Docket No. 50-336
B15469

Attachment 3

Millstone Nuclear Power Station, Unit No. 2

Seismic Evaluation Report

January 1996

SEISMIC EVALUATION REPORT FOR MILLSTONE UNIT 2

IN RESPONSE TO:

NRC GENERIC LETTER 87-02/USI A-46

VERIFICATION OF SEISMIC ADEQUACY OF MECHANICAL AND ELECTRICAL EQUIPMENT IN OPERATING REACTORS

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(*) Designates attachments that are not included in the NRC Submittal

1.0 INTRODUCTION

The requirements for seismic design of nuclear power plants have evolved over the years from the application of commercial building codes earlier in the 1960's, to more sophisticated methods being used today. In view of the extent of these changes in design requirements, the NRC initiated Unresolved Safety Issue USI A-46, "Seismic Qualification of Equipment in Operating Plant," in December 1980. In early 1982, the Seismic Qualification Utility Group (SQUG) was formed to develop cost effective means of verifying the seismic adequacy of equipment in operating plants. The results of the industry efforts in this area, have culminated in the issuance of Revision 2 of the Generic Implementation Procedure (GIP-2) and a number of supporting documents and reports. Subsequently the USNRC has documented its review of the GIP in Supplemental Safety Evaluation Report No. 2 (SSER-2) and issued Supplement No. 1 to Generic Letter (GL) 87-02. Northeast Utilities provided their response to GL87-02 in a letter dated September 21, 1992 (Reference 5.1.9) outlining their proposed schedule and approach.

The objective of this report is to provide the necessary documentation of the A-46 effort at the Unit 2 of the Millstone Nuclear Power Station referred to hereafter as Millstone 2 (MP2). It will consolidate the documentation required for the Seismic Evaluation Report.

2.0 SCOPE/METHOD

The primary objective of the A-46 program at MP2, as outlined in NU's Program Manual [5.2.8], is to verify the seismic adequacy of mechanical and electrical safe shutdown equipment. This program will provide a successful resolution of USI A-46, in addition, NU will utilize the key elements and results to streamline the seismic qualification process for the life of the plant. As discussed in Reference 5.1.9, MP2 intends to comply with the SQUG commitments set forth in GIP-2 [5.2.2], including the clarifications, interpretations, and exceptions identified in SSER-2 [5.1.2].

The essential features of the SQUG approach, for the resolution of A-46, is the use of earthquake experience data, and generic equipment qualifications and fragility test data. To use these sources of data, SQUG and EPRI have collected and organized the associated information and have developed guidelines and criteria for its use. The GIP-2 summarizes the technical approach and provides detailed implementation and documentation requirements for the application of experience data to verify the seismic adequacy of the safe shutdown equipment. Implementation of the GIP requirements at MP2 was performed by VECTRA Technologies in accordance with the Project instructions listed in Reference 5.2.6. The peer review was conducted in October 1994 by Drs. R. P. Kennedy and J. D. Stevenson and concluded that the VECTRA walkdowns have been conducted in a competent manner and results were in accordance with the GIP (Attachment D). The results and observations of the peer reviewers were consistent with the findings of the SRT.

The GIP approach for verifying the seismic adequacy of mechanical and electrical equipment is consistent with the intent of Generic Letter 87-02, "Verification of Seismic Adequacy of

Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46", including NUREG-1030 (Reference 5.1.3) and NUREG-1211 (Reference 5.1.4). The approach is also consistent with the EPRI Seismic Margins Assessment Program (SMA) described in Reference 5.2.1. The four major steps used for the majority of the equipment to be evaluated are listed below:

- Selection of Seismic Evaluation Personnel
- Identification of Safe Shutdown Equipment
- Screening Verification and Walkdown
- Outlier Identification and Resolution

Several types of individuals, their qualifications, and their responsibilities for implementing this procedure are described in Section 2 of the GIP. These individuals include: (1) Systems Engineers who identify the methods and the equipment needed for bringing the plant to a safe shutdown condition, (2) Plant Operations Personnel who have a comprehensive understanding of the plant layout and the function and operation of the equipment and systems in the plant and who compare the plant operating procedures to the safe shutdown equipment list for compatibility, (3) Seismic Capability Engineers who perform the Screening Verification and Walkdown of the safe shutdown equipment, and (4) Relay Evaluation Personnel who perform the relay functionality review.

The Seismic Capability Engineers must exercise sound engineering judgment during the Screening Verification and Walkdown. Therefore the selection and training of qualified Seismic Capability Engineers for participation on the Seismic Review Teams (SRTs) is an important element of the A-46 program.

The resumes and training records, of key individuals from the VECTRA staff that participated in the completion of the A-46 effort at MP2, are included as Attachment C.

The Safe Shutdown Equipment List (SSEL), and the Relay Evaluation Report are documented in VECTRA Reports (References 5.3.3 & 5.3.4). This report will provide, by reference or as attachments, all the documentation associated with the Seismic Evaluation Report; it will also summarize the results of the walkdowns and evaluations.

3.0 PLANT DESCRIPTION AND DESIGN BASIS

3.1 General Plant Description

The Millstone 2 Plant utilizes a pressurized water Nuclear Steam Supply System (NSSS). The plant was designed to produce 865 MW of gross electrical power. This plant provides electrical power to all sponsoring utilities in New England.

Combustion Engineering, Inc. was responsible for design and tabrication of all nuclear steam supply and auxiliary systems and equipment, as well as design and supply of all secondary plant mechanical and electrical equipment which it normally manufactures. Bechtel Engineering Corporation was responsible for site development, design of buildings and secondary systems, and all plant construction.

Millstone 2 incorporates a 2-loop closed-cycle pressurized water type nuclear steam supply system ; a turbine generator and electrical systems; engineered safety features; radioactive waste systems; fuel handling systems; structures and other on-site facilities; instrumentation and control systems; and the necessary auxiliaries required for a complete and operable nuclear power station.

The general site arrangement is presented in subsection 3.4 below.

3.2 Site Location

The Millstone 2 Plant is located in the town of Waterford, Connecticut, on the north shore of Long Island Sound and on the east side of Niantic Bay, 3.2 miles WSW of the town limits of New London and 40 miles SE of Hartford, Connecticut. The site consists of approximately 500 acres. The minimum exclusion radius of the unit is approximately 2,050 feet. The site provides good local isolation.

3.3 Site Geology and Seismology

The Millstone 2 site is located at the southern tip of Millstone Point in Waterford, Connecticut. The site is a low lying peninsula within the Seaboard Lowland section of the New England physiographic province. The Millstone area, like the rest of New England, was covered with glacial ice until approximately 15,000 years ago. The glaciers deposited a thick layer of glacial till and, as they receded, left end moraine and outwash deposits. The bedrock geology is characterized by extensive deformation, metamorphism, and intrusion by igneous bodies.

The geology of the eastern portion of Connecticut is made difficult to decipher by the complex folding and faulting of the Late Paleozoic era. The Millstone site lies approximately 30 miles east of the Triassic Border fault, and approximately 15 miles south of the Honey Hill fault. The area south of the Honey Hill fault is complexly folded. The site lies on the east limb of the recumbent Hunts Brook syncline which mantles the Lyme dome.

The site is located in a geologically complex region characterized by metamorphosed and folded rocks of Ordovician-Silurian age. This area has been affected by four orogenies: the Avalonian (575 million years ago m.y.a), the Taconian (465-445 m.y.a), the Acadian (400-370 m.y.a), and the Alleghenian (320-260 m.y.a). The surrounding region has also been affected by rifting ranging in age from Triassic to Jurassic. Since then the region has been stable, with the exception of epeirogenic uplift during Cretaceous and Tertiary times, and isostatic rebound, resulting from the removal of the weight of ice covering the region during Pleistocene time.

The site lies in an area of low seismic activity. Only 13 earthquakes of Intensity V, Modified Mercalli (MM) or greater, have been recorded within a distance of 50 miles of the site in more than 300 years. The nearest significant earthquake was at East Haddam, Connecticut, in 1791. Its epicenter was approximately 25 miles north of the site. Even though this earthquake is recorded in the Earthquake History of the United States (USCGS 1965) as having an intensity of VIII MM, detailed studies by Rev. Linehan, Director, Weston Geophysical Observatory, based on newspaper accounts and other records of the time, indicate that the intensity was no higher than VI to VII MM. Maximum intensity of ground motion experienced at the site in approximately 300 years of recorded history has not exceeded Intensity V MM, which would correspond to an acceleration of 0.02 to 0.03g.

Faults believed to be related to Triassic tectonics have been found in the excavation for Millstone 3. Potassium-argon methods of dating clay gouge found within the faults indicate that the last activity along these faults occurred approximately 142 m.y.a.; therefore, these faults are not capable features. There is no capable fault at or near the site.

A thick layer of very dense basal till blankets the site. The bedrock surface is irregular and was glacially smoothed. Most major plant safety-related structures are founded on hard, crystalline bedrock.

There has been no commercial mining in the area other than the now inactive granite quarry, located approximately 1,200 feet to the southeast of the Millstone plant area. The soils and rock underlying the site are strong, stable materials that are not susceptible to loss of strength, subsidence, or other instabilities during earthquake motion.

The maximum earthquake potential for the site is evaluated by utilizing maximum earthquakes associated with all nearby tectonic provinces and geologic structures. The analysis is made for two different sets of conditions. First, actual site intensities resulting from larger historical earthquakes are determined. Second, the maximum potential site intensities resulting from hypothetical events are calculated. These hypothetical events are specified as the largest known earthquakes in each adjoining tectonic province. Each is postulated to occur at the point where its province or structure most closely approaches the site.

The maximum earthquake potential at the site is an Intensity VII event occurring 10 to 20 km from the site. Murphy and O'Brien (1977) have published an analysis of acceleration-intensity correlation using a new worldwide data base and a variety of statistical models. Their correlation equation relating Intensity I (MM) and peak horizontal ground acceleration gives an average horizontal component peak acceleration of 0.10g.

3.4 Structures

The major structures of the Millstone 2 Plant are the Reactor Building, Enclosure Building, Auxiliary Building, Turbine Building, Intake Structure and Warehouse.

The plant arrangement is shown on Figure 1.2-2 of the MNPS-2 FSAR. The Turbine Building for Millstone Unit 2 is an extension to the north of the Unit 1 Turbine Building. A double containment system (described in Sections 5.2 and 5.3 of the FSAR) and referred to as the Containment, houses the NSSS. This Containment is enclosed by the Enclosure Building and is located east of the Turbine Building. A fuel handling facility, radioactive waste processing system, NSSS auxiliary equipment, heating and ventilating system components, laboratories, and the Control Room are located in the Auxiliary Building. The Auxiliary Building is located on the east side of the Turbine Building and is adjacent to the west and south sides of the Containment.

The Containment houses the NSSS, consisting of the reactor, steam generators, reactor coolant pumps, pressurizer, and some of the reactor auxiliaries. The Containment is equipped with a polar crane.

The Enclosure Building completely envelopes the Containment and provides a filtration region between the Containment and the environment.

The Turbine Building houses the turbine generator, condenser, feedwater heaters, condensate and feedwater pumps, turbine auxiliaries and some of the switchgear assemblies.

As shown in Figure 1.2-2 of the FSAR, the circulating water system consists of an intake structure located on the west side, and the discharge structure located at the quarry southeast of the plant.

The plant layout is shown on Figures 1.2-3 through 1.2-17 of the FSAR.

The Containment Building is a prestressed, post-tensioned concrete cylindrical structure with a 65' radius. It is founded on unweathered rock at elevation -33'. The Containment mat also supports the internal structure as shown in Figures 5.8-14 and 5.8-21 of the FSAR.

The Auxiliary Building consists of a reinforced concrete structure of interconnecting floors and walls. The building is supported on rock, providing a rigid foundation at both elevation -25' and a small area at elevation -45' as shown in Figures 5.8-12 and 5.8-38 of the FSAR.

The intake structure, located west of the main plant area, is also a reinforced concrete structure founded on bedrock. As shown in Figure 5.8-58 of the FSAR, the structure is primarily a rectangular sheer wall building with the top of the base slab at -27'.

The Turbine Building is a rigid framed steel structure with metal siding and precast concrete panels on the exterior. The foundations for the steel frame are spread footings bearing on lean concrete backfill which extends to the rock. The turbine-generator pedestal is a low-tuned mass concrete structure which is also founded on lean concrete backfill which extends to the rock (see figures 5.8-12 and 5.8-51 of the FSAR).

The turbine-generator pedestal is separated from the surrounding floor slabs by Teflon-lined sliding bearings. The Turbine Building main frame is connected to the Unit 1 Turbine Building by sliding connections so that it is an independent structure.

The Warehouse Building is a three-story reinforced concrete structure. The ground floor is at grade level of 14'-6". It is founded on a controlled select compacted fill. The portion of the building housing the fuel handling area consists of a steel framed structure supported at grade level (see figures 5.8-12 and 5.8-46 of the FSAR).

The refueling water storage tank is also founded on the compacted fill while the condensate storage tank is supported by a very dense glacial till.

3.5 Plant Seismic Design Basis

The seismic design of the Millstone Unit 2 plant is detailed in Section 5.8 of the MNPS-2 FSAR. A brief summary description of the seismic design basis is presented in subsection 3.6 below.

Construction of Unit 2 was authorized by the United States Atomic Energy Commission when it issued Provisional Construction Permit CPPR-76 on December 11, 1970. Commercial operation commenced in December 1975.

Seismic design and analyses were performed by Bechtel Corporation in the early 1970s.

3.6 Design Basis Seismic Input

The operating basis earthquake (OBE) used in the design of this plant is based on a ground motion having a maximum horizontal ground acceleration of 0.09g and a vertical ground acceleration of 0.06g, acting simultaneously. For the safe shutdown earthquake (SSE), a maximum horizontal ground acceleration of 0.17g and a vertical ground acceleration of 0.11g are used. The design response spectrum curves for structures supported on rock are shown on Figures 5.8-1 and 5.8-2 of the FSAR, and the design response spectrum curves for structures supported on compacted structural backfill are shown on Figures 5.8-3 and 5.8-4 of the FSAR.

The rock spectrum has amplifications consistent with a Housner shape spectrum, but is heavily enriched for higher frequencies with peak responses over the frequency range from 2Hz to 10Hz. The soil spectrum is similar in shape to a NUREG-0098 spectrum.

A synthetic time-history whose response spectrum curve corresponds to the design response spectrum curve is used to generate the response spectrum curves at different elevations within the structure. These are used in analyzing Class I equipment and piping at the respective locations. Comparisons of the response spectra derived from the tim-history and site seismic design response spectra for the damping values of 0.5, 1.0, 2.0 and 5.0 in percent of critical damping are shown in Figures 5.8-5, 5.8-6, 5.8-7 and 5.8-8 of the FSAR.

3.7 Seismic System Analysis

To determine the seismic response of equipment, a time-history analysis is performed on the structural model, using an earthquake as the input ground motion. This analysis generates the floor acceleration time-histories at the various mass points at which the equipment is located. The equipment response spectrum curve is then generated for each of the floor acceleration time-histories at various damping values and is used in the design of the equipment.

The equipment response spectrum curves are broadened by a smooth curve extended 10 percent each way at the peak response associated with the natural frequencies of the structure. This measure reflects the expected variations in the natural frequencies of the structure due to variations in structural material properties.

Original analyses produced spectra at 0.5% and 1% damping. Subsequent analyses from other efforts, such as GL 80-11 produced 5% damping spectra, consistent with the original analyses. Amplified Response Spectra for the Northeast Utilities stations including Millstone Unit No. 2 are controlled by Specification SP-CE-368 (Reference 5.2.4). SSER-2 required detailed information on the procedures and criteria used to generate the licensing basis in-structure response spectra for MP2; the NNECO 120-day response letter (Reference 5.1.9) provided the MP2 required information as Enclosure 1 which is also included as Attachment B to this report.

3.8 Equipment Seismic Design and Analysis

As stated in the FSAR, for all purchased Class I equipment, the vendors were required to submit seismic calculations made in compliance with the equipment specification to demonstrate the capability of the equipment to satisfy the functional requirements under specified seismic conditions. Equipment was not released for delivery without engineering approval of the calculations.

The supports for all Class I equipment were designed for the induced seismic forces. There were no significant gaps between the equipment and their supports and, hence, they were not considered in the seismic analysis of the equipment.

