C. Hofmayer
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 25 1981

50-373
50-374

MEMORANDUM FOR: Zoltan R. Rosztoczy, Chief
Equipment Qualification Branch
Division of Engineering

FROM: Pei-Ying Chen
Equipment Qualification Branch
Division of Engineering

THRU: CHH Charles H. Hofmayer, Section Leader
Equipment Qualification Branch
Division of Engineering

SUBJECT: TRIP REPORT FOR SEISMIC CRITERIA IMPLEMENTATION MEETING WITH COMMONWEALTH EDISON ON LASALLE UNITS 1 AND 2

The Seismic Qualification Review Team (SQRT) consisting of engineers from the Equipment Qualification Branch (EQB) and the Idaho National Engineering Laboratory (INEL, EG&G) made a site visit to LaSalle Units 1 and 2 near Ottawa, Illinois, on November 17 thru 21, 1980. A list of attendees at the meeting is contained in Attachment I.

The purpose of the visit was to conduct a plant site review of the qualification methods, procedures, and results for a list of selected Seismic Category I mechanical and electrical equipment and their supporting structures. The intention was also to observe the field installation of the equipment, based on which judgments can be made as to the validity of the equipment modelling employed in the qualification program, with respect to the equipment confirguration and its mounting condition.

The background, review procedures, findings and the required follow-up actions are summarized below.

1. Background

The applicant has described the equipment qualification program in Sections 3.9 and 3.10 of the Final Safety Analysis Report, consisting of dynamic testing and analysis, used to confirm the ability of seismic Category I mechanical and electrical (includes instrumentation, control and electrical) equipment and their supports, to function properly during and after the safe shutdown earthquake (SSE) specified for the plant. The applicant has also described the program for the qualification of safety-related equipment for the combined seismic and hydrodynamic vibratory loads associated with the MARK II containment suppression pool.

In instances where components have been qualified by testing or analysis to other than current standards such as Institute of Electrical and Electronics Engineers Standard, 344-1975, "Recommended Practices for Seismic Qualification of Class IE Equipment for Nuclear Power Generating

Stations," and Regulatory Guides 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis," and 1.100, "Seismic Qualification of Electric Equipment for Nuclear Power Plants," or where equipment is affected by and was not qualified for the suppression pool hydrodynamic loads, the applicant has undertaken a reevaluation and requalification program.

The applicant has identified those items of nuclear steam supply system and balance-of-plant equipment requiring reevaluation, has described the methods and criteria used to determine the acceptability of equipment qualification to meet the required dynamic loads, has submitted plans for a confirmatory in-situ impedance test and an in-plant SRV test program, and has submitted the up-to-date reevaluation and requalification results.

The plant site review was performed to determine the extent to which the qualification of equipment, as installed in LaSalle 1 and 2, meets the current licensing criteria as described in the Standard Review Plan (SRP) Sections 3.9.2 and 3.10.

2. Review Procedures

Prior to the site visit, the SQRT reviewed the equipment seismic qualification information contained in the pertinent FSAR sections and the reports referenced therein. A representative sample of Seismic Category I mechanical and electrical equipment, including both NSSS and BOP scopes as shown in Attachment II, were selected for the plant site review. The review consisted of field observations of the actual equipment configuration and its installation, followed by the review of the corresponding test and/or analysis documents. Brief technical discussions were held during the review sessions to provide SQRT's feedback to the applicant on the equipment qualification. An exit conference was held to summarize and conclude the plant site visit.

3. Findings

The results of the review of the qualification reports and pertinent documents for equipment as listed in Attachment II are summarized in Attachment III for each piece of equipment evaluated.

Due to the time limitation, the SQRT, at the conclusion of the site visit, requested the applicant to provide the test and/or analysis reports for the following four items for further review:

a) RCIC pump with turbine (NSSS-16)
b) 2" Air-operated control valve (BOP-5)
c) Diesel Fuel Storage Tank (BOP-T7)
d) Local Panels (NSSS-21)

The plant site review identified the need to provide additional information and to clarify the details of the qualification for some pieces of equipment as described in Attachment III. The applicant has committed to submit additional information and clarification for a follow-up review. The follow-up actions are described in Section 4.

4. Follow-Up Actions

In order to complete our review we requested the applicant to provide the following information:

A. Provide qualification reports as listed in Section 3 for further review.

B. Provide completed SQRT forms for NSSS and BOP equipment identified as "Open" in the CECO letter of December 12, 1980.

C. Identify all equipment which has been modified or replaced as a result of the reevaluation/requalification program. (include name, model number, manufacturer title and date of qualification report and system in which equipment is located). State reason for modification or replacement. The staff agreed that this information was not essential for its SER and need not be provided until the completion of the requalification program.

D. Provide the following information:

(a) Results and conclusions of fatigue evaluations. Describe applicability of evaluations to draw generic conclusions for all equipment in the plant.

(b) Results and conclusions of exploratory testing of relays.

E. Provide schedule for submission of results and conclusions of SRV Test Program as it relates to the equipment being monitored during the testing.

F. Provide results and conclusions of the inplant impedance tests. In particular provide the detailed information to support the qualification of the following items:

a) HPCS 4" Gate Valve
b) MSIV Leakage Control System Exhaust Blower.
c) HPCS 12" Globe Valve.
d) SRM and IRM Preamplifier Enclosure.
e) SGTS Equipment Train.
f) SGTS Primary Supply Fan.
g) SGTS Control Panel.
h) Limitorque Motor Operators.

G. Provide the results and conclusions of the reassessment of valve qualifications. Provide the piping analysis results as they relate to the qualification of the following items:

a) HPCS 4" Gate Valve.
b) 18" HPCS Gate Valve.
c) HPCS 12" Globe Valve.
d) RCIC Pump.
e) 2" Control Valve, Air Operated.
f) Limitorque Motor Operators.

H. Provide clarifying details as discussed in Attachment III for the following items:

a) HPCS 4-In. Gate Valve.
b) RHR Heat Exchanger.
c) HPCS 12 Inc Globe Valve.
d) SLC Storage Tank.
e) Condensing Chamber
f) Local Panels.
g) Level Indicator Switch.
h) Differential Pressure Transmitter.
i) SGTS Equipment Train.
j) 72-inch Secondary Containment Isolation Dampers.
k) SGTS Control Panel.
l) Post LOCA Hydrogen Recombiner.
m) HPCS Oil Storage Tank.

The review of the applicant's implementation of the equipment qualification program is continuing and the applicant is required to resolve all outstanding items as identified in Section 4 above.

