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SUBJECT: Forwards updated responses to Seismic Review Team & Pump & Valve Operability Review Team audit open items. Util currently performing compliance & verification review of seismic qualification program.

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NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

March 3, 1986
(NMP2L 0646)

Ms. Elinor G. Adensam, Director
BWR Project Directorate No. 3
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Washington, DC 20555

Dear Ms. Adensam:

Re: Nine Mile Point Unit 2
Docket No. 50-410

Enclosed for your information are certain updated responses to the Seismic Review Team and Pump and Valve Operability Review team Audit open items for Nine Mile Point Unit 2. Ten copies of the following information are provided:

1) Responses to Specific Audit Open Items:

	NRC No.	Mark No.
a.	NSSS 2	(C51J003)
b.	NSSS 6	(2 ENS*SWG102)
c.	BOP 1	(2 CMS*PNL66A)
d.	BOP 3	(2CES*P828)
e.	BOP 4	(2EJS*PNL100A)
f.	BOP 5	(2 EGS*E61)
g.	BOP 11	(2 HUVY*UC2)
h.	Not numbered	(2 MSS*HYV6A)
i.	Not numbered	(2 SWP*MOV1A)
j.	Not numbered	(2 RHS*RVV36A)

The other specific responses were previously provided in our letters dated September 30, 1985, November 1, 1985, and January 29, 1985.

2) Responses to Generic open items.

B001
1/1

Further, we are in the process of performing the Compliance and Verification review of the Seismic Qualification Program. The conclusion of that detailed review will result in a letter certifying that all required equipment is qualified and installed. This will be forwarded to the Nuclear Regulatory Commission by the fuel load date.

Very truly yours,

C. V. Mangan
Senior Vice President

NLR/ar
Enclosures
1343G

xc: R. A. Gramm, NRC Resident Inspector
Project File (2)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
Niagara Mohawk Power Corporation	)	Docket No. 50-410
(Nine Mile Point Unit 2)	)	

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Senior Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C V Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 31st day of March, 1986.

Janis M Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:

JANIS M. MACRO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
My Commission Expires March 30, 1987

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER NSSS-2

FINDING

C51-J003 - 1) Equipment was not installed.

2) Pressure controlling and monitoring system was not included in the enetration assembly.

3) Periodic and post earthquake pressure monitoring procedures were not clearly defined in light of finding 2 above.

RESPONSE

1) Response was provided January 29, 1986.

2 and 3) The pressure monitoring system used in the seismic qualification of the drywell penetration flange (C51-J003) (Viking Test Report 71185) was intended for acceptance testing only before, during and after the seismic test. There is no design requirement for a pressure monitoring system for this penetration assembly.

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER NSSS-6

FINDING

1) The seventh test run (ref. Wyle Rpt. 43639-1, p. 15) results in a breaker tripping. The report relates the anomaly to a weld stud and mentions that the cover was removed for the remaining tests.

   The applicant must demonstrate that similar tripping would not occur.

2) The applicant must establish that test results obtained by removal of the cover are applicable to the switchgear with cover.

3) A number of other anomalies were observed during the test. GE letters dated 11/17/77 and 2/8/78 mention some modifications performed on the switchgear. The applicant must provide one-to-one correlation between the anomalies and the modifications made to preclude recurrence of similar problems.

4) The applicant must demonstrate the effectiveness of filling up bolt holes with field plug welds in lieu of using mounting bolts. The tested mounting configuration utilized bolts.

RESPONSE

1 and 2) A number of anomalies were noted during the test program. In some of the test runs the breaker tripped spuriously. Post test inspection during run #7 (spurious trip noted) revealed that the breaker position switch cover disengaged due to improper installation of the cover. The cover* was removed for subsequent tests, in which the breaker continued to trip due to relay contact chatter. It is therefore concluded that removal of the switch cover had no effect on performance. Spurious breaker operation was caused by relay contact chatter of door mounted equipment as noted in Table IV "Electrical Monitoring Results..." of Wyle Report No. 43639-1 page no.21.