All Class II components and equipment were sufficiently separated from Class I components and equipment so that the Class II components and equipment will not damage the Class I components and equipment under seismic conditions.

For certain Class I systems and equipment, where analytical models and normal theory do not produce results of a significant confidence level, dynamic testing of prototypes or similar equipment was substituted to ensure functional integrity. Test data conform to one of the following:

A. Performance data of equipment which, under the specified conditions, have been subjected to equal or greater dynamic loads than those to be experienced under the specified seismic conditions.

B. Test data from previously testing comparable equipment which, under similar conditions, have been subjected to equal or greater dynamic loads than those specified.

C. Actual testing of equipment in accordance with one of the following methods:

   1. The equipment is subjected to an artificial time-history response at the elevation of interest.

   2. The equipment is subjected to a sinusoidal excitation, sweeping through the desired range of significant frequencies, using input acceleration amplitudes for the forcing function which simulates the specified seismic conditions.

   3. The equipment is subjected to a transient sinusoidal motion synthesized by a pulse exciting a group of octave filters such that the response of the shaking table and the duration of loading simulates the artificial response spectrum curve at the elevation of interest.

The certified test data and results were required to be submitted for engineering approval.

3.9 A-46 Seismic Input

The seismic input used in the A-46 effort was the same as the input used for the original design as described in subsection 3.7 of this report. Existing design spectra were designated as conservative spectra for the USI A-46 effort.

Median-Centered in-structure response spectra were generated for the Auxiliary Building. The detailed spectra generation was submitted by NNECO to the US NRC for staff review (Reference 5.1.10). An SSER (Reference 5.1.11) was issued by the staff documenting the review of these spectra and the method used. The staff determined that the generated median spectra was acceptable for use in the A-46 project. The resulting spectra are well enveloped by the Reference Spectrum for floors below 54'-6". At the 54'-6" elevation the in-structure demand spectra are more or less equal to the Reference Spectrum.

Effective grade for most structures, which are founded on rock, was conservatively taken at the base of these structures (Typically - 25'-5"). For the Warehouse, and the storage tanks in the yard which are founded at plant grade, the effective grade is 14'-6". Also the Auxiliary Feedwater Pump Foundation located in the Auxiliary Bay of the Turbine Building rests on a shallow-depth of soil layer at elevation -5'-0".

4.0 RESULTS

In general, the overall plant equipment was found to be well anchored and seismically rugged. Raceway distributed systems are very rugged owing to conservative original designs. A number of housekeeping concerns were initially identified in the control room; these and others were resolved during the outage. In general, there is greater awareness and improved housekeeping practices at this point in part as a result of the A-46 effort.

The seismic screening of components is documented on Screening Evaluation Work Sheets (SEWS) in accordance with the requirements of the GIP, and are provided as Attachment E. The SEWS are sorted by equipment class. The results are further condensed and summarized on Screening Verification Data Sheets (SVDS), also sorted by class and walkdown teams, and presented as Attachment F. Three VECTRA Seismic Capability Engineers had the primary responsibility for the screening and anchorage evaluations (Messrs. Abou-Jaoude, Antonopoulos and Chu). The anchorage evaluations are documented on continuation sheets attached to the SEWS and in calculations listed as References 5.3.1 and 5.3.2 when detailed evaluations were required. The plant Cable Tray and Conduit Raceway reviews were conducted on an area basis. Four Raceway samples were selected for limited analytical reviews; the results demonstrated the seismic adequacy of the raceway systems and are documented in Reference 5.3.6. Large flat bottom storage tanks as well as other tanks and heat exchangers were evaluated using the review method of the GIP as documented in References 5.3.1 and 5.3.2. A brief summary is provided in subsection 4.2 with the detailed screening of the Tanks and Heat Exchangers reviews documented with the class 21 SEWS.

Outliers were identified as a result of the equipment screening effort. A summary description of the outliers is provided in subsection 4.4 and Table 4.1. All outliers are documented on Outlier Seismic Verification Sheets (OSVS) and have been included as Attachment G. Each outlier was evaluated for compliance with the plant licensing basis. All outliers except the following two cases were found to meet the plant design basis. Two cases were identified which represented adverse conditions and were reported in accordance with plant procedures by using the ACR process. The two items are a surge tank where the original frequency calculation was in error, and the second was a low voltage switchgear with missing plug welds. Both were dispositioned and found not to present any risk to public health and safety. A nonconformance report was issued to document a pedestal crack for the quench tank; this was dispositioned as a Repair.

A proposed resolution has been provided for each outlier. All outliers have not yet been resolved using the outlier resolution procedures of GIP-2, Part II, Section 5. MP2 will continue to evaluate these outliers. In case any outlier remains unresolved, that outlier may also be further evaluated by the Seismic Margin Assessment (SMA) which is being performed in support of the Individual Plant Examination for External Events (IPEEE) program. It is possible that the IPEEE reviews would result in assigning such a low priority to an outlier, because of insignificant safety benefit, that no further actions will be warranted.

4.1 Equipment Screening and Walkdowns

Based on the results of the walkdowns and reviews performed by the SRT's the plant equipment was found to have good original seismic design. Electrical cabinets were generally welded to embedded steel members or secured with expansion anchors for smaller wall mounted components; mechanical equipment were typically anchored with cast-in-place or J-bolts. Equipment data such as vendor drawings and original seismic analyses were generally available and retrieved using plant databases. The Seismic II/I conditions in the plant were found to be satisfactory; all identified interactions were related to proximity or housekeeping concerns which have now been resolved. All SSEL equipment with the exception of those listed in Table 4.2 were walked down by at least two seismic capability engineers. The GIPPER (Reference 5.2.9) software was used as the primary tool to record the results and generate the SEWS. Included in the SEWS are seismic capacity versus demand comparison, Bounding Spectrum, GERS, Anchorage and Interaction Caveats. In addition, anchorage evaluations, where applicable, and field notes are included as part of the SEWS.

The evaluation for seismic adequacy of equipment was performed in accordance with the GIP, Section II.4.4. Field Inspections and analyses were performed. Tightness check for concrete expansion anchors were performed by the SRT in accordance with the GIP criteria using a plant work authorization. Cast-in-place or J-bolt evaluations used drawing embedment values. For expansion anchor bolts, minimum embedment values from the GIP were used if the tightness check was acceptable. Reduction factors for "reduced inspections" were utilized in cases where the tightness checks could not be performed. The majority of the required anchorage calculations were performed using the ANCHOR program module which is part of the GIPPER software package (Reference. 5.2.9) and are included as continuation sheets to the SEWS.

As stated earlier, the SVDS are included in Attachment F and provide an overall summary of the screening results.

4.1.1 Inaccessible Items

Table 4.2 provides a listing of the five individual components which were inaccessible during the walkdowns because they are located in contaminated areas, moderate to high radiation areas, or areas which are difficult to gain physical access.

4.1.2 Cases Where the Intent of the Caveats are Met

Instances in which the intent of a caveat is met without meeting the specific wording of the caveat rule are identified on the SEWS with an asterisk (*) and further discussed in the comment section of the SEWS. The SRT also conservatively identified cases where additional evaluations or supplemental analyses were performed with an asterisk. A brief description of the occurrences where the intent of the caveat is satisfied without explicit anlyses is provided in the following paragraphs:

The components located at elevation 54'-6" of the Auxiliary Building are tracked as meeting the intent of the Capacity vs. Demand Caveat given that, as stated in the SSER (Reference 5.1.11), the in-structure spectra at that elevation "is more or less equal to the Capacity Spectrum". The SRT judged that the intent of this caveat was met. This was also discussed with the peer reviewers who concurred with the SRT judgment.

The valves located on top of the pressurizer were also tracked as meeting the intent of the Capacity vs. Demand Caveat. The conservative in-structure spectra for that location does not envelop the Reference Spectrum and the elevation where seismic input is received is higher than 40 ft from effective grade. The SRT judged that the intent of the caveat was met since the piping support arrangement was such that the valve accelerations would clearly be less than 3g's which is the implied capacity level for line mounted valves.

A small number of air operated and motor operated valves had actuators externally braced; instances where the piping was also supported in the same direction in close proximity to the valve body were also tracked as meeting the intent of the Caveat (i.e. Actuator and Yoke not independently braced). Also a few air operated and solenoid valves are mounted on lines which are less than 1"
in diameter; the SRT reviewd the piping configurations and judged these conditions to meet the intent of the caveat since the support arrangement ensured that the piping stresses were acceptable.

Two floor mounted distribution panels were only 10" deep but had well supported top entry conduits which provided out of plane bracing. The SRT judged them to meet the intent of the equipment class inclusion caveat.

Finally the low voltage switchgear breakers do not contain an external lateral restraint but are well restrained against lateral movement by the racking rails, front mounted auxiliary contacts, and the support frame. The SRT concluded that this detail also met the intent of the caveat for lateral restraint for low voltage switchgear breakers.

4.2 Tanks and Heat Exchangers Evaluations

Tanks and Heat Exchangers were evaluated by the SRT using the general methodology and acceptance criteria described in Section 7 of the GIP. The SRT reviewed any existing analyses and performed supplemental evaluations consistent with the GIP methodology. The evaluations are summarized on the class 21 SEWS with the detailed calculations documented in References 5.3.1 and 5.3.2.

There are two large flat bottom storage tanks on the SSEL: The Refueling Water Storage Tank (RWST) and the Condensate Storage Tank (CST). The RWST was evaluated in Reference 5.3.1 and found to have a significant margin (40%) using the GIP conservative criteria. The CST has been recently upgraded for missile protection and the resulting configuration has a 20 ft high concrete ring wall connected at the base and the top of the tank shell with 18 chairs utilizing 1-1/4" diameter Maxi-Bolts. No reanalysis was necessary for this tank given the conservative redesign documented in Reference 5.3.5.

4.3 Raceways Evaluations

The Raceway reviews were performed independent of the equipment effort in accordance with the criteria given in Section 8 of the GIP. The Cable and Conduit Raceway Review consisted of:

(1) Plant walkdowns that focused on the inspection of all accessible portions of the installed raceways. The walkdowns were performed on an area basis and documented on a total of sixteen (16) area summary sheets. This enabled the SRT to confirm that the as-built details were consistent with the intent of the original design and installation specification; also, to the extent possible, the SRT looked for any seismic performance concerns in accordance with the GIP guidance. The MP2 designs met the inclusion rules set forth in the GIP.

(2) An analytical check of four (4) selected worst-case supports using a set of Limited Analytical Review (LAR) Guidelines.

The majority of the raceway supports used at MP2 are braced unistrut trapezes. The supports were obviously designed with seismic considerations and are consequently very rugged.

The area summary sheets which document the Raceway seismic review walkdowns by the SRT are included in Attachment H. Four (4) configurations were selected for Limited Analytical Review (LAR). The results of the raceway LAR evaluations have been documented in Reference 5.3.6. All four LARs met the criteria established in the GIP and are therefore acceptable. No outliers were identified from this review.

4.4 Description of Outliers

The methods contained in the GIP, Section II.5 was utilized for the identification, documentation, resolution (or proposed resolution) of outliers.

An outlier is an item of equipment which does not comply with all of the screening guidelines provided in the GIP. The GIP screening guidelines were used as a generic basis for evaluating the seismic adequacy of equipment.

The same level and requirements for qualification of personnel were used for the proposed outlier resolution as were utilized for the USI A-46 review. Personnel who were formally SQUG trained as Seismic Capability Engineers, and/or Lead Relay Reviewers and/or Systems Engineers were utilized for the resolution of outliers.

A detailed description of each equipment outlier is provided in the attached OSVS and summarized in Table 4.1 which groups the outliers by equipment class and the type of identified concern. Attachment G contains the list of outliers (OSVS), resolution and/or proposed method of resolution.

For those outliers not resolved as of the date of this submittal, the plan for addressing them and the schedule for completing the plan are addressed in the NNECO submittal letter accompanying this report.

5.0 REFERENCES

5.1 Codes, Standards and Regulatory Documents

5.1.1 USNRC Generic letter 87-02, Supplement 1, issued May 22, 1992.

5.1.2 Supplemental Safety Evaluation Report No. 2 (SSER-2) on Revision 2 of the Generic Implementation Procedure (GIP-2), May 22, 1992.

5.1.3 NUREG-1030, "Seismic Qualification of Equipment in Operating Nuclear Power Plants, Unresolved Safety Issue A-46," U.S. Nuclear Regulatory Commission, Washington, D.C., February 1987.

5.1.4 NUREG-1211, "Regulatory Analysis for Resolution of Unresolved Safety Issue A-46, Seismic Qualification of Equipment in Operating Plants," U.S. Nuclear Regulatory Commission, Washington, D.C., February 1987.

5.1.5 Not Used

5.1.6 IEEE 344-1975, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers 1975.

5.1.7 NRC Regulatory Guide 1.100, Revision 1, Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants," U.S. Nuclear Regulator Commission, August 1987.

5.1.8 Alan Waring (USNRC) letter to John F. Opeka (Northeast Utilities), dated November 25, 1992.

5.1.9 J.F. Opeka (Northeast Utilities) letter to the U.S. Nuclear Regulatory Commission, "Resolution of Unresolved Safety Issue A-46," NU Letter B14244, dated September 21, 1992.

5.1.10 J.F. Opeka (Northeast Utilities) letter to the U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 2 , Generic Letter 87-02, Supplement 1, USI A-46, dated July 7, 1994.

5.1.11 Guy S. Vissing (USNRC) letter to John F. Opeka (Northeast Utilities),"Generic Letter 87-02, Supplement 1, USI A-46 Resolution Millstone Nuclear Power Station, Unit 2 - Floor Response Spectra", dated March 22, 1995.

5.2 Technical Criteria and Design Basis Documents

5.2.1 EPRI NP-6041-SL R1, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin," August 1991.

5.2.2 "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment," Revision 2, as corrected on February 14, 1992.

5.2.3 Millstone 2 Plant Updated Final Safety Analysis Report.

5.2.4 Northeast Utilities Specification SP-CE-368, "Specification for control of Amplified Response Spectra (ARS) Data", Revision 0.

5.2.5 Not Used

5.2.6 VECTRA (formerly ABB Impell) Project Instructions 0240-099-02, 03 & 04 latest revision.

5.2.7 VECTRA (formerly ABB Impell) Project Quality Plan 0240-099, latest revision.

5.2.8 Northeast Utilities, "Program Manual for Resolution of USI A-46 and Generic Letter No. 87-02," Rev. 1, Berlin, CT, dated August 1994.

5.2.9 Stevenson & Associates, The GIPPER User's Manual, Latest Revision.

5.3 Evaluation Reports and Calculations

5.3.1 VECTRA Calculation MP2OR "Millstone Unit 2 Detailed Analysis of A-46 Equipment", Revision 0.

5.3.2 VECTRA Calculation MP2ORT3 "Millstone Unit 2 Outliers with Potential Anchorage Modifications", Revision 0.

5.3.3 VECTRA Report 03-0240-1367 "Preferred Safe Shutdown Paths for Millstone Unit2", Revision 2

5.3.4 VECTRA Report MP2-RELAY.RPT "Relay Evaluation Report for Millstone Unit2", Revision 0

5.3.5 NNECO CST calculations 90-032-422-EC(2) and 90-032-423-EC(2).

5.3.6 VECTRA Calculation 0024-099-C002, "Raceway Evaluation", Revision 0.

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TABLE 4.1

UNRESOLVED OUTLIERS

SPECTRA EXCEEDANCE:

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RECOMMENDED RESOLUTION
1	22E-MCC / B52	• The conservative FRS is not enveloped by 1.5 X BS for 22E-MCC and function during GERS for B52 MCC.	• Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition.
2	22E	• The conservative FRS is not enveloped by 1.5 X BS.	• Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition.
4	UB5	• The conservative FRS is not enveloped by 1.5 X BS. • Caveat 4 - Transformer coils are not top braced or have "A" frame, external evaluation of coil support indicated that hold-down bolts for the transformer should be A-325 or better. The SRT could not confirm bolt material during walkdown. Reference VECTRA Clac. No. MP2ORT, section 5.4, Rev. 0	• Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition. • Confirm that the transformer hold-down bolt material is A-325 or better. If not replace existing bolts with A-325 bolts. Otherwise the transformer evaluation may be further refine based on less conservative spectra.