Pei-Ying Chen

Pei-Ying Chen
Equipment Qualification Branch
Division of Engineering

Enclosures:
As stated

cc: R. Vollmer w/o encl.
V. Noonan
R. Tedesco
B. Youngblood
W. Russell, w/o encl.
R. Hermann, w/o encl.
C. Hofmayer
A. Bournia
A. Lee
B. Barnes, INEL
M. Reich, BNL

ATTACHMENT 1

SQRT VISIT TO LA SALLE

List of Attendees

1.	C. H. Hofmayer	NRC/EQB
2.	Pei-Ying Chen	NRC/EQB
3.	J. Sinnappan	Sargent & Lundy
4.	Phil Peterson	Sargent & Lundy
5.	A. E. Meligi	Sargent & Lundy
6.	R. W. Hardy	GE
7.	E. Falb	CECO
8.	G. R. Crane	CECO
9.	J. N. Singh	EG&G Idaho, Inc.
10.	G. L. Thinnes	EG&G Idaho, Inc.
11.	G. K. Miller	EG&G Idaho, Inc.
12.	J. F. Etzweiler	LILCO

Attachment 2

EG&G Idaho, Inc.
P.O. BOX 1625, IDAHO FALLS, IDAHO 83415

January 21, 1981

Mr. R. E. Tiller, Director
Reactor Operations and Programs Division
Idaho Operations Office - DOE
Idaho Falls, ID 83401

SQRT REVIEW OF LASALLE UNITS 1 AND 2 (A6415) - JAD-24-81

Ref: (a) R. H. Vollmer ltr to C. E. Williams, INEL Technical Assistance to the Division of Engineering, Office of Nuclear Reactor Regulation, NRC, Dynamic Qualification of Safety Related Electrical and Mechanical Equipment II (A6415), August 4, 1980
(b) G. E. Marx ltr to S. B. Milam, Marx-335-80, Transmittal of New 189a Statement of Work (A6415), September 24, 1980

Dear Mr. Tiller:

References (a) and (b) describe in detail the task being performed by EG&G Idaho, Inc. in support of the Equipment Qualification Branch (EQB) of the Nuclear Regulatory Commission (NRC). The EQB has the lead responsibility for reviewing and evaluating the dynamic qualification of safety related electrical and mechanical equipment which may be subjected to vibration from earthquakes and/or hydrodynamic loads. The details of this equipment and how they meet the design criteria are described by applicants in a Final Safety Analysis Report (FSAR). On completion of the FSAR review evaluation and approval, the applicant receives an Operating License (OL) for commercial plant operation.

Applicants are required to use test or analysis methods or a combination of both to qualify equipment essential to plant safety, such that its safety function will be ensured during and after a dynamic event.

The objective of this project is to obtain expert technical personnel to assist the EQB in carrying out their responsibilities relating to the review and evaluation of equipment dynamic qualification aspects of FSARs submitted by electric power utilities for operating licenses.

Reference (b), Task 1, Subtasks 2 and 3 describes one of eight plant site Seismic Qualification Review Team (SQRT) visits being performed as a part of this task. The enclosure is a report by EG&G Idaho personnel (G. L. Thinnes, J. N. Singh, and G. K. Miller) who assisted the NRC in the on-site SQRT review of the LaSalle Plant selected seismically qualified equipment. This

review consisted of field inspection of the equipment, detailed review of the qualification reports, and resolution of questions or identification of action items encountered during the review. The enclosed report covers the initial findings on the above items and defines four pieces of equipment to be used for a follow-up in-depth confirmatory review.

The enclosure completes Subtask 3 of Reference (b). Subtasks 4, 6, and 7 remain to be done for this plant.

Very truly yours,

for J. A. Dearien, Manager
Code Assessment and
Applications Division

BLB:clj

Enclosure:
As stated

cc: W. Y. Chen, NRC-DE
C. H. Hofmayer, NRC-DE
R. W. Kiehn, EG&G Idaho

LA SALLE 1 AND 2

SQRT VISIT REPORT

S.N.	REF. N.	TITLE
1	NSSS 2	HPCS 4-In. Globe Valve
2	NSSS 5	RHR Heat Excnanger
3	NSSS 8	MSIV Leakage Control System Exhaust Blower
4	NSSS 11	18-In. HPCS Gate Valve
5	NSSS 13	HPCS 12-In. Globe Valve
6	NSSS 15	HPCS Diesel Service Water Pump
7	NSSS 16	RCIC Pump
8	NSSS 18	SLC Storage Tank
9	NSSS 20	Condensing Chamber
10	NSSS 21 $(b)_1$	DC Power Supply
11	NSSS 21 $(b)_2$	Feedwater and Recirculation Instrument Panel
12	NSSS 21 $(b)_3$	Nuclear Steam Supply Shut-Off Process Instrument Panel
13	NSSS 21 $(c)_1$	Pressure Transmitter
14	NSSS 21 $(c)_2$, $(e)_2$, $(g)_3$, $(e)_3$, $(g)_2$	Local Panels
15	NSSS 21 $(e)_1$, (v)	Level Indicator Switch
16	NSSS 21 $(g)_1$, (j)	Differential Pressure Transmitter
17	NSSS 22 (j)	SRM and IRM Preamplifier Enclosure
18	BOP 1	SGTS Equipment Train
19	BOP 2, 20	Cooling-Coil Cabinets
20	BOP 5	2-In. Control Valve, Air Operated
21	BOP 6	SGTS Primary Supply Fan
22	BOP 7	Isolation Dampers
23	BOP 11	SGTS Control Panel
24	BOP 12	Post LOCA Hydrogren Recombiner
25	BOP 14	Limitorque Motor Operator
26	BOP 15	Namco Limit Switch
27	BOP 16	HPCS Waterleg Pump
28	BOP 17	HPCS Oil Storage Tank
29	BOP 18	8-In. Motor-Operated Butterfly Valve
30	BOP 19	Control Cabinets

LA SALLE 1 AND 2
SQRT VISIT REPORT

1. HPCS 4-In. Gate Valve

The HPCS 4-in. gate valve is provided by Darling Valve and Manufacturing Company and has Equipment No. E22-F012. It is located in the Reactor Building on piping subsystem HP06. It is qualified by calculations performed by Sargent and Lundy dated August 28, 1980.

The valve was qualified by analysis using hand calculations. Natural frequencies of 46, 61.5 and 101 Hz for the valve were calculated, the first of which is a torsional frequency.

Stresses were calculated on the operator-yoke bolting, yoke-bonnet bolting, yoke leg, neck of bonnet, flange bolting and flanges. The calculations indicate that if the valve is subjected to 1.2 g or less in the three axial directions simultaneously, all stresses are less than allowable. It is therefore concluded in the report that the valve is qualified to an input level of 1.2 g.

In addition, allowable nozzle loads for the three directions were calculated to be

$$Fx = 10.7 \text{ k}$$
$$Fy = Fz = 2.67 \text{ k}$$
$$Mx = Mg = Mz = 69.3 \text{ in-kip.}$$

As discussed under the HPCS 12-in. globe valve, the treatment of the flexibility of this valve is questionable.

In order to complete our review, we require the applicant to provide: (1) further clarification of the treatment of the valve flexibility, and (2) the results of the piping analysis and impedance tests as they relate to the qualification of this valve.

2. RHR Heat Exchanger

RHR heat exchanger (equipment number E12-B001A/B; Model number E12-B001 A/B) was supplied by Strutner Nuclear and Process Company (GE). It is located in the reactor building between elevations of 694 feet 6 inches and 710 feet. It is supported at both the levels. The upper support has 16-7/8 inch bolts and the lower one had 8-2 1/2 inch bolts. The loads considerd in the qualification were seismic and hydrodynamic.

