT
BUSINESS
DEPARTMENT

GENERAL ELECTRIC COMPANY 205 GREAT VALLEY PARKWAY MALVERN PA 19355-0715
Phone (215) 251-7000

1E82362

Engineering Section
August 31, 1982

Subject:

NUCLEAR CERTIFICATION OF RELAYS,
SWITCHES AND ACCESSORY DEVICES

Reference: REQUISITION NO. 297-84762
SUMMARY NO.

FOR: MILLSTONE
NUCLEAR NO. 8236-460

TO: Mr. W. P. Flowers, MD 706
Development and Design Engineering
General Electric Company - MVSBS
P. O. Box 488
Burlington, Iowa 52601

The attached list shows the seismic capability and/or qualified life of the listed models. This determination has been accomplished either through testing per IEEE C37.98-1978 (Seismic Testing of Relays) and the General Electric Co. interpretation of IEEE Standard 323-1974 (Qualifying Class 1E Equipment for Nuclear Power Generating Stations) or by comparative analysis to tested devices. The attached list indicates how the capability of each device was determined.

A copy of the generic test plan for qualifying class 1E devices is attached. A condensed description of the procedure used in the testing program is shown on the attached GEZ-6675 for Seismic Testing and GEZ-7029 for Qualification Testing.

The models on the attached list are qualified for the following service conditions:

1. Altitude - 5,000 ft. maximum
2. Current or voltage - rated
3. Frequency - rated
4. Temperature - 30°C average with 10°C-40°C excursions
5. Radiation - 1×10^4 rads (total integrated dose)
6. Relative humidity - 60% average with 10-90% excursions

Detailed test data for each test program are available on a mutually agreed schedule for audit at the Power Systems Management Business Department of the General Electric Co. There will be a charge for such audits, which is commensurate with the time and expense incurred by General Electric for such audits. The location of the Engineering Office for these data is 6901 Elmwood Avenue, Philadelphia, PA 19142. In order to identify the requisition and the customer order number for which the audit will be performed, a copy of this paper must accompany all such requests for audit.

Very truly yours,

J. F. Scamman

O. F. Scamman
Senior Design Engineer
Nuclear Qualification

QUALIFICATION CAPABILITIES - CLASS 1E DEVICES

MARK NO.	ITEM	MODEL	SEISMIC FRAGILITY LEVEL IN g's ZPA NONOPERATE MODE TOC	NONOPERATE MODE IOC	OPERATE MODE TOC	OPERATE MODE IOC	1) QUAL. METHOD T	QUAL. METHOD A	QUALIFIED LIFE YRS	1) METHOD T	METHOD A	TRANSITION TEST TIME IN SECONDS NORMAL	TRANSITION TEST TIME IN SECONDS SEISMIC	FILE REF. NO.
35G	01	10AX008G10	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SBM-001
37Z	02	006353570G012	Seismic capability is 6 g ZPA				X		41	X		--	--	SB12-001
9A7	03	16SB9AB302STS2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9D9	04	16SB9KB2A10LSM2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9E1	05	16SB9BF3A52STT2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9E2	06	16SB9FB3A52STT2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9G2	07	16SB9CB3655STS2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9G6	08	16SB9RB2A06LSM2P	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9A8	09	16SB9FD333SSL2K	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9A9	10	16SB9FD509SSV2K	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9B1	11	16SB9BB408SSM2K	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
9B2	12	16SB9CB204SDM2Y	Seismic capability is 4 g ZPA					X	2)10		X	--	--	SB9-001
3B2	13	0116B6708G043	Seismic capability is 6 g ZPA					X	41		X	--	--	EB16-001
781	14	EB25A04BC	Seismic capability is 6 g ZPA					X	41		X	--	--	EB25-001
78N	15	EB25A06BC	Seismic capability is 6 g ZPA					X	41		X	--	--	EB25-001
78R	16	EB25A12BC	Seismic capability is 6 g ZPA					X	41		X	--	--	EB25-001

NOTES: 1) T - Qualified by Test; A - Qualified by Analysis (comparison to tested device)
2) Qualification tests on a similar device are being continued to extend Qualified Life beyond ten years.

J. F. Scamman
J. F. Scamman (MD1104)
Senior Design Engineer
Nuclear Qualification
Power Systems Management Business Department
General Electric Company
205 Great Valley Parkway
Malvern, PA 19355-0715

Reqn. No. 297-84762

Nuclear No. 8236-460

DATE: August 31, 1982

QUALIFICATION CAPABILITIES - CLASS 1E DEVICES

MARK NO.	ITEM	MODEL	SEISMIC FRAGILITY LEVEL IN g's ZPA NONOPERATE MODE TOC	NONOPERATE MODE IOC	OPERATE MODE TOC	OPERATE MODE IOC	1) QUAL. METHOD T	QUAL. METHOD A	QUALIFIED LIFE YRS	1) METHOD T	1) METHOD A	TRANSITION TEST TIME IN SECONDS NORMAL	SEISMIC	FILE REF. NO.
1N9	01	12HEA51C239X2	4	4	4	4	X		2)10		X	--	--	HEA-001
9B7	02	3)12HFA151A2F (D.C.)	3	2	6	6		X	41		X	.086 PU .037 DO	.055-.118 .028-.042	HFA-002
9A6	03	12HFC21B1A	3.5	-	6	-		X	41		X	.020	.011-.034	HFC-001
9E3	04	12HGA111J2 (D.C.)	3.5	0.5	1.75	4		X	41		X	.075 PU .035 DO	.060-.081 .032-.049	HGA-002
9C2	05	12IFC51AD1A	3	-	5	-		X	41		X	.72	.59-1.03	IFC-001
9C6	06	12IFC66K1A	3	4	5	3.5		X	41		X	6.87	5.84-7.79	IFC-007
9J7	07	12IJCV51B21A	3	3.5	4	4		X	4)41		X	IOC .67 IOC .014	.63-.86 .010-.020	IJCV-001
9A5	08	12NGV13B21A	6	6	6	6	X		41	X		.026	.018-.039	NGV-001
9D4	09	12PVD21B1A	3	-	2	-		X	41		X	.051	.033-.077	PVD-001
9C9	10	12SAM11B22A	6	4	6	6	X		41		X	.028	.018-.035	SAM-002

NOTES:
1) T - Qualified by Test; A - Qualified by Analysis (comparison to tested device)
2) Qualification tests on a similar device are being continued to extend Qualified Life beyond ten years.
3) Seismic capability values apply to contact codes 33, 42, 51 and 60 for three or less N.C. (normally closed) contacts. N.C. contact seismic capability may be reduced for contact codes 06, 15 and 24 with four or more N.C. contacts.
4) Continuous current limits for 41 years Qualified Life for 2-8 and 4-16 amp Instantaneous Units are 2.75 and 5.5 amps respectively.

J. F. Scamman

J. F. Scamman (MD1104)
Senior Design Engineer
Nuclear Qualification
Power Systems Management Business Department
General Electric Company
205 Great Valley Parkway
Malvern, PA 19355-0715

Reqn. No. 297-84762

Nuclear No. 8236-460

DATE: August 31, 1982