OTHER:

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RECOMMENDED RESOLUTION
7	2-CHW-11	• Valve actuator is independently braced to building steel cross bracing at column line E.	• Review piping isometric and/or piping calculation to determine seismic stresses at valve yoke.

TABLE 4.1

ADJACENT CABINETS NOT BOLTED TOGETHER:

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RECOMMENDED RESOLUTION
14	D11 / D12 / D21 / D22 / VR11 / VR21	• D11 and D12 are not bolted to adjacent VR11 distribution panel. Similarly, D21 and D22 are not bolted to VR21. The SRT is of the opinion that adjacent cabinets should be bolted together even though no essential relays are present; the basis for this recommendation is the data represented in EPRI GERS report (NP-5223-SL) for distribution panels. The report indicated that circuit breakers were more sensitive to high frequency input. Therefore bolting the cabinets together eliminates any pounding and any potential breaker trips would be precluded.	•Bolt D11 and D12 to VR11; D21 and D22 to VR21. The subject distribution panels should be bolted at the top.
20	C25A / C25B / C80	• Adjacent cabinet C80 is not bolted to C25B, since C25A and C25B cabinets act as one unit, seismic impact is not precluded. In addition, C80 cabinet is not bolted to adjacent C26 cabinet.	• Bolt cabinet C80 to adjacent C25B and C26 cabinets.
20	RC02A1 / RC02B / RC02B2 / RC02C / RC02C3 / RC02D4 / RC05B / C06X	• RC02A1 is part of the ESAS cabinets, the TSI C20 cabinet at South side and the Annunciator logics RC22 cabinet at North side are not bolted to ESAS cabinets. • In addition, C06X cabinet is not bolted to adjacent TSI C20 and C08X cabinets. Therefore, seismic impact is not precluded. • Similarly, seismic impact is not precluded for the RPS panel RC05B which is one section of the single cabinet RC05 and is located next to RC05A section which is not bolted to adjacent cabinet RC05E.	• Bolt the ESAS cabinets to adjacent TSI C20 and RC22 cabinets. • In addition, bolt cabinet C06X to TSI C20 and C08X. • Similarly, bolt cabinet RC05A to RC05E

TABLE 4.1

UNACCEPTABLE INSTALLATION (FIELD CONDITION):

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RECOMMENDED RESOLUTION
15	DB1 / DB2	• The battery racks bolts do not meet the GIP screening criteria due to the gaps under the base being as large as 2.75". Therefore, the anchorage capacity does not exceed the demand due to high shear and tension forces on the bolts as a result of the large gaps under the base. Also, the longitudinal bracing on the front of the rack is intermittent, therefore given the gaps under the anchorage load redistribution to locations with no gap may cause load path concern with the rack members.	• A number of different options are available in order to resolve the outlier: - Grout all gaps under base that are larger than 1/4". - Install additional cross-bracing in the front of the racks to distribute longitudinal forces to more bolts. - Provide bolting of the top back members of the rack to the wall behind. - Perform necessary structural evaluation of the battery racks to determine if recommended changes will meet the GIP criteria.
21	X-82	• Quench tank Hx X-82 does not meet the GIP screening criteria since the tank anchorage capacity does not exceed the demand and the concrete pedestal on the fixed end connection is cracked. Refer to VECTRA calc. No. MP2ORT3, section 5.3, Rev. 0 for tank evaluation.	• Structurally repair the cracked pedestal. When the concrete pedestal is repaired the X-82 anchorage will be seismically acceptable per VECTRA anchorage evaluation that is attached to the SEWS.

MAINTENANCE ITEMS:

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RECOMMENDED RESOLUTION
20	C01X	• Some internal relay panels are loose and/or missing bolts for C01X cabinet.	• Loose bolts on internal panels may be due to maintenance activities during the outage. Verify that missing bolts are installed to relay panels inside C01X cabinet.
20	C05 / C05R / C06 / C06R	• Top bolt between adjacent cabinets C05 and C06 is loose. • For C05 cabinet bottom wireway cover not secured, no screws. • C05R and C06R are bolted together with three bolts. There is a 1/8" gap at top and 1/4" gap on bottom bolt on the C06R side.	• Tighten top bolt between C05 and C06 cabinets. • Secure wireway cover at bottom of C05 cabinet. • Shim and tighten top and bottom bolts between C05R and C06R cabinets.

TABLE 4.1

RESOLVED OUTLIERS

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF OUTLIER CONDITION	RESOLUTION
2	22F	• The front of 22F SWGR sections were not anchored to the embedded plate.	• Outlier has been resolved, see OSVS.
9	F38A / F38B	• The conservative FRS is not enveloped by 1.5 X BS.	• Outlier has been resolved, see OSVS.
9	F52	• The realistic FRS is not enveloped by 1.5 X BS.	• Outlier has been resolved, see OSVS.
10	F14C / F14D / X-34A	• The conservative FRS is not enveloped by 1.5 X BS.	• Outlier has been resolved, see OSVS.
11	F1A / F1B	• Block walls surrounding compressor do not have safety related marking. The SRT conservatively assumed that seismic interaction with Waste Gas Compressor can not be precluded.	• Outlier has been resolved, see OSVS.
20	C08 / C08R	• There is a line of lockers 43" away south of C08 and C08R cabinets which may cause seismic interaction. Although there are no essential relays within these cabinets, the SRT recommends that the lockers be secured or removed as part of good housekeeping practices.	• Outlier has been resolved, see OSVS.
21	T3	• Tank T3 does not meet the GIP screening criteria since it is a large vertical tank supported by legs. A detailed tank evaluation was performed to qualify the tank anchorage and connections between anchor bolts and the tank shell. See VECTRA Calc No. MP2ORT3, section 5.1, Rev. 0 for the tank evaluation. Based on the evaluation, the tank anchor bolts fail due to insufficient tension capacity; the tank legs fail in bending; and the concrete floor punching shear capacity is exceeded.	• Outlier has been resolved, see OSVS. When the A-46 outlier condition was discovered a temporary design was installed to resolve the outlier prior to start-up. PDCR 2-95-040 has been prepared and approved to replace the temporary design with a permanent design modification. [Reference NNECO calc. No. 95-ENG-1198 M2, Rev. 1 dated 11/6/95]. In addition, an Operability Evaluation of the RBCCW Surge Tank T3 was performed (VECTRA Calc No. MP2T3OPER Rev. 0). The evaluation concluded that tank T3 was operable under normal operating conditions.

TABLE 4.2

INACCESSIBLE ITEMS

EQUIP CLASS	COMPONENT ID	DESCRIPTION OF INACCESSIBILITY	RESOLUTION
8	2-CS-13.1A	• This valve is located in a pit in the vicinity of the Refueling Water Storage Tank and requires special confined space permits	• Given the lack of any overall interaction concerns identified in the plant and the well supported piping systems, the SRT judged that a drawing review was sufficient to establish the seismic adequacy of the valve.
9	F142	• The fan F142 support structure and its anchorage is inaccessible (located at roof of 480V SWGR room). Visual inspection was performed by the SRT at floor El. 36'-6" and reviewed the fan support details by drawings. The fan is supported by 4 - L4" X 4" X 1/2" angles contained inside the roof opening with a total of 12 - 1/2" diameter Hilti bolts (5 1/2" minimum embeddment), and one C7 X 14.75 channel welded to existing W10 beam.	• Based on the review of the documents, the SRT has determined that the anchorage for fan F142 is adequate.
10	X36A	• The coil / plenum structure is located in the NE corner of "A" Safeguards room. Clearance with East and West walls is approximate 18". This small clearance precluded SRT to closely examine or perform tightness check on the anchor bolts. Thus, the SRT can only provide a visual inspection of the West baseplates and anchors.	• Tightness check was not performed due to high contamination and accessibility of the anchors. Based on the results of tightness checks that were performed by the SRT on other MP2 components, a reasonable assurance is provided that anchorage at MP2 have been properly installed.
20	C25A / C25B	• C25A and C25B cabinet anchorage is inaccessible due to a metal cover (used to preclude personnel tripping hazard and is not shown on civil drawings or vendor prints. Therefore, the SRT could not evaluate the seismic adequacy of the anchorage.	• Perform additional documentation search to see if the C25A and C25B anchorage details can be found to determine the seismic adequacy of the anchorage. Based on the result of anchorage reviews at MP2 the SRT has good confidence that the anchorage details are adequate.
21	X22	• The Letdown Heat Exchanger is located in highly contaminated area and locked high radiation areas	• The SRT believes that the design drawings accurately reflect the as-built condition based on the good agreement between design dwgs and as-built configuration of other SSEL components.

ATTACHMENT A

Excerpts from the MP2 UFSAR

ATTACHMENT B

Technical Considerations for the Development of In-Structure Response Spectra on Major Structures.

ATTACHMENT C

RESUMES AND TRAINING RECORDS OF KEY VECTRA Technologies PERSONNEL

(53 Pages)

Charbel Abou-Jaoude (6 Pages)
Dimitrios Antonopoulos (8 Pages)
Charlie Beck (6 Pages)
James Buckley (5 Pages)
Sing Chu (6 Pages)
Bob Courcy (7 Pages)
Steve Reichle (7 Pages)
John Reilly (3 Pages)
Aziz Saber (5 Pages)

CHARBEL M. ABOU-JAOUDE, P.E.

EXPERTISE

Mr. Abou-Jaoude is a Project/Service Area Manager in VECTRA's Boston Office, with a broad technical and managerial experience in the power industry. His areas of technical expertise are Structural Mechanics and Seismic Design; he has an in-depth knowledge of various industry codes/standards such as Sections III & XI of the ASME Code, ANSI B31.1, IEEE-344 and 382, various USNRC Reg. Guides and NUREG Reports, WRC Bulletins, AISC, and ACI-349. He is well versed in the Generic Implementation Procedure developed by the Seismic Qualification Utility Group for the resolution of USI-A-46, and the methodologies developed by the industry for the response to Generic Letter 88-20 as outlined in NUREG-1407; he has completed the SQUG/EPRI sponsored A-46 and Seismic IPEEE training courses and has participated in several A-46/IPEEE walkdowns as an SRT member. Mr. Abou-Jaoude has also participated in Post-Earthquake Investigations at industrial facilities in California. While at VECTRA, he has lead the engineering efforts of various work scopes; his responsibilities have included: Criteria development, training and personnel development, project execution, interface with regulators and outside organizations, and overall project management.

Currently, Mr. Abou-Jaoude is the Project Manager for the Northeast Utilities A-46 projects (Connecticut Yankee, Millstone Units 1&2). He is also the Project Manager for the IPEEE peer review of the Perry Plant. He is the Project Engineer for the PECo (Peach Bottom 2&3) IPEEE/A-46 and PSE&G (Salem 1&2) A-46 projects and an SRT member of the Wolf Creek and Limerick 1&2 IPEEE efforts. At Connecticut Yankee, Mr. Abou-Jaoude has been instrumental in the successful completion of the project; he has provided cost effective resolutions to a number of outliers, and lead the development of implementation procedures for the procurement of new and replacement equipment. Mr. Abou-Jaoude is also serving as peer reviewer for A-46/IPEEE efforts at the CP&L plants (4 sites) and the Perry Plant.

Mr. Abou-Jaoude was the Assistant Project Manager for the Civil/Structural effort at TU Electric CPSES Unit 2 Project. He had primary management responsibility for the work of 80 engineers in the Electrical Raceways, Seismic Equipment Qualification, and Seismic II/I disciplines. This effort involved the design validation of existing Raceway designs, issuance of new designs, establishing the qualification basis of all BOP Seismic Cat 1 and NSSS C1E equipment, procurement of new and replacement equipment, structural evaluation of non seismic commodities using an A-46 walkdown based approach, and field engineering to support the completion and start-up of Unit 2.

EXPERTISE (Cont'd)

Prior to his Unit 2 assignment at CPSES Mr. Abou-Jaoude was the Assistant Project Manager for the Secondary Water Chemistry Improvement Project at Consumers Power (Palisades). This project involved modifications to the existing blowdown system, the addition of various equipment items, and the installation of 2000 ft. of piping. The design effort was completed in a period of six months with a peak staff of 40 engineers; the design has been successfully implemented and its operation has provided improvements beyond the plant's initial expectations. In addition to this project he was involved in a number of projects for Consumers Power: He was the Project Engineer for consulting work related to the resolution of 79-14 piping and pipe support issues; he also was the Project Engineer for a modification to install a reactor head shielding which involved generating the amplified response spectra and performing the seismic analysis and qualification of the lifting ring/shielding structure.

Mr. Abou-Jaoude has also worked on a number of piping and equipment qualification projects for Commonwealth Edison and Northern States Power. He was the Project Engineer for the development of criteria to evaluate integral welded attachments for Prairie Island; the completion of this effort provided successful closure of an NRC 79-14 issue.

Previously Mr. Abou-Jaoude lead a group of 18 engineers, working on the seismic qualification of BOP components, in support of a successful SQRT audit for TU Electric's Comanche Peak Station Unit 1. He was responsible for the technical adequacy, budget and schedule of the following scope:

- Preparation of summary packages and supporting calculations to demonstrate the seismic qualification of storage tanks, heat exchangers, pumps, valves, the diesel generator set, piping, and other electrical components (motors, battery racks, control panels, and instrumentation devices).

- Evaluation of mechanical equipment rerating, under Section XI of the ASME Code, for revised design conditions such as pressures, temperatures, nozzle loads, and or acceleration values (approx. 200 stress reports).

Mr. Abou-Jaoude was also involved in the Comanche Peak cable tray hanger design validation effort. He was a group lead responsible for qualifying cable tray systems. This required detailed dynamic analysis and evaluation of structural members and anchorages. He was involved in the development of criteria for modification reduction

EXPERTISE (Cont'd)

techniques. He also worked on the dynamic testing of full scale cable tray systems and provided analytical results for correlation with measured test data.

Prior to joining ABB Impell, Mr. Abou-Jaoude has worked in the Middle-East on the construction of several commercial and industrial reinforced concrete buildings. He has also worked as a field engineer responsible for the installation and maintenance of equipment at an automotive refurbishing plant in the United Arab Emirates.

EDUCATION

M.S., Civil Engineering, December 1985
University of Michigan, Ann Arbor, Michigan

B.E., Mechanical Engineering, July 1984
American University of Beirut. Box 11 0236, Beirut, Lebanon

PROFESSIONAL AFFILIATIONS

Professional Engineer - State of Connecticut, License No. 18527
American Society of Civil Engineers
American Society of Mechanical Engineers
Tau Beta Pi Honor Society
Chi Epsilon Honor Society

PUBLICATIONS

Lee, B. J., Abou-Jaoude, C. M., and De Estrada, M., "Issues of Control Panel Rigidity in Seismic Qualification," Proc. of 1991 Pressure Vessels and Piping (PVP) Conference, Vol. 220.

Lee, B. J., and Abou-Jaoude, C. M., "Effect of Base Uplift on Dynamic Response of Electrical and Mechanical Equipment," Proc. of 1992 Pressure Vessels and Piping (PVP) Conference, Vol. 237-2.

Roche, T.R., Abou-Jaoude, C.M., et al, " Comparison Between Analytical and Test Results for Transformer Base Details," Proc. of 1993 Pressure Vessels and Piping (PVP) Conference, Vol. 256-2.