The RHR heat exchanger was qualified through analysis done by Sargent and Lundy. The mathematical model consisted of 3D-beam finite elements. Spring elements were used at supports with appropriate stiffness in each direction. Only the mass effects of the internals were accounted for in the model. A dynamic analysis was made using an envelope of the spectra for elevations 694 ft 6 in. and 710 ft for the reactor building at the RHR heat exchanger locations. These spectra accounted for the hydrodynamic loading. A 2% damping for SSE and 1% for OBE was used. The computer program used was SLSAP. The frequencies for the seven modes used in the analysis were as follows:

h_1 = 14.97, 25.57, 53.75 Hz
h_2 = 14.92, 24.36, 53.73 Hz
V = 62.82 Hz.

The forces and reactions at elements were used to calculate stresses at critical locations. The calculated stresses were then compared to allowables taken from Form 3508 (S&L standard consistent with ASME Codes).

During the review it was found that the adequacy of the internals were not demonstrated in the analysis. In response to this question, the applicant responded that even if the internal tubes were to rupture the functionability of the equipment would not be hampered. In order to conclude that the RHR heat exchanger is adequately qualified for the prescribed loading, we require additional information from the applicant to support this contention.

3. MSIV Leakage Control System Exhaust Blower

The equipment number of the blower reviewed is (GE 478518664) E 32-C001. It is mounted about 5 ft off the floor on a steel beam which is anchored into the concrete floor of the reactor building at elevation 673 ft. The blower housing is bolted to a steel plate which is welded to the beam. GE qualified the blower in the Lab Report No. 5430-6069. The in-service mounting was qualified by Sargent and Lundy.

Dynamic analysis of the support beam and blower housing yielded a peak response of 1.36 g's from the absolute sum of the seismic and SRV spectra. SLSAP 09713066 was used in a beam model assuming a rigid housing to determine the support response. A resonance search of the housing was performed over the 1 to 33 Hz range and no natural frequencies were found. Then biaxial testing in two horizontal-vertical planes was performed, each being a sine sweep test over the range of 3.5 to 33 Hz. Maximum acceleration in the tests was 3.0 g's. Requalification to the SRV [illegible] is dependent upon the impedance test performed on the installed equipment.

Considering the testing and analysis performed on the equipment and inspection of the installation, it is concluded that, if the impedance test shows no significant frequencies of the blower in the 33 to 60 Hz range, the qualification is valid. We requrested the applicant to submit the impedance test results for this equipment to support this assumption.

4. 18 In. HPCS Gate Valve

This valve (Equipment No. E22-F015), built by Darling Manufacturing Co., is located at reactor building elevation 710 ft. The GE Qualification Report for this valve is No. VPF 3173-135-3, dated October 24, 1974. The valve has bolted pipe flanges.

Qualification was performed by the equivalent static analysis of the valve and operator for a specified g-load of 4 g's. That g-load, applied simultaneously in three directions, produces the largest allowable stresses (ASME Class 2) in the valve body when combined with the piping nozzle loads. Due to the fact that two frequencies of the operator and valve were calculated in the 1 to 60 Hz range, the limiting g-load which will be allowed to be applied to the valve was reduced from the calculated 4.0 g's to 2.67 g's. This g-load limit, will be imposed upon the piping analysis. The piping nozzle loads will also be limited to those used in the valve analysis.

Based upon review of the analysis report, the valve can be considered qualified as soon as the piping analysis is verified to produce a maximum acceleration of less than 2.67 g's and piping nozzle loads less than specified in the valve analysis. In order to complete our review, we require the applicant to provide the results of the piping analysis as it relates to the qualification of this valve.

5. HPCS 12 In. Globe Valve

The HPCS 12 inch globe valve is provided by Anchor Valve Co. and has Equipment No. E22-F023. It is located in the Reactor Building at elevation 694 feet. It is qualified by calculations performed by Sargent and Lundy dated August 26, 1980.

The valve was qualified by analysis using hand calculations. Natural frequencies of 9.3, 28.9 and 60 Hz in the yoke leg were calculated, the first of which is a torsional frequency.

Stresses were calculated in the operator-yoke bolting, yoke leg, yoke-bonnet bolting, bonnet bolting, and flanges. The calculations indicate that if the valve is subjected to 0.93 g or less in the three axial directions simultaneously, all stresses are less than allowable. It is therefore concluded in the report that the valve is qualifed to an input level of 0.93 g.

In addition, allowable nozzle loads for the three directions were calculated to be

Fx = 68.6 k
Fy = Fz = 17.1 k
Mx = My = Mz = 1386 in-k.

It is questionable as to whether the flexibility of the valve has been appropriately accounted for in qualifying the valve to 0.93 g. In the analysis, the valve's flexibility was considered by dividing the allowable g-loads at the centroid of the valve by 1.5, and using this value as the allowable load for the valve. This method accounts for the valve flexibility by allowing an amplification in peak acceleration values of 1.5 from the valve's attachment location in the piping to the valve's centroid. Depending on the nature of the motion of the attached piping at the valve location and on the natural frequencies of the valve, higher amplifications could occur.

In order to complete our review, we require the applicant to provide: (1) further clarification of the treatment of the valve flexibility, and (2) the results of the piping analysis and impedance tests as they relate to the qualification of this valve.

6. HPCS Diesel Service Water Pump

The service water pump is provided by General Electric Co. and has Equipment No. E22-C002. It is located in the Auxiliary Building at elevation 673 feet. It is qualified by calculations performed by Sargent and Lundy dated August 20, 1980.

The pump was qualified by analysis using hand calculations. The following natural frequencies were thus determined:

Pump shaft - 260, 1719 Hz
Motor shaft - 48 Hz
Pump pedestal - 78 Hz

In the analysis both seismic and nozzle loads were considered. A static analysis was used to calculate stresses in the pump and motor hold-down bolts, pump pedestal, anchor bolts, flange bolts and flanges. A comparison between required and applied 'g' levels is as follows:

	N-S	E-W	V
Required g's	0.38	0.3	0.145
Applied g's	0.57	0.57	0.22

The loads were applied simultaneously in the three directions. All calculated stresses were lower than allowable values. No concerns with the qualification of this item were identified.

7. RCIC Pump

The RCIC pump is provided by Bingham-Williamette Co. and has Equipment No. E51-C001. It is located in the Reactor Building at elevation 673 feet. It is qualified by calculations performed by Sargent and Lundy dated July 12, 1980 and by previous calculations performed by Bingham-Williamette.

This item was qualified by analysis. Since the review of the analysis was not completed during the site visit, we requested the appicant to provide the qualification reports for further review. Important to the qualification of the pump is the treatment of the "Terry" turbine drive to which it is connected.

In order to complete our review we require the applicant to provide the nozzle loads on the pump as determined by the final piping analysis.