   *The SB switch cover is constructed of PVC insulating material and serves to prevent accidental electrical shock or provide electrical separation depending on application.

3) Electrical monitoring results from Wyle Report No. 43639-1 table IV and the General Electric SBD Engineering letter (from E. M. Fitzgerald to W. G. Woodward dated 2/8/78) indicate that the spurious operations of the switchgear can be attributed to the following causes:

   Chatter of the unit 101 51GS relay (set in its most sensitive time dial position) initiating the 86N lockout relay and tripping the breaker. (test run no.s 7, 9, 23, 24, 25, 28, 29, 30, 31, 34, 90, and 93).

Spurious operations of the 21NX and or 27NY hinged armature relays which were mounted on a hinged panel in unit 102 (test run no.s 55, 56, 57).

The General Electric SBD engineering letter (from E.M. Fitzgerald to W.G. Woodward dated 2-8-78) indicates that spurious breaker operation caused by chatter of the 51 GS relay was eliminated by bolting the unit 101 door panel closed. The door design was modified for production units to achieve a design that would provide adequate stiffness without the use of door bolts. Static tests of production doors using dowels and independently adjustable door latches revealed that a five fold increase in door stiffness could be achieved. This modification leads to higher reliability of the relays in the production units. Test runs 94 through 96 conducted with the unit 101 doors bolted indicated that spurious operation of the breaker was eliminated. The static tests show that the modifications to the doors listed above will eliminate the need for door bolting.

Restriction of motion of the hinged panel containing relays 21NX and 27NY in unit 102 eliminated spurious operation at the subject test levels.

It is noted that the test ZPA levels were an order of magnitude greater than the requirements of the NMP-2 Control & Diesel Generator Building ZPA levels.

Table III of Wyle 43639-1 contains information regarding the highest test level achieved without causing a breaker trip this information can be interpreted as the fragility level of the switchgear in its tested configuration. Inspection of the TRS plots referenced in table III, reveals that the NMP-2 switchgear floor response spectra are enveloped by the test levels.

4) The support documentation provided for the HPCS switchgear states that the equipment was bolted to the seismic test facility using commercially available bolts. the installed equipment is field mounted using plug and fillet welds in lieu of bolting. the field mounting is in accordance with the requirements of General Electric Co., medium voltage switchgear department, drawing no. 006482630 "Installation details; heavy duty indoor metalclad switchgear." The drawing excerpt indicates that the welded mounting is the preferred floor anchoring method. It is also noted that this anchoring method has been tested to seismic levels that envelope the NMP-2 requirements in two separate tests of switchgear units under Wyle Laboratories report no.s 44365-1 and 43968-1 rev. A.

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER BOP-1

FINDING

The applicant must confirm that the method of mounting the subassemblies and electrical devices to the installed panel are equivalent to those mounting methods used in the seismic tests.

RESPONSE

The method of mounting of subassemblies and electrical devices to the tested panel is illustrated in the vendor (Comsip, Inc.) report (SWEC File No. STRS 07-155-5000A) in the form of photographs. However, the photographs included in the report are of poor quality and mounting details cannot be clearly identified. The original photographs are no longer available.

In subsequent discussions with the vendor, it has been determined that the subassemblies and electrical devices are mounted in the same manner on all similar panels that the vendor manufactures, and that Wyle Laboratories has performed seismic testing of a complete panel, including mounted devices. These test results are documented in Wyle test Report No. 58095. This report has been included in SWEC File No. STRS 07-155-5000A.

Comsip has certified, in a letter dated January 28, 1986, that the panel, devices, and devices and panel mounting tested by Wyle are similar to that provided to Nine Mile Point Unit 2 (NMP2). In addition, a comparison of the tested response spectra (TRS) used in the Wyle test to the required response spectra (RRS) for NMP2 indicates that significant margin exists (factor of 11 at the ZPA range and factor of 4.3 at the equipment resonance frequency).

It is, therefore, concluded that that NMP2 panel and devices are adequately qualified for their intended use.