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PROFESSIONAL ENGINEER

GLORIA R. SCHAFFER
COMMISSIONER DCP
R 32/T 57 09/15/1994

CHARBEL M. ABOU-JAOUDE
600 WORCESTER RD 3RD FLR
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FRAMINGHAM, MA 01701

SIGNED: C. M. Abou-Jaoude

LIC./REG. NO.	FEE PAID
18527	$110.00
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EPRI
Electric Power
Research Institute

Certificate of Achievement

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Charbel M. Abou-Jaoude

has Completed the
Seismic IPE Add-On Training Course
Held December 1-3, 1992

David A. Freed, MPR Associates
SQUG Training Coordinator

R. P. Kassawara

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SQUG

Certificate of Achievement

This is to Certify that

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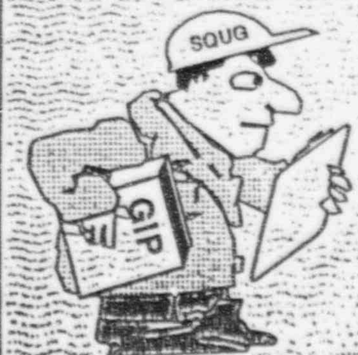
has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held November 9-13, 1992



David A. Freed, MPR Associates
SQUG Training Coordinator

Neil P. Smith, Commonwealth Edison
SQUG Chairman

Robert P. Kassawara, EPRI
SQUG Program Manager

DIMITRIOS ANTONOPOULOS

Technical Lead Engineer **Civil/Structural**

PROFESSIONAL EXPERIENCE

Mr. Antonopoulos is a Technical Lead Engineer with VECTRA Technologies and has over twenty (20) years experience in structural engineering analysis and design of nuclear power, industrial and commercial facilities. He is responsible for supervising a staff of twelve engineers for structural and mechanical consulting services. He has particular expertise in the analysis and design of plant concrete and steel structures, including vessels, foundations for various equipment, seismic equipment qualification and support of piping systems in accordance with applicable industry codes. Mr. Antonopoulos is also assigned as a member of the Seismic Review Team on the USI A-46 SQUG and IPEEE projects for Northeast Utilities and PECO Energy Company. He has been trained by EPRI/SQUG/IPEEE and is certified as a Seismic Capability Engineer.

Mr. Antonopoulos is currently the Project Engineer for the PORV/SV piping system Design Change Package project for Public Service Electric and Gas Salem Units 1 and 2. This project addresses issues associated with PORV and SV actuation in response to NRC concerns identified in NUREG-0737 (II.D.1). In addition, he is involved as the Lead Structural Engineer with the Digital Feedwater and Annunciator projects for Salem Units 1 and 2. He is responsible for the overall structural support, including equipment qualification for the various plant design change packages. On previous assignments he was involved as the Lead Structural Engineer with the Control Room lighting modification projects for Salem Units 1 and 2. The projects included an analysis and design of a temporary work platform for replacing existing light fixtures in accordance with NUREG-0700 requirements, and support of the new light fixtures. The design was performed for deadweight, live and seismic inertia effects, in accordance with PSE&G Seismic II/I Program. The ANSYS computer code was utilized to develop and analyze static and dynamic finite element models for the platform.

Mr. Antonopoulos was assigned to Niagara Mohawk Power Corporation Nine Mile Point Unit 1 Design Basis Reconstitution Program project where he prepared the Design Criteria Document (DCD) for plant reinforced concrete structures.

Mr. Antonopoulos was assigned to Ohio Edison's Niles Generating Station DOE WSA-SNOX Demo Plant Project as a Lead Senior Structural Engineer. In this capacity, he was responsible for the design of foundations which supported duct towers, high RPM fans, tanks, and various equipment/buildings. The STAAD-III structural program was utilized in the analysis and design of spread footings, mats and pile cap foundations.

PROFESSIONAL EXPERIENCE (Cont'd)

Mr. Antonopoulos was assigned to BECo's Pilgrim Nuclear Power Station Salt Service Water Pump Evaluation Project. The evaluation was performed for deadweight, internal pressure and seismic inertia effects in accordance with the requirements of ASME BPVC Section III. The ANSYS computer code was utilized to develop and analyze finite element models for the vertical pump columns and the flanged column section region.

Mr. Antonopoulos was assigned to GPUN Three Mile Island Unit 1 skew loaded clam evaluation project as a Lead Support Engineer. Employing the finite element method and utilizing ANSYS the skewed pipe clamps were evaluated for non-standard load application and checked against sliding. Similarly, the stresses in the pipe wall induced by a lug were evaluated. This project successfully demonstrated that 58 skewed pipe clamps were acceptable and field modifications were avoided.

Mr. Antonopoulos was assigned to Niagara Mohawk Power Corporation Nine Mile Point Unit 1 Project where he was involved in numerous pipe support evaluations to support plant restart.

Prior to joining VECTRA, Mr. Antonopoulos was employed by Cygna Energy Services where his experience included an assignment as Group Leader for the pipe support and baseplate analysis and design effort for the Vermont Yankee Nuclear Power Plant. In this capacity he was responsible for the supervision of a staff of 20 engineers involved in the analysis and design effort. He was also responsible for the development of work instructions and design criteria, and for setting specifications for the design of special purpose software for pipe support analysis.

Mr. Antonopoulos was assigned to Boston Edison Civil/Structural Group for over a year as a resident engineer providing engineering support on various PDC packages. In addition, he was responsible for writing and/or revising engineering specifications dealing with painting, grouting and miscellaneous fasteners.

Mr. Antonopoulos was responsible for performing analysis and design of upper internals storage cask for Northern States Power Prairie Island Units 1 & 2. The cask was designed to meet radiation shielding and NUREG-0612 requirements. The cask was of cylindrical shape and was used for transporting the upper internals of the reactor vessel from the reactor building to its permanent location at the plant site for long term storage.

PROFESSIONAL EXPERIENCE (Cont'd)

Mr. Antonopoulos was also responsible for performing analysis and design of IDNS RAGEMS facilities for CECo's Dresden, Quad Cities and Zion Plants. The steel facilities were designed for wind and/or seismic loads in accordance with the requirements of the UBC code and were supported by the roofs of existing structures or the ground which involved design of footings and slabs on ground. Mr. Antonopoulos was responsible for interfacing with the architect to produce all necessary specifications and architectural details as well as interfacing with HVAC and electrical groups to bring the project to its successful completion.

Mr. Antonopoulos was also responsible for performing analysis of postulated reactor vessel and upper internals load drops for NUREG-0612. This work was performed for RG&E's Ginna Plant and it involved finite element models using ANSYS, and both elastic and plastic analyses. This project successfully demonstrated that these drops were acceptable and expensive crane modifications were avoided.

In an earlier assignment, Mr. Antonopoulos served as Assistant Project Engineer for the reanalysis of masonry walls for I.E. Bulletins No. 80-11 for Millstone Unit 1. On this project he was responsible for various phases of the analysis and modification design effort. In addition, Mr. Antonopoulos supervised the field effort for installing the blockwall modifications.

Mr. Antonopoulos on three occasions was loaned to area engineering firms were he performed structural engineering analysis and design of industrial facilities (General Motors, Paint Shop in Framingham, MA) and various high rise commercial buildings.

Mr. Antonopoulos has been involved in structural analysis and design at Stone and Webster Engineering Corporation. Responsibilities on various projects included analysis and design of reinforced concrete structures, pipe rupture restraints, equipment supports, embedded plates for pipe rupture restraints, pipe supports, cable tray and conduit supports. His project assignments included Beaver Valley Unit 2, North Anna Unit 1, Shoreham, Montague, and Nine Mile Point Unit 2. As a Senior Engineer in the Structural Division, Mr. Antonopoulos was relied upon to prepare

PROFESSIONAL EXPERIENCE (Cont'd)

structural designs for some of the more complex plant buildings. In particular, he was responsible for the analysis and design of the fuel handling structure which contained the spent fuel pool for the Beaver Valley Unit 2 Nuclear Station. This project involved 3-D finite element modeling for dead, live, wind, tornado, seismic and thermal loadings. He was responsible for all phases of the production effort including analysis, design and drafting.

EDUCATION

M.S., Structural Engineering
Northeastern University, Boston, MA

B.S., Civil Engineering
University of Massachusetts Dartmouth, North Dartmouth, MA

REGISTRATION

Professional Engineer
In the States of Massachusetts and Rhode Island

PROFESSIONAL AFFILIATION

Member - American Institute of Steel Construction
Member - American Concrete Institute

DIMITRIOS ANTONOPOULOS, P.E.
CIVIL/STRUCTURAL TECHNICAL LEAD ENGINEER

EXPERIENCE HIGHLIGHTS

Over eighteen (18) years experience in structural engineering analysis and design of nuclear power, industrial and commercial facilities.

Ten (10) years experience as Project Engineer and Supervisor on various nuclear power projects.

EXPERIENCE SUMMARY

- Project Engineer for PSE&G's Salem Units 1 and 2 PORV/SV piping system modification projects (92-94).
- Seismic Review Team member on USI A-46 (SQUG) and IPEEE projects for Northeast Utilities and PECO Energy Company (93-94).
- Lead Structural Engineer for PSE&G's Salem Units 1 and 2 Digital Feedwater (ADFCS), Control Room lighting modifications and Annunciator projects (90-94).
- Developed Design Criteria Document (DCD) for plant reinforced concrete structures for NMPC's Nine Mile Point Unit 1 Design Basis Reconstitution Program (92).
- Group Leader for Vermont Yankee's pipe support and baseplate evaluation project in support of NRC Bulletins 79-02 and 79-14 (81-83).
- Assistant Project Engineer for Northeast Utilities Millstone Unit 1 Block Wall Reanlaysis Project in support of NRC Bulletin 80-11 (80-81).
- Analysis and design of reinforced concrete and steel structures, foundation design of steel towers, high RPM fans and various equipment/facility buildings (73-80, 83-86, 91-92).
- Other experience includes: Seismic Qualification of equipment, design of pipe rupture restraints, evaluation of structural elements due to load drops for NUREG-0612, specification and design criteria development and review of shop drawings for concrete and steel structures (75-94).

PROFESSIONAL AFFILIATIONS

Member - American Institute of Steel Construction
Member - American Concrete Institute

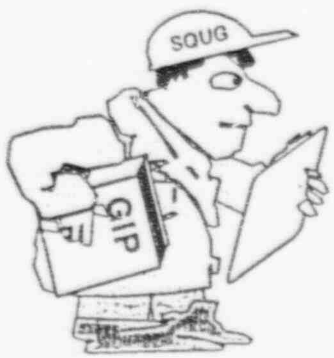
SQUG

Certificate of Achievement

This is to Certify that

Dimitrios Antonopoulos

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held August 10-14, 1992



David A. Freed, MPR Associates
SQUG Training Coordinator

Neil P. Smith, Commonwealth Edison
SQUG Chairman

Robert P. Kassawara, EPRI
SQUG Program Manager

EPRI
Electric Power Research Institute

Certificate of Achievement

This is to Certify that

D. Antonopoulos

has Completed the
Seismic IPE Add-On Training Course
Held November 2-4, 1992

David A. Freed

David A. Freed, MPR Associates
SQUG Training Coordinator

R. P. Kassawara

Robert P. Kassawara, EPRI
SQUG Program Manager

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
BOARD OF REGISTRATION FOR
PROFESSIONAL ENGINEERS
THE REGISTRANT HAS MET THE REQUIREMENTS OF THE LAW AND HAS BEEN GRANTED THIS CERTIFICATE OF REGISTRATION AS A PROFESSIONAL ENGINEER

(VALID WHEN STAMPED)

REGISTRANT
D ANTONOPOULOS
191 MANET AVE
QUINCY , MA 02169

REGISTRATION NUMBER
4074

EXP DATE
06/30/95

SIGNATURE (NOT VALID UNLESS SIGNED)

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF REGISTRATION
IN ENGINEERING
AS A REG/PROF ENGINEER
ISSUES THIS LICENSE TO
DIMITRIOS ANTONOPOULOS
191 MANET AVE
QUNICY MA 02169-2927

LICENSE NO.	EXPIRATION DATE	SERIAL NO.
30441	06/30/94	224279

Signature

CHARLES E. BECK, P.E.

EDUCATION

Ph.D. Candidate, Electrical and Computer Engineering, Illinois Institute of Technology (IIT)
MS, Electrical and Computer Engineering, IIT
BS, Electrical Engineering, University of Notre Dame

FORMAL TRAINING

- US Navy Nuclear Power School
- SQUG "Equipment Selection" and "Relay Evaluation" training courses (by MPR Associates)
- BWR "Introduction to Power Plant Operation" (by Commonwealth Edison Company)
- "Electrical Power System Survey" course (by Commonwealth Edison Company)
- "Nuclear Codes, Standards, and Regulatory Requirements" (by General Physics Corporation)
- "Fire Protection for Power Plants" (by Professional Loss Control)
- "Project Engineer" and "Project Management" training courses (by ABB Impell Corporation)

PROFESSIONAL AFFILIATIONS

Licensed Professional Engineer in IL, MA, MI, MN, and WI

Senior Member - Institute of Electrical and Electronics Engineers (IEEE)

Member - American Nuclear Society
- National Society of Professional Engineers
- National Fire Protection Association
- Program Committee for the American Power Conference

PROFICIENCIES

- Analysis, Design, and Modifications for Electrical Systems.
- Nuclear Station Systems Engineering.
- IEEE Standards, NEMA Standards, NUREGs, NRC Generic Letters & Information Notices.
- 10CFR21, 10CFR50 (Appendix B) and 10CFR50.59.
- Developing Test Plans and Performing Electrical Tests. Technical Writing.
- Computer-aided Power System Analysis.
- Large-scale Project Management.

EXPERIENCE SUMMARY

Mr. Beck is the Engineering Manager for Kiran Consultants, Incorporated. His project management responsibilities include assuring compliance with client requirements, scheduling and monitoring major tasks, optimizing the use of personnel and other resources, and controlling project budgets. He has performed detailed system reviews for Licensee Event Reports, operability issues, NRC Information Notices, and Root Cause Investigations. He wrote test plans, conducted laboratory tests, and wrote test reports on safety-related relays and motors. He wrote a training program for motor refurbishment, including the Student Handout, the Instructor's Guide, and visual aids.

Previous experience includes a multi-million dollar, four year, multi-disciplinary, Human Factors project to upgrade Annunciator Systems. Other DCRDR projects include modifications to Control Room Lighting and HVAC, Control Panel layout, and DG Control Systems.

Mr. Beck was the "Lead Relay Reviewer" for a SQUG Relay Evaluation. He has performed and reviewed calculations and design changes for Motor-Operated Valves, in response to Generic Letter 89-10 requirements. He has provided audit support and other consulting services, including EDSFI preparations, DET support, and ECCS System logic reviews. He has extensive design experience in minor plant changes, ranging from simple relay substitutions, to reactor mode switch rewiring, to replacements of Station Batteries. He has performed operability assessments for potentially degraded systems, reviewed mechanical and structural modifications for electrical interactions, and performed Safety Evaluations and Technical Quality Reviews to assure acceptability of designs.

Mr. Beck directs a section of seven engineers. He is responsible for ensuring technical quality and client satisfaction, for productivity, and for training. His section performs specialty consulting tasks related to power system analysis, topical issues (such as motor operated valves), component testing, and environmental qualification of electrical equipment. Included with these tasks are verification of compliance with applicable codes, standards, regulations, and client-specific procedures.

Mr. Beck has twenty years of experience in the operation, maintenance, and design of nuclear power plants. This includes four years with ComEd's BWR Engineering Department, where he performed all phases of modification design. He held a two-year assignment at Quad Cities Nuclear Station, in the role of onsite representative of the corporate engineering office. He was involved in over fifty significant projects as a BWR design engineer, including modifications, conceptual studies, operability assessments, and responses to Nuclear Licensing issues.

EXPERIENCE SUMMARY (Cont'd)

Mr. Beck served in the US Navy Nuclear Program for nine years, supervising up to 130 operators and technicians. He was responsible for Electrical Distribution and Reactor Control on three nuclear powered ships. With his background as a navy nuclear operator and as a BWR design engineer, he has performed project work from both the Electrical and the Systems Engineering perspectives.

TECHNICAL PUBLICATIONS

"Expert System Applications in Nuclear Plants: Discussion of the Key Issues, "IEEE Transactions on Nuclear Science v39 n5: 1992.

"Concepts of Reactor Physics, Without the Mathematics, "IEEE Transactions on Nuclear Science v39 n3, Part II: 1992.

"Video/CAD Animation: A Technical Tool to Simplify the Human Task In Nuclear Plant Maintenance," Conference Record, IEEE SMC International Conference: 1992.

"Addressing External Constraints for AI in Nuclear Power Applications," Conference Record, IEEE Nuclear Science Symposium: 1992.

"Minimizing Installation Impact of Human Factors Projects," Conference Record, IEEE Nuclear Science Symposium: 1992.

"A Bibliography of Expert Systems as Applied to Nuclear Power Plants," IEEE Transactions on Energy Conversion v8 n1: 1993.

"Modelling External Constraints: Applying Expert Systems to Nuclear Plants," Proceedings of the American Power Conference: 1993.

"Impact of Transient Inrush on MOV Starting" Conference Record of the 1993 IEEE Nuclear Science Symposium, San Francisco, CA: 1993.