8. SLC Storage Tank

The tank (Equipment No. C41-A001) is [illegible]ted with 12 anchor bolts to the floor of the reactor building at elevation 820 ft. The tank was fabricated by Lamco Industries and Qualified in GE Report No. 22A4068 RA542, dated March 28, 1974. The tank is 108 in. in diameter, 145 in. nigh

and has a shell of 0.250 in. carbon steel plate. The top cover is reinforced with beam ribs welded to the shell. A 3 in. inlet pipe and an outlet pipe compose the significant attachments.

The tank was analyzed using hand calculations to determine the critical sloshing frequency of the tank considering the fluid to be divided into convective and rigid body portions. Conservative dynamic loads of 1.4 g's were applied and anchor bolt, skirt flange, shell, roof, and access hole cover stresses were calculated according to the ASME Code. The piping nozzle stresses which employed the Bijlaard stress evaluation were originally too high. Limit loads have been supplied to the piping analysts which are within nozzle-shell stress allowables.

During inspection of the tank it was noted that a 1/2 in. gap existed between the 3 in. concrete pedestal and the tank flange. We requested the applicant to provide an evaluation of the anchor-bolt stresses in light of this discovery. If this evaluation demonstrates sufficient integrity of the bolts, we will be able to conclude that the tank is adequately qualified.

9. Condensing Chamber

A number of condensing chambers were located in the primary containment of the reactor building. Equipment No. B21-D006 was inspected in place. The chamber, GE Model No. 736B2798, is welded to a main steam line and consists of a reducer, a tee, a short section of pipe, and a cap.

The chamber was modeled dynamically as part of the attached piping system. The stress analysis is to conform to the criteria of ASME Section III. By virtue of the fact that the attached piping sections are much smaller than those of the condensing chamber, piping stresses will govern the nozzle loading of the chamber. Originally, the stresses due to nozzle loads were calculated by a Bijlaard analysis but that method was shown to be inappropriate for the condenser geometry. Sargeant and Lundy

has agreed to evaluate the dynamic stresses via the piping analysis using appropriate stress multipliers for piping tees and reducers from NB3680 of ASME Section III.

In order to complete our review we require the applicant to provide verification that all component stresses are within allowables.

10. DC Power Supply (No. 159C4487)

The DC power supply (instrument number B21-K613 A/B, model number 9T66Y987) was supplied by GE/STD. A and B are mounted on panels H13-P612 and H13-P613 respectively. Each is bolted with four 1/4 inch bolts. These panels are located in the auxiliary building at an elevation of 768 feet. The load considered is seismic only. Qualification is documented in report number: GE No. 159C4487, dated November 1, 1978, Rev. 3.

These equipments were qualified through test. Both the field and laboratory mountings were the same. The required g-level for these was

S-S = 0.57 g
F-B = 0.36 g
V = 0.36 g.

However, this particular device was tested mounted on a panel C61-P001 which measured 96 in. W x 90 in. H x 36 in. D. The test was a pseudo-biaxial one and repeated in four orientations. The RRSs for this panel at an elevation of 768 ft in the auxiliary building are more severe than the panels H13-P612 and H13-P613. The TRSs for the test envelopes the RRSs. There were five OBE followed by one SSE tests.

Based on our review of the test report, and observed field installation, the dc-power supply is adequately qualified for the seismic loads.

11. Feed Water and Recirculation Instrument Panel

This panel (equipment number: H13-P612, model number 328X237TD) was supplied by General Electric. It is mounted with 10-3/4 inch bolts in the auxiliary building at an elevation of 731 feet. The load considered is seismic only.

This panel was qualified through analysis done by Sargent and Lundy. The mathematical model was made up of 3D-beam and plate finite elements. All devices and attachments contained in it were considered for mass effects. The computer code used was SLSAP 097130-660. The response spectrum method with simultaneous seismic loading in three directions was used. The input response spectrum curves were obtained by using 2% damping for SSE and 1% damping for OBE at an elevation of 731 feet in the auxiliary building. The natural frequencies from the analysis were as follows:

4.17	22.50	39.22	53.56
8.77	23.35	42.39	54.09
11.49	26.68	43.18	55.30
11.64	28.16	43.39	56.85
13.58	33.11	45.22	61.76
15.86	33.75	47.57	
16.23	34.04	48.86	
18.20	35.62	51.13	
19.39	37.04	51.53	

The frequency range was 0 to 60 Hz and 32 modes were used in the analysis. The stresses were compared to Form 350B.

Based on our review of the analysis reports, observed field installations and clarifications provided by the applicant, this panel is adequately qualified for the seismic loads.

12. Nuclear Steam Supply Shutoff Process Instrument Panel

This item (equipment number H13-P613, model number 328X238TD) was supplied by General Electric. It is mounted with 4-3/4 inch bolts in the auxiliary building at an elevation of 731 feet. The load considered is seismic only.

Panel H13-P613 was qualified through analysis done by S&L. The mathematical model was made up of 3D-beam and plate finite elements. All devices and attachments contained in it were considered for mass effects. The computer code used was SLSAP 097130660. Response spectrum method with simultaneous loading in three directions was used. The input response spectrum curves were obtained by using 2% damping for SSE and 1% damping for OBE at an elevation of 731 ft in the auxiliary building. The natural frequencies from the analysis were as follows:

15.44	33.07	57.56
26.05	37.08	76.58
28.58	51.21	
32.50	55.68	

Ten modes were used in the analysis. The stresses were compared to form 3508.

Based on our review of the analysis document, observed field installations and clarifications provided by the applicant, this panel is adequately qualified for the seismic loads.

13. Pressure Transmitter (No. 163C1292)

The pressure transmitter (instrument number B21-N051 A/B, model number 556) was supplied by Bailey Meter. 'A' is mounted on local panel H22-P004 with 4-3/8 inch bolts. This local panel is located at an elevation of 761 feet in the reactor building. 'B' is mounted on local panel H22-P027 with 4-3/8 inch bolts. This panel is also located in the

reactor building at the same elevation. The referenced reports are UPAD-GE Test Report Nos. 440, 453, 518, and 507. Seismic and SRV loads are considered in the qualification.

This piece of equipment was qualified through test. Both the field and laboratory mountings were the same. The first was a resonance search test between 5 to 100 Hz with a 0.8 g input in both horizontal axes and 0.37 g input in the vertical direction. No frequencies were found within the range of interest. The required g-level for this equipment, depending on the worst of the two locations, was

S-S = 1.35 g
F-B = 2.05 g
V = 0.9 g.

The equipment was then subjected to a single axis, single frequency 30 seconds dwell tests at 16, 22, 28, and 35 Hz in each direction. The g-level for the input was

S-S = 5.5 g
F-B = 5.5 g
V = 3.7 g.

A fragility test was also performed with an input of 10 g in each direction. The functionality of the equipment was verified.

Based on our review of the test report, the observed field installation, and clarifications provided by the applicant, we conclude that the pressure transmitters are adequately qualified for seismic and SRV loads.

14. Local Panels

The following panels, all of which are different assemblies out of three basic generic panels, are grouped together for review:

(i) Reactor Level and Pressure Panel 'A' (H22-P004)
(ii) Reactor Level and Pressure Panel 'C' (H22-P005)
(iii) Jet Pump Instrument Panel 'A' (H22-P010)
(iv) Reactor Level and Pressure Panel 'D' (H22-P026)
(v) Reactor Level and Pressure Panel 'B' (H22-P027)

The evaluation of these are presented following brief discussions of the pertinent information about each item.