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER BOP-3

FINDING

The cabinet was qualified with a 50 ft-lb torque on mounting bolts. The applicant must demonstrate how this torque value will be maintained on regular mounting bolts during the entire life of the plant, given the possibility of relaxation and creep.

RESPONSE

The following discussion indicates that this cabinet mounting connection will not be subjected to conditions which typically contribute to excessive relaxation or creep..

Standard nuts and washers are used so that thread engagement length is satisfactory. There is no bolt head to body fillet (since this is a nut/stud fastener) which could otherwise tend to enlarge the holes, leading to embedment and loss of prestress. Gaskets are not used, another common source of joint relaxation. The ambient environment is relatively stable, such that elevated or variable temperature and humidity conditions do not exist, which could cause joint expansion, corrosion or creep effects. Multiple surfaces in a joint increase relaxation because there are more high spots and irregularities to yield under initial contact forces; this connection has the minimum possible number of adjoining surfaces. Stress reversal, under normal operating conditions, is not present.

The literature quotes a range of typical relaxation values as 10-25% of preload. The initial clamp force generated by the stated torque value is 6000 lb. per bolt, which compares to a tensile load in the most critical bolt of 1995 lb., caused by seismic response of the cabinet. Consequently, 50% relaxation of preload could be tolerated and still leave a margin of 50% over that necessary to accommodate the applied load.

Based upon these conditions no further action is planned.

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER BOP-4

FINDING

Actual installed equipment is mounted differently than the tested equipment; i.e., the installed equipment has a space behind the four mounting points, whereas the tested equipment was flush against the horizontal supports. The applicant must demonstrate similarity between tested and installed conditions.

RESPONSE

The panelboard mounting deviation at the site was determined to be acceptable by performing new seismic tests in which the actual NMP2 installation was duplicated. The test results are documented in approved test report, S&W File No. STRS 01.420-5000D.

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER BOP-5

FINDINGS

No justification was provided for acceptability of the anomalies observed during testing of various devices. The nozzle loads assumed for analysis of the engine mounted system were not confirmed.

The use of loose shim plates in mounting the generator skid was not justified.

RESPONSE

A letter from the vendor dated 8/13/85 addresses the subject anomalies, including loosening of the differential pressure gauge mounting arrangement, a requirement for periodic surveillance has been transmitted to NMPC via Equipment Qualification Maintenance Program Data Sheet - EQMPDS E031AAA and E031AAB. These EQMPDS are transmitted to the Maintenance Department in accordance with procedures and incorporated into appropriate preventative or corrective departmental procedures.

Refer to response to confirmatory Issue 3.10.1.3(3).

A review of the foundation drawing for installation of the generator skid (Cooper Bessemer Drawing No. KSV-97-16) found no loose shim plates specified for the generator mounting.

There appears to be a misunderstanding in terminology used. The above-referenced drawing refers to a sole plate which is placed on top of the grout, under the bottom washer of the foundation bolts (see attached sketch). The bolts were torqued to the specified value, and the sole plate was set and level in accordance with SWEC procedure SC-28-12, as verified and documented in the QC inspection report that was presented during the audit.

The installation drawing referenced above does not call for any shim plates to be used in the installation of the generator skid, and none were used as verified by field walkdown.

It is concluded that the generator skid is adequately mounted in accordance with applicable procedures and as verified by QC inspection.