"Modelling of Nuclear Plant System Interactions Using a 'Layered-Data' Concept." IEEE Transactions on Nuclear Science v41 n4, Part I: 1994.

"On-Site Motor Refurbishment Shop." Conference Record of the 1994 IEEE Nuclear Science Symposium, Norfolk, VA: 1994.

TECHNICAL PUBLICATIONS (Cont'd)

"Analysis of Simultaneous Unbalanced Faults Using Three-Port Network Theory," Proceedings of the American Power Conference: 1995.

"A Qualification Test for Relay Contacts as Isolation Devices in Nuclear Power Plants," accepted for IEEE Transactions on Nuclear Science: 1995.

Organizer, Chairman, and Moderator for the "Nuclear DC Systems Roundtable," a technical presentation and panel discussion in the American Power Conference: 1993 - 1995.

SQUG

Certificate of Achievement

This is to Certify that

Charles E. Heck

has Completed the

SQUG Equipment Selection Training Course

Held March 22-24, 1993

Paul W. Hayes, MPR Associates

Richard G. Starck II, MPR Associates

SQUG

Certificate of Achievement

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Charles E. Beck

has Completed the

SQUG Relay Evaluation Training Course

Held March 22-24, 1993

Jess O. Betlach, MPR Associates

JAMES J. BUCKLEY

SPECIALTIES

ELECTRICAL ENGINEERING AND DESIGN

APPLICABLE TRAINING

Mr. Buckley has attended the training course sponsored by the SQUG Committee for Safe Shutdown Equipment Selection and Relay Screening and Evaluation which qualifies him as a Lead Relay Reviewer. He has served as lead Relay Reviewer for the following A-46 / IPEEE plants:

- Public Service Electric and Gas Company (PSE&G) - Salem Generating Station Unit 1
- Public Service Electric and Gas Company (PSE&G) - Salem Generating Station Unit 2
- Northeast Utilities Service Company (NUSCO) - Connecticut Yankee
- Northeast Utilities Service Company (NUSCO) - Millstone Unit 1
- Northeast Utilities Service Company (NUSCO) - Millstone Unit 2
- Boston Edison Company Pilgrim Nuclear Power Station

PROFESSIONAL EXPERIENCE

Mr. Buckley is the Supervisor of Design and Drafting for VECTRA's Boston office Design/Engineering Section of the Electrical Systems Division. He has over 24 years of experience in the engineering, design and installation of electrical systems for power generation and various industrial facilities including pulp and paper projects and water/ sewerage treatment plants.

Prior to this assignment, he was the Project Engineer for the Boston Edison Pilgrim Station Annunciator Project, which performed a complete redesign of the existing system including the preparation of three Plant Design Change (PDC) packages. The project scope was to rearrange the Control Room annunciator windows and revise the associated electrical schematics, wiring diagrams, cable block diagram, cable and raceway schedules, process and instrumentation diagrams and functional control diagrams.

EXPERIENCE (Cont.)

Previously, Mr. Buckley served as Lead Engineer for the Electric Load Management System project, a data collection effort for NUSCO's Millstone Unit 1 Station. He also held the same position for an identical project at NUSCO's Connecticut Yankee Station.

Prior to this assignment, Mr. Buckley was assigned to the Carolina Power and Light, Brunswick Plant, Appendix R separation analysis documentation review. He also supported the Niagara Mohawk, Nine Mile Unit 1, project which consisted of 125VDC system modifications, fuse and molded-case switch additions to the 125VDC distribution boards and addition of battery monitoring systems for 125VDC batteries.
In a previous assignment, he was a Project Engineer on the Commonwealth Edison, Dresden Unit 2 Annunciator Modifications Project. This modification addressed the human engineering deficiencies associated with the plant annunciator system.
Changes to the system included auditory coding, ringback and flashrate adjustment and reflash. These changes resulted in extensive revisions to the plant's wiring and schematic drawings.

Previously, he was the Lead Electrical Design/Engineer for the No. 4 Chemical Recovery Boiler Project for Miramichi Pulp and Paper. His responsibilities included checking electrical specifications and calculations, development of the wiring design for connection of field cables as well as the design of raceways, grounding, lighting, etc.

His earlier assignments at VECTRA included experience in an as-built verification of wiring diagrams for control panels and the development of design change packages required to resolve any deficiencies and updating all affected drawings for Boston Edison's Pilgrim Station. Other activities at Pilgrim Station included lighting design of the Computer Room, answering Engineering Service Requests (ESR), issuing and resolving Potential Conditions Adverse to Quality (PCAQ), writing and implementing Maintenance Work Request (MWR), evaluating plant conditions for circuit isolations and the preparing Appendix R Plant Design Change Packages. These packages included cable rerouting, and the installation of fire detection and suppression systems.

His previous assignments include a staff position on the Equipment Qualification Program team for Northeast Utilities and at the Seabrook Station which also included walkdown assignments. Earlier assignments with VECTRA include the electrical design of the Appendix R Emergency Lighting System for Connecticut Yankee.

EXPERIENCE (Cont)

In an assignment at the NYPA Fitzpatrick plant, Mr. Buckley was responsible for coordinating the installation of electrical modifications in accordance with 10 CFR 50, Appendix R. His responsibilities included the layout of equipment, conduit routing and design of conduit supports.

Mr. Buckley previously worked with the C.T. Main Corporation Pulp and Paper Division where he was responsible for the electrical design of recovery boiler systems including precipitators, evaporators, and air compressors for the Ngodwana Mill Expansion Program in South Africa. In connection with this work, he was also responsible for raceway layout and design, and field engineering support. He prepared the secondary electrical power drawings, motor control center arrangements, computerized cable schedules, and related PLC drawings. He was assigned to the site for four months for the checkout and start-up of the recovery boiler, and the review of the electrical subcontractor's work. Other projects included the design of paper machines, power boilers, coal and wood yards and turbine generators.

With Metcalf & Eddy, Mr. Buckley was involved in the electrical design of various water and sewerage treatment plants. His work included a three month field assignment to determine the sources of computer analog and digital inputs associated with the computerization of an existing sewage treatment plant in St. Paul, Minnesota.
In an earlier assignment, he spent three months overseas providing engineering support for the construction of military air base facilities in the Kingdom of Saudi Arabia.

EDUCATION

Attended Northeastern University's Lincoln College

SQUG

Certificate of Achievement

This is to Certify that

James Buckley

has Completed the

SQUG Relay Evaluation Training Course

Held February 25-27, 1992

Jess O. Betlack, MPR Associates

SQUG

Certificate of Achievement

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James Buckley

has Completed the
SQUG Equipment Selection Training Course
Held February 25-27, 1992

Paul W. Hayes, MPR Associates

Richard G. Starck II, MPR Associates

SING CHU

PROFESSIONAL EXPERIENCE

Mr. Chu is a Senior Engineer in the Engineering Mechanics Services Area of VECTRA's Boston Office. He has nine years of experience in areas of seismic engineering, systems engineering, design baseline documentation, cost and scheduling, computers, and emergency preparedness.

Systems Engineering

NUSCO - Presently Mr. Chu is involve in the NRC's Unresolved Safety Issue (USI) A-46 "Seismic Qualification of Equipment in Operating Plants" for Millstone Units 1 & 2. His responsibilities include equipment and relay screening verification and walkdown and outlier identification and resolution. Mr. Chu is also responsible for all GIP databases' control and maintenance. All tasks are perform in accordance with the SQUG, "Generic Implementation Procedure for Seismic Verification of Nuclear Plant Equipment" with Stevenson & Associates GIPPER software v2.03.

Mr. Chu is also assigned as a member of the Seismic Review Team on the USI A-46 SQUG and IPEEE projects for NUSCO and PECO Energy Company. He has completed training by EPRI/SQUG/IPEEE and is certified as a Seismic Capability Engineer.

PECo / PSE&G - Mr. Chu is also involved in USI A-46 and IPEEE projects at Peach Bottom Atomic Power Stations and Salem Stations.

NUSCO - Staff augmentation for Seismic Equipment Qualification at Connecticut Yankee and Millstone Unit 1. Responsible for seismic qualification activities associated with new replacement equipment such as electrical instrument and cabinets, mechanical components, and valves, etc..

Staff augmentation for High Energy Line Break HELB at Millstone Unit 2. Responsibilities included identifying all high energy lines within the plant, documentation and drawing search, plant wide walkdown, developed / maintain HELB databases, and generated final calculations.

Project team member for Connecticut Yankee A-46 project, final NRC report submitted 12/93. Responsibilities included equipment/relays walkdown, evaluations, and final report generation.

PROFESSIONAL EXPERIENCE (Cont'd)

FPL - Mr. Chu functioned as an engineer in support of the As-Built In-Service Inspection Project. In this capacity, Mr. Chu performed field walkdowns and generated engineering calculations to qualify noncompliance to the existing field conditions. Structural and stress analyses were performed by using STAAD III and MATHCAD.

Design Baseline Documentation

PECo - Mr. Chu developed the 480 Volt Load center and the 480 Volt Motor Control Center Design Baseline Documents (DBDs) for both PBAPS and LGS. His duties included researching the system design, modifications, plant specifications, and licensing documents. Mr. Chu was also responsible for writing draft and final sections of the DBDs ensuring technical accuracy and completeness in accordance with PECo requirements.

Cost and Scheduling

NMPC - Mr. Chu served as the Financial Administrator to the Nine Mile Point Units 1 & 2 engineering mechanics project. In addition, he was our Syracuse Branch Office Administrator. Mr. Chu was mainly responsible for forecasting and scheduling of NMPC's Work Task Assignments. He also monitored and tracked all purchase orders and job expenditures to ensure that they are within their specific contracted limits. Mr. Chu's other responsibilities are as follows:

Assisting in setting up Structural Evaluation System (SES) database for the Seismic Upgrade Program

Translate NUPIPE-SW piping models to SUPERPIPE using the same geometry, material properties, support configuration, and boundary conditions.

Provide forecasts and schedules for NMPC's Work Task Assignments, monitors and tracks all purchase orders and job expenditures to ensure that they are within their specified contracted limits.

PROFESSIONAL EXPERIENCE (Cont'd)

Track actual vs. projected resource allocation, production, and expenditure. Used ABB Impell's Project Engineering System to support project engineers with job tasks progress and activities information.

Established and maintained databases for the NMPC Maintenance Walkdown/ISI and 50.59 program.

Responsible for maintenance, setup, networking, supplies, and procurement of ABB Impell Syracuse office computer system.

Iowa Electric - Mr. Chu assisted the project engineer in cost and scheduling for the Duane Arnold Offsite Emergency Plan Project. His main responsibilities were to monitor overall budget and schedule for the project in accordance with contract requirements and to provide project progress (% completed) and financial status to the client.

Emergency Preparedness

NMPC/LILCO - Mr. Chu was involved in the development of the NRC exercise and emergency preparedness drill scenarios for NMPC's Nine Mile Point Unit 2. He also reviewed and developed LILCO Shoreham Station's 1988 FEMA/NRC graded exercise. In both capacities, Mr. Chu's main task was to generate drill information based upon raw data input. His primary involvement was to generate both in-plant and offsite radiological data using HP-85 Dose Assessment Program and various spreadsheet and database programs he developed. This included ingestion pathway, core damage, in-plant chemistry, effluent monitoring, and plant status calculations. He has also generated all the necessary maps such as EPZ survey, ingestion pathway, in-plant dose and D.O.E. Environmental Survey for these exercises. Mr. Chu provided support as a controller at the Technical Support Center (TSC) for SNPS.

NHY - Mr. Chu was assigned to New Hampshire Yankee's Seabrook Station as a document/production controller. Here, he helped to establish and track the completion of several hundred open items between several consulting firms required to revise the New Hampshire Radiological Emergency Response Plan. He has also provided input to assist in completing Seabrook's Offsite Emergency Plan.

PROFESSIONAL EXPERIENCE (Cont'd)

Subsequent to this assignment, Mr. Chu was assigned to ABB Impell's Plant Engineering Division to assist in completing Niagara Mohawk's Nine Mile Point Unit 1 pipe hangers and supports analysis using CAD and CAEMIS (Computer Aided Engineering Management Information System). Duties included generating support and hanger drawings using CAD, creating mathematical model, and running analysis per set requirements.

Prior to joining ABB Impell Corporation, Mr. Chu worked as an electrician aide for a large electrical contractor.

EDUCATION

B.S. Aerospace Engineering
Polytechnic University, Farmingdale/Brooklyn, New York

TRAINING COURSES

- SQUG USI A-46 Walkdown Screening and Seismic Evaluation Training Course, Nov. 1992
- EPRI IPE Individual Plant Examination of External Events Seismic Margin Assessment Training Course, Dec. 1992
- Stevenson & Associates SQUG Generic Implementation Procedure GIPPER computer program training course, Nov. 1992.
- EPRI STERI Training Seminar - Seismic Technical Evaluation of Replacement Items in Nuclear Power Plants NP-7484, Jan. 1995

HONORS AND AFFILIATIONS

Who's Who Among Students in American Universities and Colleges

REGISTRATION

Engineer in Training, New York

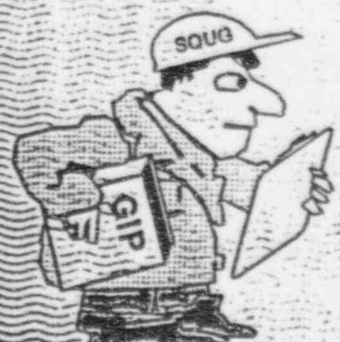
SQUG

Certificate of Achievement

This is to Certify that

Sing L. Chu

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held November 9-13, 1992



Neil P. Smith, Commonwealth Edison
SQUG Chairman

David A. Freed, MPR Associates
SQUG Training Coordinator

Robert P. Kassawara, EPRI
SQUG Program Manager

EPRI
Electric Power
Research Institute

Certificate of Achievement

This is to Certify that

Sing L. Chu

has Completed the
Seismic IPE Add-On Training Course
Held December 1-3, 1992

David A. Freed
David A. Freed, MPR Associates
SQUG Training Coordinator

R.P. Kassawara
Robert P. Kassawara, EPRI
SQUG Program Manager

ROBERT J. COURCY

PROFESSIONAL EXPERIENCE

Mr. Courcy has over 22 years experience in structural engineering analysis/design and supervision of projects for nuclear and fossil power generation and industrial facilities. He is presently an Engineer IV with VECTRA's Eastern Region Civil/Structural Group in Boston. In this position he fills the role of a Project Engineer, Analyst and Procedures Writer, responsible for the supervision and technical aspects of projects involving building structures, equipment supports, piping, tubing and conduit systems, as well as seismic equipment qualification. Mr. Courcy is also assigned as a member of the Seismic Review Team on the USI A-46 SQUG project for Northeast Utilities. He has been trained by EPRI/SQUG/IPEEE and is certified as a Seismic Capability Engineer.

Specific projects include the following:

- Seismic Equipment Qualification for Northeast Utilities' Connecticut Yankee Atomic Power Station (CYAPS). Responsible for seismic qualification activities associated with the purchasing and installation of new safety-related cabinets, electrical and mechanical components, raceways, valves, etc. for refueling outage Cycle 17 at CYAPS.

- Design Basis Reconstitution (DBR) project for Niagara Mohawk's Nine Mile Station 1. Responsible for the design verification of the DBR document and calculations for the analysis of reinforced concrete.

- Reactor Water Pipe Replacement project for Boston Edison's Pilgrim Station. Responsible for the writing/preparation of the Plant Design Change (PDC) document and interface with the pipe supplier and BECo's Construction Management group.

- Service Water Pipe Replacement project for Commonwealth Edison's Zion Plant. Responsible for the preparation of the pipe support design/evaluation procedures.

- Fuel Pool Cooling System pipe replacement at Vermont Yankee for Yankee Atomic Electric co. Responsible for the design/evaluation of equipment and pipe supports.

- Conduit evaluation project for Texas Utilities' Comanche Peak Station. Responsible for the design/evaluation of conduit supports.

PROFESSIONAL EXPERIENCE (Cont'd)

- Control Room Lighting project for Public Service Electric & Gas (PSE&G) Salem 1 and 2 plants. Responsible for the development of the conceptual design for the Control Room lighting supports and connection details.