(i) Reactor Level and Pressure Panel 'A' (H22-P004)

The Pressure Panel 'A' (Model No. 127D1826TD, Rev. 2) is supplied by General Electric Company and located in the reactor building at an elevation of 761 ft. It has the dimensions of 94 in. H x 102 in. W x 30 in. D and weigns 2100 lb. In this configuration it is an assembly of two basic panels: 94 in. H x 72 in. W x 30 in. D and 94 in. H x 30 in. W x 30 in. D, bolted together along the 30 in. side. This unit is mounted on the floor with 18-5/8 in. bolts.

(ii) Reactor Level and Pressure Panel 'C' (H22-P005)

Pressure Panel 'C' (Model No. 127D1833TD, Rev. 2) is supplied by the same vendor as H22-P004 and is also located in the reactor building at an elevation of 761 ft. It is one of the basic panels itself and has the dimension of 94 in. H x 72 in. W x 30 in. D. It weighs about 1500 lo and is attached to the floor with 12-5/8 in. bolts.

(iii) Jet Pump Instrument Panel 'A' (H22-P010)

Jet Pump Instrument Panel 'A' (Model No. 127D1832TD, Rev. 2) from the same vendor is located at an elevation of 710 ft 6 in. in the reactor building. In this configuration, it measured 94 in. H x 120 in. W x 30 in. D and weighs about 2300 lb. It consists of two basic panels measuring 94 in. H x 72 in. W x 30 in. D and 94 in. H x 48 in. W x 30 in. D bolted to each other along the 30-in. side. These are also bolted to floor with 5/8 in. bolts at 20 places.

(iv) Reactor Level and Pressure Panel 'D' (H22-P026)

This pannel (Model No. 127D1830TD, Rev. 1), weighing about 2600 lb, is supplied by General Electric Company. It consists of two basic panels (94 in. H x 72 in. W x 30 in. D each) bolted along its 30 in. side and has an overall dimension of 94 in. H x 144 in. W x 30 in. D. It is located in the reactor building at a elevation of 761 ft. This model also has 24-5/8 in. bolts connecting it to the floor.

(v) Reactor Level and Pressure Panel 'B' (H22-P027)

General Electric Company is also the vendor for this panel (Model No. 127D1929TD, Rev. 2). This configuration consists of two basic panels (94 in. H x 72 in. W x 30 in. D and 94 in. H x 48 in. W x 30 in. D.) and has an overall measurement of 94 in. H x 120 in. W x 30 in. D. The total assembly weighs about 2300 lb. and is located in the reactor building at 761 ft level. The base is attached to the floor with 20-5/8 in. bolts.

As is evident, all of the above configurations are different combinations from three basic units. They are

(a) 94 in. H x 72 in. W x 30 in. D
(b) 94 in. H x 48 in. W x 30 in. D
(c) 94 in. H x 30 in. W x 30 in. D

The panels are qualified on the basis of analysis done by Sargent and Lundy Engineers, Chicago. The referenced documents are as follows:

1. SWRI Report, dated January 18, 1979
2. Nutech Report No. GEN-51-008, dated February 9, 1979
3. Structural data, dated October 18, 1978
4. GE document No. 994-79-012, dated July 11, 1979
5. GE Spec. 22A4073, dated July 26, 1979
6. SWRI lab. data, dated January 11, 1979
7. LaSalle Design Adequacy Evaluation - Second Report, October 23, 1980
8. Zimmer-1 Local Panel Seismic Adequacy No. 994-79-010
9. S&L Evaluations, dated December 6, 1979
10. S&L Dynamic Analysis Report, dated April 22, 1980.

The loads considered in the evaluation are seismic and SRV. S&L analyzed the three basic units separately with 3D-beam finite elements. This was a dynamic response spectrum analysis with 2% damping. 40 modes in the frequency range of 0 to 60 Hz were used. The computer program used was SLSAP09713066. The natural frequencies for the three basic units are as follows:

Frequencies (Hz)

W	S-S	F-B	V
72 in. W	17.7	12.5	17.7
	36.7	17.7	32.8
	45.9	22.1	36.7
	52.7	31.2	
		32.8	
		36.7	
		40.6	
		43.6	
		49.3	
		58.0	
		60.0	

48 in. W	18.0	12.6	12.6
	25.7	25.7	25.7
	46.3	34.2	45.0
	49.8	36.5	46.3
	54.3	40.6	54.3
	61.5	45.0	
		46.3	
		59.0	
30 in. W	16.5	32.9	32.9
	44.7	44.7	
	58.3	47.1	
		53.4	
		55.8	

Absolute Maximum Response for Each Panel (g's)

W	S-S	F-B	V
72 in. W	1.35	2.05	0.9
46 in. W	1.37	2.04	0.9
30 in. W	1.10	0.76	0.9

A similar panel (94 in. H x 72 in. W x 30 in. D) was tested at SWRI for GE and documented in a report prepared by SWRI dated January 18, 1979. The natural frequencies were:

S-S	F-B	V
9.0	10.5	8.2
15.5	15.7	15.5
35.5	26.7	25.5
	30.7	54.0

The equipment mounted in any of the three basic units is to be qualified on the basis of the maximum g-level for that particular unit irrespective of where it is mounted in the unit.

In order to complete the review of the qualification of these panels we requested the applicant to provide the following information:

1. Demonstrate the validity of the analysis in the light of the SWRI test.

2. Demonstrate the conservatism in the analysis since effect of coupling between the basic units is not accounted for.

Due to the above concerns and the extensive use of these panels, its report was selected for further review.

15. Level Indicator Switch (No. 759C4384)

Level indicator switches (instrument number B21-N024 A/D and B21-N031 A/D model number 288A-9688) were supplied by ITT Barton. B21-N024A is mounted on local panel H22-P004 with 4-1/4 inch bolts. All of these three local panels are located in the reactor building at an elevation of 761 feet. The referenced documents are: ITT Barton Report No. R1-288A-10, dated November 30, 1972, and EMD file No. 007919. The loads for qualification are seismic plus hydrodynamic.

This equipment was qualified through test. Both field and laboratory mountings were the same. A resonance search test in the frequency range of 1 to 60 Hz along the three axes indicated resonant frequencies of 38 and 58 Hz for x-axis. The highest required g-level from among their locations was

S-S = 1.35 g
F-B = 2.05 g
V = 0.9 g.

The equipment was subjected to a single frequency, single axis test. A sine dwell test at each resonant frequency with an input g-level of

S-S = 4.0 g
F-B = 4.0 g
V = 2.67 g

was carried out. A fragility test in F-B direction at 10 Hz with an input of 10 g's was also performed.

During the review the following problems were detected.

(a) Report No. R1-288A-10 of November 30, 1972 indicated that the model switch chattered at 38 Hz at an input level of 3 g.