PREGROUTING INSTRUCTIONS FOR SOLE PLATES
KSV UNITS

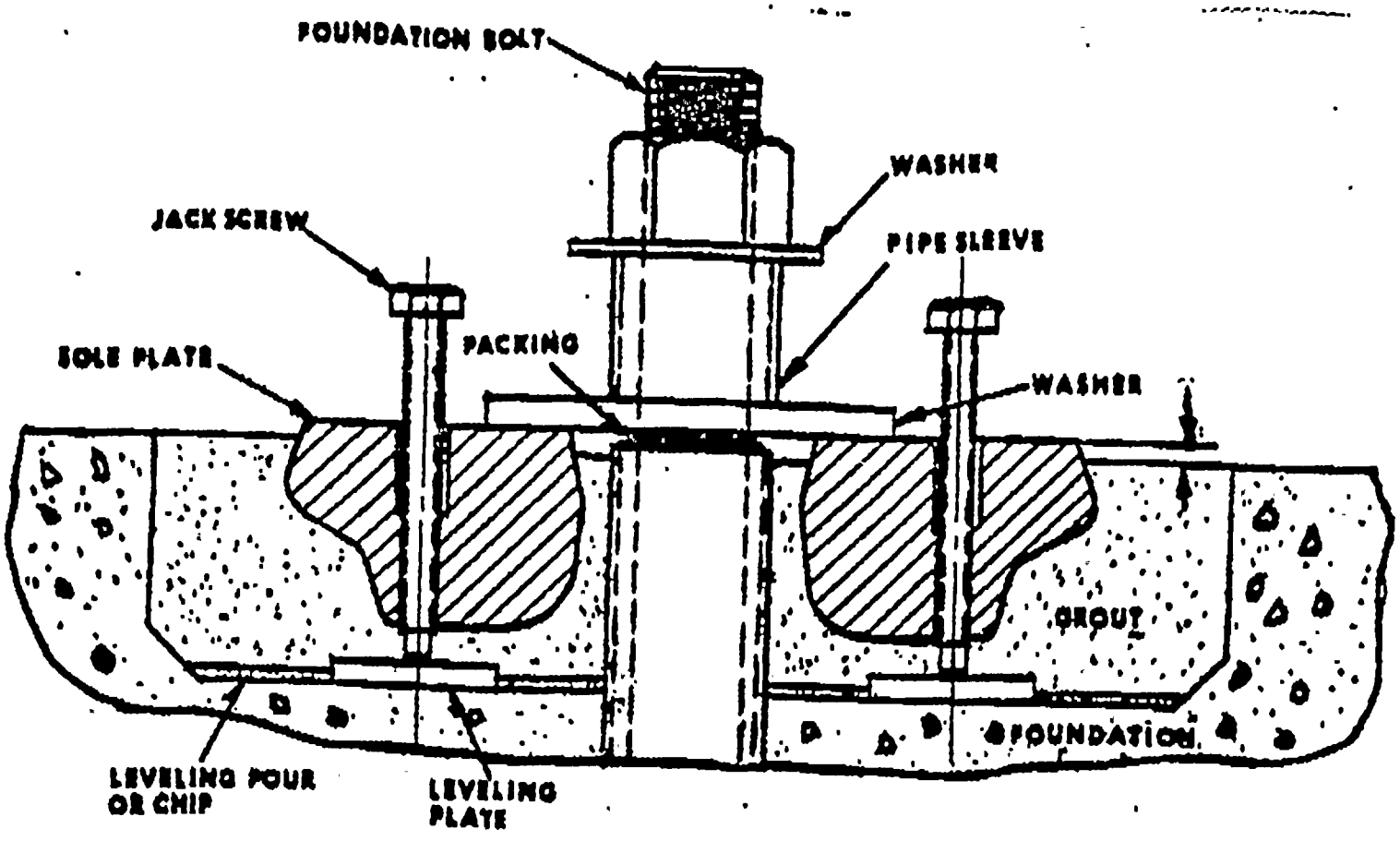

FIGURE 1

SOLE PLATE PREGROUTING DEVICES

SER OPEN ITEM

TABLE 3.1 SQRT IDENTIFICATION NUMBER BOP-11

FINDING

It appears that in the analysis some nodes were assumed anchored, although they are not really anchored in the field (ref. AAF RPt. NESE-714, p. 25). This might lead to unconservative results. The applicant must confirm actual field mounting is reflected in qualification analysis.

RESPONSE

In order to demonstrate the adequacy of the vendor's (American Air Filter) analytical model presented in AAF Report NESE-714, page 25, SWEC has performed a verification analysis.