- DOE SNOx project for Ohio Edison's Niles Plant. Subcontracted from ABB Environmental Systems. Responsible for the conceptual design, analysis and details for the following:

  - Sixteen 50'-0" structural steel towers with interconnecting bridges for the support of a 7'-0" diameter flue gas duct system.

  - A rigid frame steel structure to support a gas/gas heat exchanger unit.

  - Development of a procurement, fabrication and delivery specification for structural steel.

- Instrument Tubing Evaluation project for Rochester Gas & Electric's Ginna Plant. Responsible for the layout, analysis and support of various instrument tubing systems and the interface with RG&E's Construction Management group.

- Major Pipe Support Evaluation/Modification project for NMPC's Nine Mile Station. Responsible for the analysis to determine stiffnesses and load capacities of all pipe supports.

Prior to joining VECTRA, Mr. Courcy served eight and a half years as a Supervising Engineer for Cygna Energy Services. For approximately six years, he was Group Leader for the Site Engineering Office at Pilgrim Nuclear Power Station (PNPS), responsible for the supervision and technical direction of the group. While in charge of this group, he was responsible for the resolution of all problems associated with new construction, and modification projects.
Major projects that he was involved with included:

- Appendix "R" - Responsible for conduit layout, support design and resolution of on-going problems with the excavation and placement of major concrete duct bank.

PROFESSIONAL EXPERIENCE (Cont'd)

- Blockwalls - Responsible for the development of modifications details for all new structural steel reinforcing members.

- Scram Discharge Volume - Redesigned pipe supports and resolved pipe and pipe support problems.• TMI - Developed modifications of piping, tubing and supports.

- MCC Environmental Enclosures - Responsible for the design of structural steel enclosures and conduit tubing and pipe supports.Earlier, Mr. Courcy was in charge of a ten man design team at Millstone 1 where he was involved in the design and installation of numerous duct, pipe and conduit supports, along with the design and installation of six MCC enclosures and a structural steel extension to the building steam tunnel.

Originally Mr. Courcy represented Boston Edison Company as part of the craft supervision team during the NRC IE 79-02 and 79-14 Bulletin effort at PNPS.

Prior to joining Cygna, Mr. Courcy served over ten years as a structural designer/engineer at Charles T. Main, Inc. in Boston in their Pulp and Paper Division. In this capacity he was responsible for the structural analysis of several major structures such as recovery and power boiler buildings, paper machine and evaporator buildings, and warehouse structures. The analysis included steel framing, concrete floors and foundations, and equipment supports.

Projects he worked on during his tenure at Charles T.Main included:

- Scott Paper Co. - Design of a bleach plant building and digester enclosure tower

- Boise Cascade - Design of a paper machine building and renovation of an existing building into a storage facility.

- Fraser Paper Co. - Design an extension to an existing paper machine building to house a new in-line coater machine, a boiler building and several tank foundations.

- Union Camp Co. - Design of a recovery boiler building, an evaporator building and a black liquor pump house.

EDUCATION

A.S. Structural Engineering, Northeastern University, Boston Massachusetts

PROFESSIONAL REGISTRATION

Registered Professional Engineer (Structural) - Massachusetts

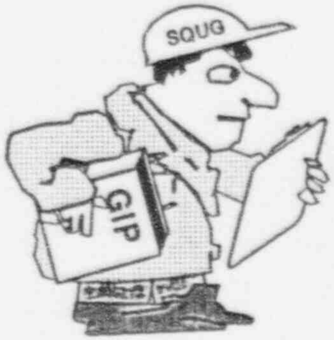
SQUG

Certificate of Achievement

This is to Certify that

Robert J. Courcy

has Completed the SQUG Walkdown Screening and Seismic Evaluation Training Course Held August 2-6, 1993



Neil P. Smith, Commonwealth Edison
SQUG Chairman

David A. Freed, MPR Associates
SQUG Training Coordinator

Robert P. Kassawara, EPRI
SQUG Program Manager

EPRI
Electric Power
Research Institute

Certificate of Achievement

This is to Certify that

Robert J. Courcy

has Completed the
Seismic IPE Add-On Training Course
Held August 31 - September 2, 1993

David A. Freed

David A. Freed, MPR Associates
SQUG Training Coordinator

R. P. Kassawara

Robert P. Kassawara, EPRI
SQUG Program Manager

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF REGISTRATION
IN ENGINEERING
AS A REG/PROF. ENGINEER

ISSUES THIS LICENSE TO

ROBERT J COURCY

3 HOBBLER RD

BOURNE MA 02532-2223

LICENSE NO.	EXPIRATION DATE	SERIAL NO.
32320	06/30/94	207622

Signature

STEPHEN P. REICHLE

PROFESSIONAL EXPERIENCE

Mr. Reichle has over 20 years of power plant engineering, design, maintenance, and operations experience. As Technical Services Consultant for Mechanical Systems in VECTRA's Boston office he is currently assigned as the Project Manager for the Fire Hazards Analysis (FHA) project for the New York Power Authority. This project consists of updating the FHAs for both the James A. FitzPatrick and Indian Point 3 nuclear plants. The project also includes the preparation of an analysis that assesses the effects of pipe rupture, inadvertent actuation and manual use of fire protection systems on safety-related equipment at JAF and IP3.

Mr. Reichle is also currently serving as the Systems Project Engineer on the NRC's Unresolved Safety Issue (USI) A-46 projects for: Northeast Utilities (Millstone 1, 2 and Connecticut Yankee), Philadelphia Electric (Peach Bottom and Limerick) and Public Service Electric & Gas (Salem). In this role, he is responsible for the identification of safe shutdown paths and the development of a Success Path Component List for each unit. These NRC programs deal with the seismic adequacy, or margin of equipment in operating plants.

Previously, Mr. Reichle served as the Project Manager for the Appendix R Compliance Program and Fire Barrier Upgrade Projects at the Pilgrim Station. Mr. Reichle managed these programs for over two years, with tasks including the development of Appendix R shutdown analyses, the development of associated operating procedures, the review and upgrade of all Appendix R fire barriers, and the design of various electrical and mechanical system modifications. This project was staffed with approximately 25 engineers and technicians.

Mr. Reichle served as the Project Engineer, and managed the engineering resources, during the update of the J. A. FitzPatrick Fire Protection Reference Manual, and supported the update of the Fire Protection Program Manual for Indian Point Unit 3. Both of these projects involved the update of fire protection and Appendix R programs to include the changes made by modifications, and the preparation of a new manual that included both programs.

Mr. Reichle also served as the Project Engineer for an Appendix R project for Northeast Utilities Millstone 3 Nuclear Power Plant. This project consisted of four major tasks: 1) review the plant's safe shutdown methodology and equipment list to ensure completeness 2) identify which components might be affected for each fire area, 3) identify the worst case fire scenario (in terms of equipment loss) for each fire area, and 4) identify and prioritize the operator actions that need to be taken in each fire area.

EXPERIENCE (Cont'd)

Prior to this assignment, Mr. Reichle performed a design baseline verification of the Emergency Operating Procedures (EOP) for Nine Mile Point 1, and determined the impact of operating safety related systems with normally open manual valves at the system's interface with non-safety related portions of the system. His responsibilities on these projects included the preparation of verification packages to document design basis of input parameters to EOP flowcharts, preparation of various design calculations, and preparation of a report on the boundary valves. Also included within this project was a review of the plant's Service Water System and the effect of increased lake water temperature.

Mr. Reichle has also served as a technical specialist in support of triennial fire protection audits at the H.B. Robinson, Brunswick and Shearon Harris nuclear power plants. During these audits, he served as the Systems Engineer reviewing station operating practices, programs and procedures used to ensure safe shutdown of the plants in the event of a fire.

Mr. Reichle has prepared Design Baseline Documents (DBDs) for the feedwater and fire protection systems at the PECO Peach Bottom and Limerick nuclear plants. This project consisted of conducting the necessary research to identify the boundaries, interfaces and requirements of the individual systems. The documents also describe how each of the systems satisfies their design input and output requirements, and what modifications have impacted the system's original design basis. Mr. Reichle also participated in the Appendix R update project for the Limerick Nuclear Station by reviewing the new and updated shutdown methods identified for each fire area, and assisting in the resolution of shutdown concerns identified during the review process.

Mr. Reichle has also served as the Project Manager for the single failure analysis of the ECCS sub-systems, and their support systems, for the Connecticut Yankee plant. This project included the identification and review of potential equipment failures for each of the systems, including mechanical, electrical and instrumentation, during injection and recirculation modes in response to a LOCA.

In conjunction with the above single-failure analyses, a review of the CY surveillance procedures was performed. This review was conducted to ensure that all ECCS redundant or required components were included in the appropriate procedure, and that proper surveillances were being performed to assure operability of the systems.

EXPERIENCE (Cont'd

Prior to joining VECTRA, Mr. Reichle was a Senior Engineer at Cygna Energy Services and assisted in the preparation of the Appendix "R" review for NUSCo's Millstone 1, 2 and Connecticut Yankee generating stations. As a member of this project, he was assigned tasks such as developing safe shutdown scenarios and identifying equipment which needed to be protected, establishing safe shutdown fire areas, performing walkdowns of fire areas to verify the adequacy of existing barriers (including doors, dampers, and penetration seals), identifying barrier deficiencies, preparing justifications for exemption requests, and making recommendations for upgrading fire barriers or their penetrations to the required fire resistance rating.

Mr. Reichle also participated in preparing a conceptual design of a seismic hot shutdown system for the Yankee Rowe Nuclear Plant. This project reviewed the feasibility of providing a standby, portable pumping system made up of standard commercial grade components, that would deliver water to the steam generators and/or main coolant system in the event no other method was available. Included in this project was the identification system demands, sizing of components, identification of water sources, and providing an estimated cost to install the system.

In a previous assignment, Mr. Reichle served as Lead Engineer for the development of surveillance and maintenance procedures for the Shoreham Power Station. His responsibilities included the identification of maintenance and inspection requirements for all mechanical balance of plant equipment. He established the parts requirements, special tools, rigging and handling instructions for those procedures. Mr. Reichle also supervised additional tasks for the Shoreham Station including:

- Development of Fire Protection Program Description and Associated Procedures
- Development of Maintenance Program Description
- NUREG-0612 Heavy Loads Analysis, and Procedure Preparation
- Preparation of Refueling Procedures
- Design, Analysis, and Fabrication of Fuel Handling and Reactor Head Strongback

Before joining Cygna, Mr. Reichle held the position of Lead Applications Engineer for the Jamesbury Corp., a manufacturer of fluid control equipment. His responsibilities included supervising technical analysis, sizing equipment, selecting material and accessories, and resolving field installation and operational problems of motor-operated valves.

EXPERIENCE (Cont'd)

Mr. Reichle was responsible for sizing valve actuators (both pneumatic and electric) given the system operating conditions. For motor operated valves this task included determining the necessary torque output, then selecting the appropriate gear train configuration and motor size. For nuclear projects, motor sizing included considerations of both normal and degraded voltage conditions.

Earlier in his career, Mr. Reichle worked with Stone & Webster Engineering Corporation where he was the responsible engineer for liquid and solid radioactive waste systems. Responsibilities associated with this position included: development of system design and flow diagrams, engineering, selection of equipment and layout, preparation of equipment specifications and purchase requisitions. Other duties included review of system piping diagrams, and resolution of field installation problems. Mr. Reichle also assisted in the development of a spare parts program and database for Millstone Unit 3.

In his initial assignment at Stone and Webster, Mr. Reichle assisted in the preparation of a system operations manual for Connecticut Yankee. This work included the writing of system descriptions and operating procedures for the waste evaporator degasifier, aerated drains, and steam generator blowoff.

Before Mr. Reichle's employment with Stone & Webster, he spent six years in the U. S. Navy Nuclear Submarine Program where he qualified as an Engineering Watch Supervisor.

EDUCATION

B.S., Mechanical Engineering, Central New England College
A.S., Mechanical Engineering, Worcester Junior College
U.S. Navy Nuclear Power School and Prototype Training

Graduate Work, Fire Protection Engineering,
Worcester Polytechnic Institute

PROFESSIONAL ACTIVITIES

Member, American Society of Mechanical Engineers
Member, Society of Fire Protection Engineers

STEPHEN P. REICHLE
TECHNICAL SERVICES CONSULTANT

EXPERIENCE HIGHLIGHTS

Twenty (20) years of experience in nuclear systems design, analysis, fire protection, 10CFR50 Appendix R safe shutdown analysis and related areas of the nuclear power industry.

VECTRA	1985 to present	Technical Services Consultant
CYGNA Energy Services	1981 to 1985	Lead Engineer
Jamesbury Valve	1979 to 1981	Lead Applications Engineer
Stone and Webster Eng.	1974 to 1979	Operations Services Engineer
U.S. Navy	1968 to 1973	Nuclear Power Program

EXPERIENCE SUMMARY

- Project Manager for NYPA (JAF and IP3) Fire Hazards Analysis update and Suppression Effects Analysis (1993 - present)

- Project Manager for NUSCO (Conn. Yankee) Single Failure Analysis of ECCS Sub-systems (1988 - 1989).

- Project Manager or Project Engineer for several 10CFR50 Appendix R Analysis and fire protection projects:

  - BECo (Pilgrim Station) Appendix R Analysis and Fire Barrier Upgrade (1985 - 1988)
  - NYPA (JAF and IP3) Fire Protection Reference Manual and FHA (1990 - 1992)
  - NUSCO (MP3) Appendix R Shutdown Methodology Review (1989)

- Project Engineer (System) for several USI A-46 and seismic IPEEE projects:

  - NUSCO (Conn. Yankee, Millstone 1 and 2) 1992 - present
  - PECo (Peach Bottom 1 and 2, Limerick 1 and 2) (1992 - present)
  - PSE&G (Salem 1 and 2) (1993 - present)

- Project Engineer for NMPC (NMP2) Design Basis Document project (1992 - 1993).

- Lead Engineer for radwaste systems design for new construction BWR.

- Preparation of conceptual designs and design change packages for various nuclear systems and components.

- Applications Engineer for the section of valves and actuators to meet client specifications.

SQUG

Certificate of Achievement

This is to Certify that

Stephen Reichle

has Completed the
SQUG Equipment Selection Training Course
Held February 25-27, 1992

Paul W. Hayes, MPR Associates

Richard G. Starck II, MPR Associates

SQUG

Certificate of Achievement

This is to Certify that

Stephen Reichle

has Completed the
SQUG Relay Evaluation Training Course
Held February 25-27, 1992

Jess O. Betlack, MPR Associates

JOHN W. REILLY

PROFESSIONAL EXPERIENCE

Mr. Reilly is an Engineer III with the Boston Office of VECTRA. He is presently assigned to the High Energy Line Break (HELB) Analysis for Northeast Utilities' Millstone Unit 2 Power Station. His responsibilities on this project include identifying plant frontline and auxiliary systems and paths required to accomplish the specified plant safe shutdown functions. In addition, he performed the analyses associated with pipe whip and jet loads which impacted the safe shutdown components.

Previously he was assigned to the Motor Operated Valve (MOV) modification project (NRC G.L. 89-10) for Boston Edison Company's Pilgrim Nuclear Power Station. His tasks included, but were not limited to: preparation of plant design change packages, safety evaluations and procurement specifications for the MOV upgrades.

He was also recently assigned to the Boston Edison Company Setpoint Control Program. The primary objective of this program was to increase the Pilgrim Nuclear Power Station operating cycle from 18 months to 24 months by identifying the governing criteria for such a change. The overall approach in developing the setpoint calculations was to determine a total loop uncertainty based on instrument error, including statistically analyzing actual plant calibration and surveillance data to reflect a high confidence level drift value to bound the actual instrument's drift over a 24 month interval.

Prior to this project, Mr. Reilly was assigned to the Public Service Electric & Gas Company Erosion-Corrosion modelling effort. This task consisted of the engineering support necessary to model all susceptible systems and lines for Salem Units 1 & 2 and the Hopecreek Generating Stations, including but not limited to, developing the plant configuration (heat balance) file for each unit, developing the water chemistry file for each unit, running flow analyses where required and generating specific component susceptibility reports for each system.