(b) In another report No. 54486, dated April 30, 1975, chattering was reported at 12 Hz with an input level of 1.8 g.

In order to complete our review we require the applicant to demonstrate that the reported chattering does not have an adverse effect on the performance requirements for the equipment.

16. Differential Pressure Transmitter (No. 163C1560)

Differential pressure transmitters (instrument number B21-N027 and B33-N014D, model number 1151DP5A) were supplied by Rosemont Inc. B21-N027 is mounted on local panel H22-P027 with 4-3/8 inch bolts whereas B33-N014D is mounted on local panels H22-P010, 006, 009, and 022 with 4-3/8 inch bolts. All these panels are located in the reactor building at an elevation of 761 feet. The referenced reports are: Rosemont Report No. 9726C, dated Sept. 12, 1972; Wyle Lab. Report No. 43082-1, dated December 16, 1975 and EMD file No. 005769. The loads considered are seismic and hydrodynamic.

This equipment was qualified based on test. It was mounted on a 2in. Schedule 40 pipe which was clamped and rigidly attached to the shaker. Resonance search test was performed along each axis from 5 to 70 Hz with resonances noted at 70; 62; and 50, 68 Hz in V, F/B and S/S directions, respectively. The required g-level for this equipment in the most severe mounting location was

S-S = 1.35 g
F-B = 2.05 g
V = 0.9 g.

Both single axis, single frequency and multiaxis, multifrequency tests were performed on this item. The g-levels for the single axis, single frequency test were

S-S = 2.0 g
F-B = 2.0 g
V = 2.0 g.

Since these tests may not be adequate for the present locations, multiaxis and multifrequency tests were performed.

However, the RRS and TRS for the test were not available at the time of review. In order to complete our review we require a comparison of the TRS with the RRS. The applicant stated that they were under preparation and would be supplied.

17. SRM and IRM Preamplifier Enclosure

These preamplifier enclosures (equipment number H22-P030, 31, 32, 33, model numbers the same) were supplied by General Electric Company. H22-P031 and H22-P032 are mounted with 4-1/2 inch bolts on the walls. H22-P032 and H22-P033 are mounted on pillars (2 each) with 4-1/2 inch bolts. All of these are located in the reactor building at an elevation of 740 feet.

Out of the four, H22-P030 and H22-P033 were the critical ones due to their mountings and one of them was analyzed by S&L. The mathematical model consisted of 3D-beam and plate finite elements. All devices and attachments contained in it were considered for mass effects. The computer code used was SLSAP097130-660. The response spectrum method with simultaneous loading in three directions was used. The input response spectrum curves were obtained by enveloping 2% damping for SSE and 1% damping for OBE at an elevation of 740 ft. Seismic and Hydrodynamic loads were considered. The natural frequencies from the analysis were;

7.35	38.72	50.41
17.92	46.22	55.89
23.00	48.98	62.88.

Nine modes were used in the analysis. The stresses are compared to Form 350B.

An impedance test for confirmation of resonances was performed on the enclosure, but the results were not available at the time of review. The applicant agreed to supply these test results when available.

Based on our review of the analysis report, the observed field installations, and the clarifications provided by the applicant we conclude that the enclosures are adequately qualified for the defined loads, pending the applicant's submittal of the impedance test results thereby confirming the results.

18. SGTS Equipment Train

The train (Equipment No. 1VG01S) is bolted to the floor of the reactor building at elevation 820 ft. It was manufactured by Pennwalt CVI Corp. and qualified by analysis in Report No. B453-9991.

The analysis consisted of hand calculations of natural frequencies in the structure and conservative estimates of the rocking and translational accelerations (1.3 g vertical 0.5 g and 0.6 g horizontal) of the 26,500 lb structure. Frequencies exciting the total mass are in the 260 to 279 Hz range. Local stresses in the shell and support frames were calculated with the g-loads from the SRSS of the earthquake and T-quencher SRV spectra. Allowables were based on the AISC code (1974).

The nozzle stresses imposed upon the train by the outlet duct are of major concern since the present support configuration of the piping shows stresses above allowables. Sargent and Lundy is considering various options to reduce those stresses. Impedance testing of the train has been performed but results have not been documented at this time.

Considering the analyses performed and the inspection of the unit, the analysis is conservative with respect to the method of dynamic loading of the unit, however, the issue of high nozzle stresses must be resolved. In order to complete our review we require the applicant to: (1) demonstrate the adequacy of the train wall junction for the nozzle loads and (2) provide the results of the impedance test to verify the conservative derivation of the dynamic loads.

19. Cooling Coil Cabinets

The cooling coil cabinets are provided by Bahnson Company and have Equipment No. VY03A. They are located in the reactor building at elevation 694 feet. They are qualified by calculations performed by Sargent and Lundy dated November 6, 1979, and July 22, 1980.

The cabinets were qualified by analysis using the MRI/STARDYNE 3 finite element program. The finite element model was used to determine natural frequencies for the cabinet. There were no resonance frequencies less than 33 Hz identified. There were, however, several such frequencies determined in the 33 to 60 Hz range.

In the original qualification of the cabinet only seismic loads were considered along with deadweight, pressure, and nozzle loads. The cabinet was thus treated as rigid and analyzed statically. In the later qualification hydrodynamic loads were added with the seismic loads by both an absolute sum (ABS) and SRSS combination, but the cabinet was again analyzed statically by a simple scaling up of results from the previous analysis. Such a static analysis is an inappropriate approach to determine response to the hydrodynamic loads because of the existence of natural frequencies in the 33 to 60 Hz range.

Because the calculated stresses in all portions of the cabinet are significantly lower than allowable, a more accurate determination of stresses is regarded to be unnecessary and thus this item is considered qualified.

20. 2-Inch Control Valve, Air Operated

The 2 inch air operated control valve is provided by ACF Industries and has Equipment No. E51-F025. It is located in the Reactor Building on piping subsystem SC-1. It is qualified by the document "Seismic Qualification Test Report, WKM 2-In.," Report No. 02-5099-001, by Southwest Research Institute, April 7, 1978.

This control valve was qualified by testing using a random biaxial input motion. From the input motion a Test Response Spectrum was generated which should envelope a Required Response Spectrum for the valve. Since results from the associated piping analysis are not yet available, the adequacy of the TRS cannot be ascertained.

A resonance search was performed which identified the following natural frequencies (Hz):

h_1 : 15 h_2 : 11 V : 77, 88, 95.5.

A total of 5 OBE tests and one SSE test were performed in each orientation. Functionability of the valve was monitored by hydro-leak tests, stem displacement measurements, visual observation for cracks and limit-switch monitoring. The valve behaved normally during and after all tests.

In order to complete our review, we require the applicant to provide the piping analysis results to demonstrate: (1) the adequacy of the TRS and (2) that the loads at the nozzles are satisfactory. In addition, we requested the applicant to provide the qualification reports for further review.