The vendor, in Report NESE-714, had used the STRUDL computer program. SWEC, in Calculation MS-2062, has used the STARDYNE computer program. Thus, SWEC has developed two analytical models as follows:

Model 1 - Modified the boundary conditions to reflect actual field mounting as suggested by the NRC; i.e., removed the questioned anchoring of the referenced nodes.

Model 2 - Duplicated the boundary conditions used in AAF Report NESE-714.

A comparison of the first mode frequencies of the three models indicates that the anchoring of the questioned nodes had an insignificant effect on the frequency as shown below.

The first frequencies are:

AAF Model - 28.04 Hz
SWEC Model 1 - 30.925 Hz
SWEC Model 2 - 30.981 Hz

In addition, a comparison of the first 7 mode shapes (6 of the 7 are the significant modes) of the two SWEC models yielded the same results. The analysis presented in the AAF model resulted in the lowest frequency and, therefore, yielded a more conservative result than the two SWEC models.

In summary, the SWEC verification analysis has demonstrated that: (1) the anchoring or removal of the anchoring of the questioned nodes did not have significant effects on the resultant frequencies, and (2) the vendor's analysis is adequate since it yielded more conservative results.

SER OPEN ITEM

TABLE 3.2 PVORT IDENTIFICATION NUMBER 2MSS*HYV6A

FINDING

Verify qualifiation of actuator.

RESPONSE

The qualification of the actuator is complete.

SER OPEN ITEM

TABLE 3.2 PVORT IDENTIFICATION NUMBER 2SWP*MOV1A

FINDING

Due to specification violation regarding maximum torque output, retrofit of actuator (gear ratios) and valve stem (shaft materials) was required. To be evaluated are:

Stress allowables exceeded elsewhere in the assembly (e.g., interface between shaft and ball).

Applicant must determine if the test/analysis used in qualification is still valid as a result of the retrofit.

Applicant must identify the schedule and action being taken to address this operability problem.

RESPONSE

Contromatics calculation dated October 7, 1985 establishes adequacy of the stem and ball interface (Calculation Misc. 5.340-5001A.)

The interface between the shaft and the ball is determined by Operability Report 16985-82N, which is verified by contromatics letter dated July 9, 1985, and operator torque is verified by Limitorque letter dated September 23, 1985, and this is summarized in E&DCR P41156. No other components are affected by the change in the gear ratios of the limitorque electric operators, as confirmed by Comtromatics letter dated February 12, 1986.

Parts are available and completion of field work will be tracked as N&D 12,915.

CONFIRMATORY ISSUE 3.10.1.3(5)

It was observed that the floor spectra for the control and diesel generator building were recently revised exhibiting a frequency shift (refer for example to E&DCR P02502 dated January 12, 1985). The applicant must confirm before fuel load that all equipment in these buildings is qualified to the revised spectra.

RESPONSE

As a result of the revised floor response spectra for the control and diesel generator buildings (E&DCR P02502), all previously approved seismic qualification documents for the affected equipment in these buildings were reevaluated. It has been determined that all affected equipment is qualified to the revised spectra.

This review is documented for BOP equipment in the following SWEC calculations.

Calc. No.	Spec.	Equipment
MS-1831-1	E033A	Storage Batteries and Racks
MS-1844	P243U	Air Filter Assemblies
MS-1846-1	P413E/V	Central Station A/C Units
MS-1852	P413R	Safety-related Axial Fans
MS-1856-1	C071V	Flexible Metal Hose
MS-1857	P222X	Safety-related Horizontal Centrifugal Pumps
MS-1858	P225E	Standby Diesel Generator Fuel Oil Transfer Pump
MS-1859-1	P413H	Centrifugal Liquid Chillers
MS-1864	P413T	Safety-related HVAC Dampers
MS-1870	E031A	Standby Diesel Generator systems
MS-1871	P412M/W	Safety-related unit Space Coolers
MS-1879	P413S	Safety-related centrifugal Fans
MS-1883	C072U	Vibration Monitoring System
MS-1895	C021L	Level Switches

For NSSS equipment, these results are documented in GE Document DRF A00-02129-1, Rev. 3 dated January 23, 1986.