Mr. Reilly was previously assigned to the NRC's USI A-46/SQUG project for Northeast Utilities Service Company, Millstone Unit 2 and Connecticut Yankee plants. He was responsible for the identification of those systems and safe shutdown paths used to accomplish the plant safe shutdown functions as well as the components necessary to align these paths. All paths and components were chosen based on a safety classification approach with the application of the SQUG GIP criteria such that the integrity of the Reactor Coolant System pressure boundary was maintained and the reactor was shut down and maintained in a safe shutdown condition. In addition to the above, Mr. Reilly was responsible for the preparation of the Safe Shutdown Paths report for Millstone Unit 2.

PROFESSIONAL EXPERIENCE

Prior to this project, Mr. Reilly was assigned to the Erosion/Corrosion Project at NUSCo's Connecticut Yankee and Millstone 1, 2 and 3 nuclear power stations where he served as a lead reviewer of historical E/C-related piping modifications and deficiencies. This information was used to determine the plants' operability status after the Millstone 2 extraction steam line failure.

Mr. Reilly was also previously assigned to a project at Boston Edison's Pilgrim Station during which time he worked on a multi-disciplined project team to establish the design performance, installation and test requirements for a hydrogen injection system. The system's primary function was to suppress the radiolysis of water in the reactor vessel by providing, controlling and delivering hydrogen gas into the feedwater.

In addition, he assisted in the development of the SQUG Safe Shutdown Equipment List for the Connecticut Yankee Station. His responsibilities included the review of P&ID's and electrical drawings to identify safe shutdown equipment, as well as sharing lead responsibility in the preparation of component specific data packages for the safe shutdown equipment identified as requiring a detailed seismic review.

In an earlier assignment for New York Power Authority, Mr. Reilly prepared a detailed Fire Hazard Analysis for the James A. FitzPatrick Nuclear Power Plant as part of a Fire Protection Program upgrade. The project also included a review of modification packages to determine impact on licensing commitments, safe shutdown capabilities, and fire protection/detection.

Mr. Reilly also prepared Section 6.0 of the Fire Protection Program Manual titled "Fire Area/Zone Analyses" as a part of this project. This included a combustible loading analysis for all plant fire zones and a station walkdown to gather new, and verify current, fire protection information.

Prior to this project, Mr. Reilly was assigned to a project involving the substantiation of heat exchanger performance parameters and tubing minimum wall criteria for Rochester Gas and Electric Corporation's Ginna Nuclear Power Station. This effort included developing heat exchanger performance calculations, ductile analyses, vibration analyses and fatigue analyses based on existing, probable and possible equipment loadings to determine required heat transfer surface and minimum tube wall requirements.

PROFESSIONAL EXPERIENCE

Other responsibilities and experience include in-house responsibility for computer troubleshooting and upgrading, including both hardware and software maintenance; on-site walkdown planning preparation; electronic communications between regional offices via configuration files and modems; and database and report development as necessary for project commitments.

EDUCATION

B.S., Mechanical Engineering, University of Notre Dame, 1988
B.A., Liberal Arts, Stonehill College, 1987

LICENSES AND REGISTRATION

Engineer-in-Training License

AZIZ SABER

PROFESSIONAL EXPERIENCE

Mr. Saber is an Engineer IV in the Boston Office Civil/Structural Group. He has over eight years of experience in the power industry, and extensive experience in the design and installation of suspended distributed systems. He has an in depth knowledge of dynamic analysis and structural design; he is well versed in the use of various finite element codes (STRUDL, ANSYS, ADINA, NASTRAN) and the design criteria for nuclear power structures (Reinforced Concrete and Steel). Mr. Saber is an active member of ACI Committee 533 on precast panels.

Mr. Saber is currently involved in the IPEEE and A46 projects for NUSCo, PECo, NYPA and PSE&G. He is certified as SRT by the SQUG. Mr. Saber is responsible for review of the plant safe shutdown equipment list and the evaluation of equipment anchorage, concrete pedestals, and support details.

Mr. Saber has performed detailed analysis on tanks, pumps, motor operated valves, heat exchangers and associated piping and supports using finite element anlaysis and detailed calculations.

Prior to his transfer to the Boston Office, Mr. Saber was assigned to the Comanche Peak Unit Civil/Structural Project as a site lead. He provided the coordination of the field engineering activities of the electrical raceways group in support of the construction and completion of the CPSES U2 designs.

Mr. Saber has worked on various other CPSES Unit 1 projects. He has worked on the Mechanical Equipment List project and with the Cable Tray and Cable Tray Hangers Group. He was the lead engineer for the Field Engineering Group responsible for supporting activities and resolving any field problems with authorization to approve any design changes and assure their adherence with the design specifications and code requirements.

Mr. Saber was also responsible for revising and updating the technical project design methodology and the installation and inspection specification for electrical raceways. He also designed and analyzed cable trays and components using computer aid programs and graphics and detailed calculations.

EXPERIENCE (Cont'd)

While assigned to the Train C Conduit project, Mr. Saber designed and analyzed conduit systems and supports for seismic loads using systems frequency, projected and/or tributary span methods. He was a lead engineer in the System Interaction Group for engineering evaluations of postulated interactions resulting from seismically induced failures of non-safety-related conduits incident upon safety-related systems, structures and components. His responsibilities included writing engineering design change notices to update and revise the project criteria, training personnel for using the field walkdown criteria and the plant documents; namely FSAR, structural drawings, composite piping drawings, HVAC layout drawings, flow diagrams, Q-list and electrical wiring diagrams to resolve the postulated interactions based on field conditions along with engineering techniques.

Prior to joining VECTRA, Mr. Saber was a structural engineer responsible for designing and analyzing seismic loading structural supports in power plants utilizing computer programming and graphics. He supervised the installation of those supports with the authorization to issue any field changes and assure their adherence with the design specifications and code requirements.

EDUCATION

M.S., Civil Engineering, University of Michigan, Ann Arbor
B.S., Civil Engineering, The American University of Beirut, Lebanon

PROFESSIONAL AFFILIATIONS

Professional Engineer, State of Texas
American Concrete Institute
American Society of Civil Engineers
The Masonry Society

EPRI
Electric Power
Research Institute

Certificate of Achievement

This is to Certify that

Aziz Saber

has Completed the
Seismic IPE Add-On Training Course
Held August 31 - September 2, 1993

David A. Freed
David A. Freed, MPR Associates
SQUG Training Coordinator

R. P. Kassawara
Robert P. Kassawara, EPRI
SQUG Program Manager

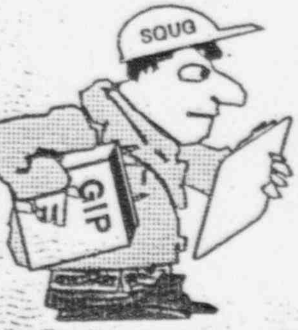
SQUG

Certificate of Achievement

This is to Certify that

Aziz Saber

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held August 2-6, 1993



Neil P. Smith
Neil P. Smith, Commonwealth Edison
SQUG Chairman

David A. Freed
David A. Freed, MPR Associates
SQUG Training Coordinator

R.P. Kassawara
Robert P. Kassawara, EPRI
SQUG Program Manager

State Board of Registration for Professional Engineers

P. O. DRAWER 18329
AUSTIN, TEXAS 78760

THIS CERTIFIES THAT

AZIZ SABER

WHOSE SIGNATURE APPEARS BELOW, BEING THE HOLDER OF CERTIFICATE NUMBER 68182 CURRENTLY RENEWED IS ENTITLED TO PRACTICE AS A PROFESSIONAL ENGINEER IN TEXAS FOR PERIOD OF 07/01/94 - 06/30/95

A Saber
SIGNATURE OF REGISTRANT

EXECUTIVE DIRECTOR

ATTACHMENT D

PEER REVIEW REPORT

(6 Pages)

Stevenson & Associates

A structural-mechanical consulting engineering firm

10 State Street, Woburn, Massachusetts 01801
Tel 617 932 9580 Fax 617 933 4428

BOSTON•CLEVELAND

November 3, 1994

Steve W. Wainio
Northeast Utilities Service Company
Millstone Nuclear Power Station
Route 156
Waterford, Connecticut 06385

Subject: Millstone, Unit 2 Peer Review

Dear Mr. Wainio:

Please let this letter serve as a report on the peer review walkdown for the A-46 (SQUG) and IPEEE evaluation of the Millstone Unit 2 (M2) plant. The peer review was conducted by Drs. R. P. Kennedy and J. D. Stevenson on October 17 and 18, 1994. Walkdowns were conducted before the Screening Evaluation Worksheets (SEWS) were reviewed. A sampling of SEWS were subsequently reviewed and generally found to be in good order with comments as shown in Attachment A. General and specific comments on the walkdowns and the SEWS reviewed are provided below.

Accessible areas of the plant were reviewed excluding the Containment and high radiation areas. Areas which were inaccessible due to radiological concerns were the Containment, and a few areas in the Auxiliary building including the Boric Acid Storage area, charging pump room, and the RHR areas.

The walkdown has been conducted in a competent manner and results are in accordance with the guidance of the Generic Implementation Plan (GIP) and NP-6041 documentation. The vast majority of the findings noted in this letter were already found and documented by the walkdown team, so the peer reviewers believe this walkdown to have been conducted in a thorough and professional manner. The M2 plant has been found to be in good condition with respect to seismic ruggedness owing to good original design and modifications made to meet information bulletins and notices during the past fifteen years. Nothing was found that would be considered a challenge to the design basis of the plant.

During the peer review walkdowns a number of observations were made for the consideration of the A-46 and IPEEE seismic capability engineers (SCE). Some general conditions were noted:

- Plug welds are predominantly used to anchor electrical buses at M2. The peer reviewers have found problems with plug weld integrity at another nuclear plant. An instance of a cracked plug weld and a raised (deformed) baseplate not in contact with the embedded steel suggests a closer inspection of plug weld integrity might be called for. The peer reviewers recommend that a plant weld inspector evaluate a small sample of the plug welds to determine their acceptability, particularly with respect to the issue of weld metal fusion to the embedded channels.

- Vibration isolators on the local control panel of the Emergency Diesel Generators H7A and H7B are manufactured of cast iron. One of them was found to be cracked. Although the peer reviewers agree with the SCE's judgment that they are acceptable because the "ears" act as travel limit stops (and, furthermore, the cracked isolator passed a reasonable tug test), it is recommended that the cracked isolator be replaced. The peer reviewers agree that the other isolators that are not cracked are acceptable.

- Finally, the Auxiliary and Turbine buildings are in contact with one another at discrete column locations at Elevation 54.5' along Column Line E. The concern is not so much with change in structural response since the Turbine building mass at that elevation is significantly smaller than the Auxiliary building, but rather with the potential for impact loads that could be generated in the Switchgear room immediately adjacent to this column line. In the judgment of the peer reviewers, this is estimated to have a small effect, but an evaluation is recommended to verify this judgment. By virtue of such an evaluation, the effect of load transfer can also be determined, although it is once again estimated not to be significant and is not considered a design basis operability issue.

A-46 and IPEEE Related Comments

Diesel Generator Area

Non-Safety Related Fan in "B" Area A non-safety related fan supported on a steel frame above the "B" diesel generator only is anchored on one side by 2 steel bolts. There is no anchorage on the other side of the fan. This should be evaluated to assess its potential as an interaction concern for the emergency diesel generator.

Local Control Panel on "B" Diesel Generator Skid The local control panel is supported on 4 steel springs (vibration isolators). The spring housing has interlocking "ears" which act as travel limit stops. Although the spring housing is manufactured of cast iron material, the velocity that could be generated before the ears engage is not enough to fracture the cast iron housing in the judgment of the SCEs and the peer reviewers. One of the cast iron housings on the "B" generator local control panel is cracked. The isolator passed a reasonable tug test; however, it is recommended that the cracked isolator be replaced.

F-38 Supply Fan The supply fan is supported on a steel, braced frame on vibration isolators. Even if the isolators were to fail, the fan is well confined and will not displace significantly or fall.

"B" Diesel Generator There are no issues with the diesel generator itself.

T-041 Panel Regarding the SEWS, the SCE's should provide justification for the use of a the "medium" amplification factor of 4.5 .

Yard

Refueling Water Storage Tank (RWST) The tank is well anchored and adequate piping flexibility is also evident. Large storage containers adjacent to the RWST could pose an interaction hazard and should be moved away or be properly restrained in some manner.

Lower & Upper 4160V Switchgear Rooms

Buses 24C, D &E These buses are subject to the inspection of plug weld adequacy discussed in the general issues at the beginning of this letter report. Bus 24D in the upper switchgear room is subject to the impact issue also discussed in the general issues section at the beginning of this report.

East and West DC Switchgear Rooms

Distribution Panels & Inverters The wall mounted distribution panels and the floor-mounted inverters are well supported and have no perceivable issues.

VR11-Floor Mounted Distribution Panel The panel has marginal anchorage and is tall (approx. 90") and narrow (depth of approx. 12"). Currently, this item is classified as an outlier and it is under evaluation. It may be resolved by use of the newly developed median-centered amplified floor response spectra.

V201A (DC1) The adjacent battery chargers are not tied together. These chargers are being replaced in their entirety per PDCR # 2-025-93 and SQR # 93-134, thus this issue is considered resolved.

V201B (DC2) This battery charger has no issues.

UAC4 Consider weak way bending of the base channels.

Battery Rooms

Station Batteries The racks in one battery room are shimmed at one end up to 2 inches high due to the sloping floor. The anchor bolts are subject to bolt bending and should be evaluated for this effect. The longitudinal bracing on the front face of the rack is at the ends only where the force would need to be transferred to the shimmed bolts. The load path and longitudinal stiffness of the rack should be evaluated to ensure it is higher than about 10 Hz and that the anchor bolts at the end can react the forces without failing. The batteries are about 15 years old which is the qualified life for these batteries according to M2 personnel. M2 should investigate with the manufacturer if the qualified life can be extended to 20 years (including seismic effects); otherwise, the batteries may need to be replaced. The surrounding masonry block walls are a HCLPF candidate for focused scope (and modified focused scope) plants.

Turbine Building

Buses 22E & F light metal (sheet metal) base channels support the buses and are stitch welded to embedded steel. The channels should be checked to assure they can carry the superstructure's load to the welds.

2-CHW-11 The peer reviewers agree with the SCEs that this valve is an outlier because the operator is braced , and there is no nearby support of the valve body and pipe.

AFW Pumps No issues were noted for the motor or turbine driven pumps.

Auxiliary Building

MCC B51 & B61 These MCCs are housed in environmental enclosures. B51 has small gaps with respect to its longitudinal direction with the enclosure (1/4") on one end and a cable tray hanger (<1/8") on the other. The gap with the enclosure should be checked. The interference with the cable tray hanger is judged negligible because of the relatively light mass of the hanger. The B61 MCC has no such problems.

P41A,B &C & P42A&B The HPSI and LPSI pumps (Elevation -45.5') are well anchored. The bolts on the LPSI pumps are close to the steel edge such that only one side (the bearing side) can be confidently relied upon to take out shear. This should be considered in the analysis. The HPSI pumps have lateral alignment blocks, while the LPSI pumps have no alignment pins or lateral blocks.

P11A,B & C The RBCCW pumps (Elevation -25.5') are well anchored. The pumps do have lateral alignment blocks.

Warehouse Building

T-48A & B The diesel fuel oil day tanks appear well anchored with a bottom, gusseted ring girder to which the bolts are secured. The bolt type is unknown, so an ultrasonic test may be needed to determine its length (if it is not a J-type bolt). The surrounding block walls may govern the plant HCPLF since they are relatively tall and at the top of the Warehouse building where the seismic demand will be the greatest.

Control Room

Control Room Ceiling The ceiling appears to be adequately secured such that there will be no general failure of the ceiling. The aluminum diffusers above the center of the room are secured by tie-wrap to the T-bars and will not fall. The T-bars are secured by threaded rod to a light metal strut grid which in turn is supported by rods and wire to the concrete floor above. The attachment of the rods to the T-bars is by a clamp which is positively bolted together so it can not inadvertently open under seismic excitation. The lights are safety wired. Acoustic tiles may fall, especially at the outer periphery of the control room; however, they are judged to be acceptable since they do not pose a credible interaction concern.