21. SGTS Primary Supply Fan

The fan (Equipment No. 1VG01C) is attached to the inlet plenum of the SGTS equipment train. It is isolated on its inlet and outlet sides from the attached ducting by flexible duct material. The fan and motor are mounted on legs, which in turn, are bolted to a frame work of steel channels which are anchored into the reactor building floor at elevation 820 ft. The unit is manufactured by Buffalo Forge Co. and it was qualified by analysis by McMahon Engineering Co. in Report No. 76J-25201-27 (Reanalysis by S&L September 1, 1978, June 26, 1980).

Hand calculations of the natural frequencies of various components of the unit indicated that a static analysis in conjunction with the g-loads from the absolute summed earthquake and SRV curves is appropriate. The analysis assumed the framed support to be rigid and, indeed, it appears to be. An impedance test has been performed on the unit and should determine the validity of that assumption. The ZPA values (0.58 g and 0.65 g horizontal and 1.3 gs vertical) were taken from the combined spectra curves corresponding to 33 Hz. The stresses and deflection calculated with the g-loads were very low with respect to the allowables.

In order to complete our review we require the applicant to provide the impedance test results as they relate to the qualification of this fan. If the examination of the impedance test results indicates the channel support base of the unit to be rigid, the unit is adequately qualified for the described loading.

22. 72-Inch Secondary Containment Isolation Dampers

The dampers (Equipment No. VR05Y A, B) are bolted at their flanges to a duct whose centerline is roughly 5 ft off the floor in the Auxiliary Building at elevation 686 ft. The 4693 lb dampers are constructed by the Techno Corp. and qualified by Techno Report No. 1177A, Rev. 1, February 22, 79. Dynamic qualification was performed for seismic loads only.

Due to a Sargent and Lundy specification that all ducting be designed rigidly, the damper analysis assumed the input spectra to be those of the Auxiliary Building floor at elevation 686 ft. Inspection of the ducting support raised the question of support rigidity for lateral translation of the duct. The damper body and components were analyzed with static hand calculations, using g-loads of 0.44 g and 0.37 g horizontally and 0.46 g vertically after calculations of frequencies showed all damper components to be rigid. The stress criteria was based upon ASME Code Section III.

Analysis of the damper qualifies it for the seismic load if the duct support in the lateral direction can be shown to be rigid. In order to complete our review we require the applicant to provide an analysis to demonstrate the rigidity of the supports.

23. SGTS Control Panel

The SGTS control panel is provided by Systems Control Corporation and has Equipment No. PL17J. It is located in the Reactor Building at elevation 820 feet. It is qualified by the document "Seismic Test Report on Control Panels," Spec. No. J-2551, by Sargent and Lundy, February 22, 1979.

The SGTS Control Panel was qualified using multiaxis sine beat tests at 1/2 octave frequency intervals from 1 to 50 Hz and at each resonance frequency. The sine beat tests consisted of 5 beats with 10 cycles per beat at each frequency.

A total of 5 OBE and 1 SSE tests were conducted in two mutually perpendicular planes. A sine beat test at each frequency constitutes one such test.

Resonance search tests conducted in the two perpendicular planes identified the following natural frequencies:

h_1 : 16, 17, 25, 26 h_2 : 18, 19, 26, 28 V : 16, 17, 18, 25, 28.

The sine beat tests were performed with the following input g-levels for the SSE:

h_1 : 0.54 h_2 : 0.54 V : 0.94.

Correspondingly, the required zero period acceleration levels are:

h_1 : 0.54 h_2 : 0.54 V : 0.75.

These values are derived from a response spectrum corresponding to combined seismic and hydrodynamic loads.

During tests, two General Electric relay contacts and two Agastat timing relay contacts were monitored in the open and closed conditions. No improper deflections, openings, or closings in these contacts occurred.

In order to complete our review we require the applicant to provide: (1) justification for single frequency testing and (2) the impedance test results as they relate to the qualification of this item.

24. Post LOCA Hydrogen Recombiner

The hydrogen recombiner is provided by Atomics International and has Equipment No. HG01A. It is located in the Reactor Building at elevation 786 feet. It is qualified by Wyle Laboratories Report No. 58129-1, dated December 29, 1976.

The recombiner was qualified by testing using multifrequency multiaxis input. Tests were conducted over the 1 to 100 Hz range and a Test Response Spectrum was generated. The TRS thus developed nearly envelopes the Required Response Spectrum for the recombiner. The RRS corresponds to combined seismic and SRV loading.

For complete envelopment of the RRS, sine beats were superimposed on the random signals at discrete frequencies from 1.25 to 4 Hz for the horizontal axis and to 8 Hz for the vertical. Five random tests of 30 seconds duration were run in each of two mutually perpendicular planes.

Functional operability of the recombiner was verified after the tests and no problems occurred. During the Wyle tests the "Barton" transmitters exhibited some anomalies (electrical spikes). Since the safety function of the recombiner is needed only after an event, these present no difficulty.

A 3 or 4 in. pipe enters the Hydrogen Recombiner from the plant. The influence of nozzle loads exerted by this pipe have not yet been considered. In order to complete our review, the applicant was requested to demonstrate the adequacy of qualification of the recombiner with these nozzle loads included..

25. Limitorque Motor Operator

The Limitorque motor operators are provided by Limitorque Corporation and are of several models including SB and SMB units. They are located on piping systems in both the Auxiliary and Reactor Buildings at several

elevations. They are qualified by the document "Seismic Qualification Limitorque Valve Actuators," EMD File No. 019152 (for tests performed by Aero Nav. Laboratories, Inc. and Wyle Laboratories).

The operators were qualified by testing. Tests were performed on a group of valve actuators representative of the generic range of models from SMB-000 to SMB-5.

The tests performed on a typical model (such as SMB-000-5) included a resonance scan in each of three axes at 0.1 g from 5 to 33 Hz. With resonance defined as a minimum acceleration multiplication factor of two, there were no resonances identified. Seismic dwell tests of 30 seconds duration were then conducted at a frequency of 33 Hz in each of the three axes, independently. The dwell tests for each axis were performed at a basic input level of 6 g. To this base of 6 g were added cross coupling factors to account for coupling between axes. In this fashion, the operators were qualified to a simultaneous loading of 6 g in each direction.

On model SB-3-100, fragility tests were run at a frequency of 33 Hz. With an input level of 8 gs in each axis, no malfunctions occurred.

Since the present qualification of the Limitorque Motor Operators does not consider hydrodynamic loads, the potential for frequencies beyond 33 Hz is not addressed. The results of impedance tests, which are to be performed, will have to be reviewed to assure that the operators can still be qualified to 6 g over an expanded frequency range.

Since the operators are qualified by requiring of the piping designer that no valve operator be subjected to higher than 6 g's, a review of the piping analysis results is needed to verify this to be the case.

In order to complete our review we require the applicant to provide the impedance test results and piping analysis results as they relate to the qualification of the Limitorque Operators.

26. Namco Limit Switch

The switch (Model No. EA 700) is bolted to the support post of duct dampers throughout the system. This switch was qualified by test by Autonetics of Rockwell International, EMD No. 017958, dated March 22, 1979.