CONFIRMATORY ISSUE 3.10.1.3(6)

A recent study by the applicant indicates that the vertical floor response spectra in the control building may be exceeded by as much as 50-60 percent at certain frequencies if the floor flexibility is accounted for in the model used for dynamic analysis of building structures (refer to applicant's letter, dated October 25, 1984). The applicant must confirm before fuel load that all equipment in control building has been verified against this possible exceedance of vertical response spectra.

RESPONSE 3.10.1.3(6)

The vertical direction natural frequencies of the control building floors were determined by in-situ vibration testing. The test results are documented in SWEC Report No. V-230 (Calculation No. 12177-NS-2056). Amplified response spectra were also developed to include the floor flexibility at the natural frequencies of concern (reference SWEC Calculation No. 12177-EM3.285). The existing seismic qualification data for the affected seismic Category I equipment was evaluated versus the new response spectra. The qualification data test response spectra enveloped the New RRS (including the effects of floor flexibility) by considerable margins as demonstrated below:

Mark No.	Location	Qualification Document	% Margin
2BYS*CHGR2A2	CB261FT	QR-14476 Rev. 7	340
2BYS*CHGR2B2	CB261FT	QR-14476 Rev. 7	340
2EHS*MCC103	CB261FT	STRS01.340-5000D	92
2EHS*MCC303	CB261FT	STRS01.340-5000D	92
2EJS*X1A	CB261FT	STRS01.330-5001B	620
2EJS*X3B	CB261FT	STRS01.330-5001B	620
2ENS*SWG101	CB261FT	STRS01.320-5000X	76
2ENS*SWG103	CB261FT	STRS01.320-5000X	76
2VBA*UPS2A	CB261FT	STRS01.560-5013A	132
2VBA*UPS2B	CB261FT	STRS01.560-5013A	132
2CEC*PNL602	CB306FT	STRS016.610-5000C	116
2CEC*PNL603	CB306FT	STRS016.610-5000C	116
2CEC*PNL701	CB306FT	STRS016.610-5000C	116
2CEC*PNL748	CB306FT	GE No. DRFA00-02129-1 Rev. 3	116
2CEC*PNL851	CB306FT	GE No. DRFA00-02129-1 Rev. 3	564
2CEC*PNL852	CB306FT	STRS016.610-5000C	116

The above table demonstrates the adequacy of the qualified seismic Category I equipment to withstand the anticipated amplification resulting from the floor flexibility with considerable margin of safety

TABLE 3.3

Generic Item 3

FINDING

The applicant should amend the existing tables of pumps and valves in the FSAR to include the standards used for qualification. As an alternative, a separate table may be provided which includes the above information correlated to FSAR Tables 2.9A-1 and 3.9B-4. Listed are IEEE standards only. Applicant must provide a list of standards used for pump and valve operability qualification.

RESPONSE

NSSS See Revised Table below which will be incorporated in the FSAR.

GE-SUPPLIED SEISMIC ACTIVE PUMPS AND VALVES

Component	Master Parts List No.	Standards
Main steam SRV	B22-F013	IEEE 32301974 IEEE 344-1975 IEEE 382-1980 NUREG-0588, Cat. 1 ASME Section III, 1974 Ed. S76 Addenda
Standby liquid control (explosive) valve	C41-F004	IEEE 323-1974 IEEE 344-1975 NUREG-0588, Cat. 1 ASME Section III, 1977 Ed. S77 Addenda
CRD solenoid valve	C12-F009 C12-F110 C12-F160 C12-F162 C12-F163 C12-F182	IEEE 323-1974 IEEE 344-1975 IEEE 382-1980 NUREG-0588, Cat. 1 ASME Section III, 1971 Ed. S73 Addenda
CRD globe valve	C12-F010 C12-F011 C12-F180 C12-F181	IEEE 344-1975 ASME Section III, 1971 Ed. S73 Addenda IEEE 344-1975 IEEE 382-1980 ASME Section III, 1977 Ed. S77 Addenda
HPCS gate valves	E22-F001 E22-F004 E22-F010 E22-F011 E22-F012 E22-F015 E22-F023	IEEE 323-1974 IEEE 344-1975 IEEE 382-1980 NUREG-0588, Cat. 1 ASME Section III, 1971 Ed. W73 Addenda