Due to the fact that ducts are designed by specification and dampers shown by analysis to be rigid, the floor spectra are the required input. Absolute sum spectra envelopes for all floors of the reactor building for the earthquake and T-quencher loads in each of the three principal directions were used as the RRS for the test. A resonance search was performed over the 1 to 40 Hz range and no frequencies discovered. Qualification was performed using biaxial tests (vertical-horizontal) in two ortnogonal norizontal directions using input motion of complex random form. Five OBE level tests of at least 30 seconds duration and one SSE level of at least 40 seconds duration were performed. During the tests the switch was energized and the output response was monitored and functionality verified.

The testing was only conducted up to 40 Hz. The g-load level of the TRS was so high (approximately 10 g at 40 Hz), however, that the ZPA of the TRS would not be expected to fall below the RRS level of 0.8 g. Thus, the TRS would most probably envelope the RRS. Therefore, the item is considered qualified for the given dynamic loads.

27. HPCS Waterleg Pump

The item (equipment number 2E22-C003 model number 3062 size AA) was supplied by Crane Company, Demming Division. It is attached to the floor with 4-5/8 inch bolts at an elevation of 674 feet in the reactor building. Referenced report is "McDonald Engineering Analysis Company report number ME-211, dated 6-17-77." The seismic, hydrodynamic, nozzle and normal loads are considered in the qualification.

HPCS Waterleg pump was qualified through analysis. A dynamic lumped mass model was developed and a computer frequency analysis made for frequencies of the system. The first two frequencies were 52.78 and 77.00 Hz. Before the SRV qualification, the cut-off frequency for seismic was 33 Hz. Since both of the frequencies were higher than 33 Hz, a static load analysis was performed using the ICES-STRUDL-I. computer program. The required/qualified SSE spectra were,

h_1 = 0.62/2.0 g; h_2 = 0.73/2.0 g; V = 1.35/2.0 g.

Thus, a requalification was necessary to show its adequacy for SRV loads. The requalification was performed using g-values taken from the combined seismic and SRV response spectra. The new required g-levels with 1% and 2% damping values for OBE and SSE, respectively, were,

h_1 = 0.81 g; h_2 = 0.81 g; V = 0.35 g.

Since the new requirements were less than the original qualification requirements a new calculation was not required. The stresses and deflections for the equipment were compared with ASME or other industry applicable code allowables and found adequate.

Based on our review of the analysis reports, observed field installations and clarifications provided by the applicant this piece of equipment is adequately qualified for the prescribed loads.

28. HPCS Oil Storage Tank

The HPCS oil storage tank is provided by Chicago Bridge and Iron and has Equipment No. 0002T. It is located in the Auxiliary Building at elevation 710 feet. It is qualified by calculations performed by Sargent and Lundy dated October 20, 1978.

This item was qualified by analysis using hand calculations. The review of the analysis was not completed during the site visit; therefore we requested the applicant to provide the qualification report for further review. It was noted that the allowable value for stress in the tank wall appears to be high. Therefore, the applicant also was requested to provide justification for the high value.

29. 8-Inch Motor Operated Butterfly Valve

The valve (Equipment No. VP113 A, B) is flanged and bolted to the adjacent chilled water piping. It was manufactured by Continental Division of Fisner Controls and was qualified by analysis at the company in Report Nos. 5A094 and 5A095, dated December 19, 1978.

The finite element computer program "Seismic 4" was used for the dynamic analysis for natural frequencies and the first mode was at 39.5 Hz. The sum of the seismic and SRV acceleration values indicate peak accelerations of 4.38 g and 2.58 g in the horizontal and 3.7 g in the vertical directions. The static stress analysis considered 6 g in the horizontal and 7 g in the vertical direction. Piping nozzle loads were determined in the "PIPSYS" piping computer code and applied to the valve. Stresses at these g-levels were compared against ASME Code, Section III allowables and found acceptable.

While a frequency determination was not made in the 40 to 60 Hz range, the conservative g-loading applied in the analysis would provide adequate margin for amplification of any mode in that region.

After consideration of the analysis and inspection of the valve the unit is considered qualified for the earthquake and T-quencher loads.

30. Control Cabinets

The cabinets (Equipment Nos. OPM14J and OPM15J) are bolted into the floor of the control room in the Auxiliary Building at elevation 768 ft

with eight 1/2 in. bolts. They are fabricated by General Atomic Company and were qualified by test at Wyle Laboratories (Report No. 58380). Only seismic loads are considered.

The test had been performed for a more severe condition than Lasalle's RRS. In the test the TRS envelopes the RRS except in the range of less than 1.5 Hz. The test was run with the cabinet welded to the test fixture which is a case of lower damping than found in situ. The cabinet was tested with all components in place. The qualifying test was a multi-frequency, biaxial test over the range of 1 to 100 Hz in which functional operation of instruments was monitored during and after the test. Five OBE level tests were run before the SSE level test.

Upon review of the test and inspection of the cabinet in place, the cabinet has been considered qualified for the seismic load.

SQRT VISIT TO LA SALLE

List of Attendees

1.	C. H. Hofmayer	NRC/EQB
2.	Pei-Ying Chen	NRC/EQB
3.	J. Sinnappan	Sargent & Lundy
4.	Phil Petersen	Sargent & Lundy
5.	A. E. Meligi	Sargent & Lundy
6.	R. W. Hardy	GE
7.	E. Falb	CECO
8.	G. R. Crane	CECO
9.	J. N. Singh	EG&G Idaho, Inc.
10.	G. L. Thinnes	EG&G Idaho, Inc.
11.	G. K. Miller	EG&G Idaho, Inc.
12.	J. F. Etzweiler	LILCO

LA SALLE 1 & 2

(A) List of Open Items

1. HPCS 4-In. Gate Valve.
2. RHR Heat Exchanger.
3. MSIV Leakage Control System Exhaust Blower.
4. 18 In. HPCS Gate Valve.
5. HPCS 12 In. Glove Valve.
6. RCIC Pump.
7. SLC Storage Tank.
8. Local Panels.
9. Level Indicator Switch.
10. Differential Pressure Transmitter.
11. SRM and IRM Preamplifier Enclosure.
12. SGTS Equipment Train.
13. 2-Inch Control Valve, Air Operated.
14. 72-Inch Secondary Containment Isolation Dampers.
15. SGTS Control Panel.
16. Post LOCA Hydrogen Recombiner.
17. Limitorque Motor Operator.
18. HPCS Oil Storage Tank.

(B) Items Dependent on "Impedance Test." (Open)

1. HPCS 4-In. Gate Valve.
2. MSIV Leakage Control System Exnaust Blower.
3. HPCS 12-In. Glove Valve.
4. STM and IRM Preamplifier Enclosure.
5. SGTS Equipment Train.
6. SGTS Control Panel.
7. Limitorque Motor Operator.

(C) Items Dependent on "Piping Analysis." (Open)

1. HPCS 4-In. Gate Valve.
2. 18-In. HPCS Gate Valve.
3. HPCS 12-In. Glove Valve.
4. RCIC Pump.
5. SGTS Equipment Train.
6. 2-Inch Contol Valve, Air Operated.
7. Post LOCA Hydrogen Recombiner.
8. Limitorque Motor Operator.