GE-SUPPLIED SEISMIC ACTIVE PUMPS AND VALVES

Component	Master Parts List No.	Standards
RCIC Turbine	E51-C002	a, b
RCIC Pump	E51-C001	d, e, f, h, j
SLC Pump and Motor	C41-C001	Pump: d, e, f, h, i Motor: a, b, c, d, e, f, g, h, i, j
RHR Pump and Motor	E12-C002	Pump: d, e, f, h, i Motor: a, b, c, d, e, f, g, h, i, j
LPCS Pump and Motor	E21-C001	Pump: d, e, f, h, i Motor: a, b, c, d, e, f, g, h, i, j
HPCS Pump and Motor	E22-C001	Pump: d, e, f, h, i Motor: a, b, c, d, e, f, g, h, i, j

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(1) a: IEEE-323-74
b: IEEE-344-75
c: IEEE-334-74
d: Reg. Guide 1.48
e: Reg. Guide 1.60
f: Reg. Guide 1.61
g: Reg. Guide 1.89
h: Reg. Guide 1.92
i: Reg. Guide 1.100
j: Reg. Guide 1.122

BOP

See FSAR Table 3.9A-4

TABLE 3.3

Generic Item 4
and Confirmatory Issue 3.10.2.3(4)

FINDING

For those components for which qualification and/or operability assurance was achieved by analysis alone, some question remains as to the confidence level assured by this methodology. The necessity for additional component testing is being considered and cannot be estbalished without an inspection at the plant site. See Section 3.10.2.3, item 4, this supplement.

RESPONSE

NSSS

The following mechanical equipment was qualified by analysis only:

Recirculation Pump/Motor and Recirculation Valves

These components have a pressure integrity only function; they need not operate during or after an accident. Qualification by analysis only to show structural integrity is performed for the SQRT program and is adequate. Qualification for operability under the PVORT program is not required.

SLC, RHR, HPCS, LPCS AND RCIC Pumps

These pumps are qualified by analysis only while the drivers are qualified by a combination of test and analysis. The basis for the use of analysis only for the pumps is as follows:

Equipment which is large, simple, and which can be adequately modeled is qualified by an analysis which shows that the loads, stresses, and deflections are less than the values which give assurance of proper operation. The impracticality of performing full-scale tests on large equipment results in the need to perform a combination of test and analysis. The drivers (motors and RCIC turbine) are therefore qualified by a combination of test and analysis, while analysis only is used for the pumps.

Experience has shown that the analytical methods utilized have excellent correlation to field data, and if pumps and motors are maintained in good mechanical condition with clean process fluid, analysis can be used as the primary means to demonstrate operability.

In summary, analysis only is acceptable when the following conditions are met:

- Impracticality of full-size tests
- Operability depends on loads, stresses, and deflections (applies to purely mechanical equipment such as pumps)
- Analytical methods are shown to have good correlation to field data

- Maintenance program to ensure equipment is maintained in good mechanical condition

Fulfillment of the above conditions for the listed pumps justifies the qualification method.

BOP

The following equipment was qualified by analysis.

Vacuum Relief Valves

The vacuum relief valves are considered simple in design and can be adequately modeled to demonstrate seismic/dynamic qualification and operability by analysis. The analysis uses maximum disc velocities, obtained from pressure transients, as the basis for obtaining impact loads. The analysis considers the seismic/dynamic loads together with the transient loads to determine the stresses, and demonstrates that adequate safety margins exist.

NMPC had responded to NRC SER confirmatory issue 13(k), where a similarity between NMP2 drywell floor vacuum breaker, which was analyzed, to Commonwealth Edison Company's LaSalle Units 1 and 2 vacuum breaker, which was tested, has been established. The results of that evaluation concluded that the analysis adequately demonstrated the functional capability of these valves and no additional testing is needed.

The following is a comparison of the analysis performed for the NMP2 drywell floor vacuum breaker and the analysis performed for the subject vacuum relief valve 2RHS*RVV36A.

(a) Both valves are manufactured by the same vendor and with the same material and method of fabrication.

(b) Both analyses combine seismic/dynamic inertia loads with the operating loads (i.e. pressure transients).

(c) Both analyses utilize energy principles to determine stresses in the disc due to impact loading.

(d) The same structural analysis methods are used to calculate stresses in the various valve components.

(e) Both analyses used maximum disc velocities as the basis for obtaining impact loads. The difference is that for valve 2RHS*RVV36A only the opening velocity was determined to be significant. The stresses from the opening transient impact loading are within the acceptable limits.

The above demonstrate the adequacy of the analytical method, to assure qualification and operability of this type of valve.

Pumps

Qualification of all active pumps is assured through a combination of analysis and testing. Active pumps are designed in accordance with the requirements of ASME III, and their performances are assured by subjecting them to a series of stringent tests, both prior to installation and after installation in the plant. These performance tests are delineated in the NMP2 FSAR Section 3.9.3.2.1A. Table 3.9A-12 of the FSAR lists all active pumps.

However, due to test equipment limitations and difficulties in simulating operating conditions simultaneously with seismic loadings, it is not practical to seismically qualify this type of equipment by test. Thus, adequate analytical models are developed to demonstrate seismic qualification of pump assemblies. Analysis is an acceptable method of qualification in accordance with IEEE 344-1975.

Valves

Overall qualification of active valves is accomplished through combined testing and analysis. All valves are subjected to in-shop hydrostatic and functional tests, and periodic valve exercising/in-service performance tests to assure functional operability. For valves with extended structures, operability of the valve assembly under seismic/dynamic loading is demonstrated by static deflection testing. Also, Class 1E electrical appurtenances (motor operators, limit switches, etc.) are qualified by dynamic testing.

For certain types of valves, seismic/dynamic qualification is achieved only by analysis. These valves are characteristically simple in design, and in some cases, they do not have extended structure or mass whose motion could cause distortions or restrict operation of the valve. A list of these by valve type and the basis for using analysis for qualification are provided below.

Valve Type	Qty	Spec. No.	Basis For Qualification
1. Double Slimline Vacuum Breaker Valve	8	P303R	(1)
2. Vacuum Relief Valve	59	P305B	(1)
3. Check Valves	52	P304 H,J,Y	(2)
4. Swing Check Valves	10	P303W	(3)
5. Feedwater Check Valves	4	P303W	(4)
6. Exhaust Relief Valves	3	P305E	(5)

BASIS FOR QUALFICATION

(1) See response regarding vacuum relief valves (2RHS*RVV36A) described above. The double slimline vacuum breakers and other vacuum relief valves are similar in design to 2RHS*RVV36A, thus, the same basis for qualification is applicable.

(2) Check valves are considered simple in design and do not have extended structures or masses. These valves are designed and certified in accordance with ASME III Subsections NB, NC and ND 3500 as applicable. In addition, piping analysis ensures that the stresses in piping, which is weaker than the valve body, are below the ASME code allowable limits.

(3) For these valve assemblies, the air operator is not classified as safety related. Thus, an analysis of the extended structure is adequate to assure structural integrity. However, the limit switches and the solenoid valves are classified as Class 1E and are qualified by test in accordance with IEEE 323-1974 and IEEE 344-1975. In addition, these valves are designed, tested and certified in accordance with the ASME III code.

(4) The feedwater check valves are qualified by dynamic analysis for the worst transient condition following a pipe break. The seismic/hydrodynamic loads are also considered in the analysis. The same method of analysis has been used for feedwater check valves by Limerick Unit 1 and River Bend Station Unit 1 plants which was accepted.

(5) The diesel exhaust relief valves are simple in design and do not have an extended structure. The design pressure is less than 1 psi. Thus, analysis adequately assures the seismic qualification of these valves.