Control Room Cabinets The control room cabinets are generally well anchored. There are numerous "seismic housekeeping" issues which result in potential seismic interactions such as shift lockers adjacent to the main control board and storage of materials (storage cabinets, ladders, etc.) adjacent to selected cabinets. It is recommended that M2 develop a seismic housekeeping plan for the main control room to provide guidance regarding the placement of items in proximity to safety-related cabinets and equipment. Various cabinets lined up adjacent to one another were found not to be bolted (tied) together, particularly where they were of different manufacture. Noted occurrences of this were C06X not tied to an adjacent cabinet, C26 not tied to C80, C80 not tied to C25B, and C08 not tied to ACT-5. Finally, at one location in the main control board, one internal frame bolt connecting one section of the main control board to another was found loose. All of these occurrences were found by the SCEs and the peer reviewers concur with their findings.

S&A

Intake Structure

P-5A,B&C The edge distance on the anchorage of the service water pumps should be considered.

IPEEE Only Related Comments

The piping is laterally well restrained. No issues were noted for safety-related piping and it can be screened at the 0.5g PGA HCLPF value.

Building capability assessments are being made by Dr. John Reed of J. Benjamin Associates and are being reported separately from this report.

The equipment reviewed that was not covered in the A-46 program is discussed below.

Battery Rooms

Station Batteries The surrounding masonry block walls are a HCLPF candidate for focused scope (and modified focused scope) plants.

East and West DC Switchgear Rooms

V201C (DC3) The adjacent battery chargers are not tied together. These chargers are being replaced in their entirety per PDCR # 2-025-93 and SQR # 93-134; thus, this issue is considered resolved.

Lower & Upper 4160V Switchgear Rooms

Buses 24A&B and 25A&B These buses are subject to the inspection of plug weld adequacy discussed in the general issues at the beginning of this letter report. Buses in the upper switchgear room are subject to the impact issue discussed also in the general issues section at the beginning of this report.

Intake Structure

MCCs B-42 & B-13 The HCLPF would be governed by the MCC anchorage or the surrounding masonry block walls.

If you have questions or comments, please contact the undersigned.

Very truly yours,

John D. Stevenson
Seismic Review Walkdown Engineer

Very truly yours,

Robert P. Kennedy
Seismic Review Walkdown Engineer

cc: S. Pornprasert, NU

S&A

Attachment A
SEWS Review Comments

1) Reference ID 2-HV-139A-Class O, Ventilation Damper Inlet to Fan F112A

It is recommended that for this Class O component that a reference be made to the applicable demand spectra. Line 5 of Seismic Capacity vs. Demand section should reflect this spectral reference. In addition for Class O, since no bounding spectra is identified, Line 4 should reflect the basis of the capacity (e.g. judgment, calculations, etc.)

2) Reference ID 2-SW-3, 2A-TK-Class O, Air accumulator for 2-S3.2A

For this Class O component, capacity vs. demand is a needed consideration so I believe that the first sentence in the comments is inappropriate. It is obvious you have done so in your Anchor calculation. Line items 4 and 5 should reflect what assumptions made in this regard.

3) Reference ID P122A-Class 6, Vertical Pumps

Agree with conclusion reached except that Caveat 3 check of long unsupported piping should be "Yes" rather than "N/A."

4) Reference Id-2-CHW-11 (Rev. O)-Class 7, Fluid-Operated Valve

Agree with SEWS

5) ID: SV-4188 (Rev. O) Class 8, Motor-Operated and Solenoid-Operated Valves

Agree with SEWS

6) ID: DV10-Class 14 Distribution Panels

If seismic adequacy of a panel is by tug test it is recommended the estimated amount of the tug and the weight of the panel should be given. In particular the tug should exceed the peak of the demand spectra times the mass of the panel.

7) ID: DC2-Class 16, Battery Charger

Agree with SEWS

8) ID: RS1-Class 20, Auto Transfer Switch RSI

Estimated amount of tug should be given.

ATTACHMENT E

SEWS

(See Table of Content for Page No.'s)

ATTACHMENT F

SVDS

(26 Pages)

SCREENING VERIFICATION DATA SHEET (SVDS)

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
0	2-FW-43A-TK	0	AFW / BACKUP AIR FOR 2-FW-43A	TB	14.50	AUX FD VLV STA	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-FW-43B-TK	0	AFW / BACKUP AIR FOR 2-FW-4BA	TB	14.50	AUX FD VLV STA	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-139A	0	HVAC / VENTILATION DAMPER, INLET TO FAN F112A	AB	14.50	A BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-139B	0	HVAC / VENTILATION DAMPER, INLET TO FAN F112B	AB	14.50	B BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-140A	0	HVAC / VENTILATION/FIRE DAMPER TO FANS F112A&B	AB	14.50	PLEN BX	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-140B	0	HVAC / VENTILATION/FIRE DAMPER TO FANS F112A&B	AB	14.50	PLEN BX	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-141	0	HVAC / WEST DC SWGR ROOM SUPPLY DAMPER	AB	14.50	B DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-142	0	HVAC / VENTILATION DAMPER	AB	14.50	B DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-145A	0	HVAC / VENTILATION DAMPER	AB	14.50	A BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-145B	0	HVAC / VENTILATION DAMPER	AB	14.50	A BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-146	0	HVAC / VENTILATION DAMPER	AB	14.50	BTWN A&B BATT	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-147	0	HVAC / VENTILATION DAMPER	AB	14.50	BTWN A&B BATT	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-155A	0	HVAC / WEST DC SWGR ROOM EXHAUST/FIRE DAMPER	AB	14.50	B DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-155B	0	HVAC / EAST DC SWGR ROOM EXHAUST/FIRE DAMPER	AB	14.50	A CEDM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-155C	0	HVAC / EAST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	A DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-156A	0	HVAC / WEST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	B DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-156B	0	HVAC / EAST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	A CEDM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-157A	0	HVAC / WEST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	B DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes

Certification:

All the information contained on this Screening Verification Data Sheet (SVDS) is, to the best of our knowledge and belief, correct and accurate. "All information" includes each entry and conclusion (whether verified to be seismically adequate or not).

Approved: (Signatures of all Seismic Capability Engineers on the Seismic Review Team (SRT) are required; there should be atleast two on the SRT. All signatories should agree with all the entries and conclusions. One signatory should be a licensed professional engineer.)

Certification:

The information provided to the Seismic Capability Engineers regarding systems and operations of the equipment contained in the SVDS is, to the best of our knowledge and belief, correct and accurate.

Approved: (One signature of Systems or Operations Engineer is required if the Seismic Capability Engineers deem it necessary.)

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Charbel Abou-Jaoude	C. M. Abou-Jaoude	12-11-95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
0	2-HV-157B	0	HVAC / EAST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	A DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-157C	0	HVAC / WESTST DC SWGR ROOM SUPPLY/FIRE DAMPER	AB	14.50	A DC SWGR	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-158	0	HVAC / CABLE VAULT TO EAST BATTERY ROOM VENTILATION/FIRE DAMPER	AB	14.50	A BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-159	0	HVAC / CABLE VAULT TO WEST BATTERY ROOM VENTILATION/FIRE DAMPER	AB	14.50	B BATT RM	36.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-203B	0	HVAC / CONTROL ROOM VENTILATION SUPPLY DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-204A	0	HVAC / CONTROL ROOM VENTILATION SUPPLY/FIRE DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-204B	0	HVAC / CONTROL ROOM VENTILATION SUPPLY/FIRE DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-206A	0	HVAC / 'A' CONTROL RM EXH FAN F31A DISCH DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-206B	0	HVAC / 'B' CONTROL RM EXH FAN F31A DISCH DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-2[illegible]9	0	HVAC / CONTROL RM EXH FAN RECIRC DAMPER	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-253B	0	HVAC / OUTSIDE AIR TO D/G ROOM FAN F27 VENTILATION DAMPER	WH	14.50	B D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-2[illegible]5A	0	HVAC / A D/G ROOM EXHAUST VENTILATION DAMPER	WH	14.50	A D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-255B	0	HVAC / B D/G ROOM EXHAUST VENTILATION DAMPER	WH	14.50	B D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-256A	0	HVAC / A D/G ROOM INTAKE VENTILATION DAMPER	WH	14.50	A D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes

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0	2-HV-256B	0	HVAC / B D/G ROOM INTAKE VENTILATION DAMPER	WH	14.50	B D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-257A	0	HVAC / A D/G ROOM RECIRC VENTILATION DAMPER	WH	14.50	A D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-257B	0	HVAC / B D/G ROOM RECIRC VENTILATION DAMPER	WH	14.50	B D/G	38.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-333	0	HVAC / EAST 480V SWGR ROOM SUPPLY FIRE/VENTILATION DAMPER	AB	36.50	EAST 480V	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	T49A	0	DG / A DIESEL ENGINE STARTING AIR TANK A	WH	14.50	A D/G	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	T49B	0	DG / A DIESEL ENGINE STARTING AIR TANK B	WH	14.50	A D/G	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	T49C	0	DG / B DIESEL ENGINE STARTING AIR TANK C	WH	14.50	B D/G	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	T49D	0	DG / B DIESEL ENGINE STARTING AIR TANK D	WH	14.50	B D/G	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	T98	0	HVAC / CHILLED WATER SURGE TANK	AB	54.50	CHILL EXP TK	54.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
1	22E-MCC	0	ELEC AC / 480V BUS 22E (B05) MCC SECTION	TB	36.50	WEST 480V SWGR	36.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
1	22F-MCC	0	ELEC AC / 480V BUS 22F (B06) MCC SECTION	AB	36.50	EAST 480V	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
1	B51	0	ELEC AC / 480V MCC BUS B51 (22-1E)	AB	14.50	SFP SKIMMER PP AREA	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
1	B61	0	ELEC AC / 480V MCC BUS B61 (22-1F)	AB	14.50	PMP SAMP SK	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
1	B62	0	ELEC AC / 480V MCC BUS B62 (22-2F)	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
2	22E	0	ELEC AC / 480V BUS 22E (B05)	TB	36.50	WEST 480V SWGR	36.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
2	22F	0	ELEC AC / 480V BUS 22F (B06)	AB	36.50	EAST 480V	36.50	N/A	ABS	RRS	Yes	Yes	No	Yes	No
4	UAC1	0	ELEC AC / REGULATING TRANSFORMER UAC1	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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4	UAC2	0	ELEC AC / REGULATING TRANSFORMER UAC2	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
4	UAC3	0	ELEC AC / REGULATING TRANSFORMER UAC3	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
4	UAC4	0	ELEC AC / REGULATING TRANSFORMER UAC4	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
5	P4	0	AFW / TERRY TURBINE AUXILIARY FEED PUMP	TB	1.50	TERRY TURBINE	1.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P9A	0	AFW / A AUXILIARY FEEDWATER PUMP ASSEMBLY	TB	1.50	ELEC AUX FD PP	1.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P9B	0	AFW / B AUXILIARY FEEDWATER PUMP ASSEMBLY	TB	1.50	ELEC AUX FD PP	1.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P122A	0	HVAC / 'A' DC SWGR RM CHILLED WATER PUMP	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P122B	0	HVAC / 'B' DC SWGR RM CHILLED WATER PUMP	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P5A	0	SW / A SERVICE WATER PUMP	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P5B	0	SW / B SERVICE WATER PUMP	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P5C	0	SW / C SERVICE WATER PUMP	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	2-CH-507	0	RCS / ISOLATION TO RCP LEAKOFF RV (2-CH-199)	RB	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CHW-11	0	HVAC / CHILLED WATER SUPPLY HDR XTIE CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	No	N/A	Yes	No
7	2-CHW-12	0	HVAC / CHILLED WATER SUPPLY HDR XTIE CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CHW-13	0	HVAC / CHILLED WATER RETURN HDR XTIE CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CHW-14	0	HVAC / CHILLED WATER RETURN HDR XTIE CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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7	2-CHW-3	0	HVAC / CHILLED WATER SUPPLY CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CHW-33	0	HVAC / CHILLED WATER SUPPLY CONTROL VALVE	TB	14.50	TBCCW PP&HX	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-FW-43A	0	AFW / #1 STEAM GENERATOR AUX FDWTR REGULATING VALVE	TB	14.50	AUX FD VLV STA	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-FW-43B	0	AFW / #2 STEAM GENERATOR AUX FDWTR REGULATING VALVE	TB	14.50	AUX FD VLV STA	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-111	0	SW / A CHILLER TO QUARRY CONTROL VALVE	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-113	0	SW / B CHILLER TO A CHILLER DISCHARGE VALVE	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-231A	0	SW / A D/G HEAT EXCHANGER SERVICE WATER BYPASS VALVE	WH	14.50	DG ROOMS	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-231B	0	SW / B D/G HEAT EXCHANGER SERVICE WATER BYPASS VALVE	WH	14.50	DG ROOMS	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-3.2A	0	SW / A SERVICE WATER HEADER SUPPLY TO TBCCW STOP VALVE	TB	14.50	TBCCW HX AREA	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-3.2B	0	SW / B SERVICE WATER HEADER SUPPLY TO TBCCW STOP VALVE	TB	14.50	TBCCW HX AREA	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-90A	0	SW / A SERVICE WATER PUMP DISCHARGE STRAINER FLUSH VALVE	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-90B	0	SW / B SERVICE WTR PUMP DISCHARGE STRAINER FLUSH VALVE	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-90C	0	SW / C SERVICE WATER PUMP DISCHARGE STRAINER FLUSH VALVE	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-97A	0	SW / SERVICE WATER PUMP HDR X-TIE CONTROL VALVE	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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7	2-SW-97B	0	SW / SERVICE WATER PUMP HDR X-TIE CONTROL VALVE	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-CS-13.1A	0	HPSI / RWST OUTLET HEADER A ISOLATION VALVE	YD	4.50	RWST PP CHASE	4.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-HV-214A	0	HVAC / CONTROL ROOM 'A' REFRIGERATION CYCLE CLG COIL INLET VALVE	AB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
8	2-HV-214B	0	HVAC / 'CONTROL ROOM A' REFRIGERATION CYCLE CLG COIL INLET VALVE	AB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
8	2-HV-215A	0	HVAC / CONTROL ROOM 'B' REFRIGERATION CYCLE CLG COIL INLET VALVE	AB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
8	2-HV-215B	0	HVAC / CONTROL ROOM 'B' REFRIGERATION CYCLE CLG COIL INLET VALVE	AB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
8	SV-4188	0	MS / TERRY TURBINE TRIP THROTTLE VALVE	TB	1.50	TERRY AUX FD PMP	1.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
9	F112A	0	HVAC / 'A' DC BATTERY RM EXHAUST FAN	AB	36.50	A DC BATT	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F112B	0	HVAC / 'B' DC BATTERY RM EXHAUST FAN	AB	36.50	B DC BATT	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F142	0	HVAC / EAST 480V RM EXHAUST FAN	AB	36.50	EAST 480V	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F31A	0	HVAC / 'A' CONTROL RM EXHAUST FAN	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F31B	0	HVAC / 'B' CONTROL RM EXHAUST FAN	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F38A	0	HVAC / 'A' DG ROOM VENT FAN	WH	14.50	A D/G	38.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
9	F38B	0	HVAC / 'B' DG ROOM VENT FAN	WH	14.50	B D/G	38.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
9	F52	0	HVAC / EAST 480V ROOM SUPPLY FAN	AB	54.50	UPPER 4160V	71.50	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	F133	0	HVAC / UPPER 4160V SWGR ROOM CLG FAN	AB	54.50	UPPER 4160V	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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10	F134	0	HVAC / LOWER 4160V SWGR ROOM CLG COIL	AB	45.00	CABLE VAULT	45.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F14A	0	HVAC / 'A' CONTAINMENT RECIRCULATION COOLING UNIT FAN	RB	-3.50	N. END FUEL POOL	0.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	F14B	0	HVAC / 'B' CONTAINMENT RECIRCULATION COOLING UNIT FAN	RB	-3.50	N. END FUEL POOL	0.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	F14C	0	HVAC / 'C' CONTAINMENT RECIRCULATION COOLING UNIT FAN	RB	36.50	N. END FUEL POOL	36.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
10	F14D	0	HVAC / 'D' CONTAINMENT RECIRCULATION COOLING UNIT FAN	RB	36.50	N. END FUEL POOL	36.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
10	F21A	0	HVAC / 'A' CONTROL ROOM A/C SYS UNIT FAN	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F21B	0	HVAC / 'B' CONTROL ROOM A/C SYS UNIT FAN	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F36A	0	HVAC / 'A' CONTROL ROOM A/C AIR CLG COND FAN	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F36B	0	HVAC / 'B' CONTROL ROOM A/C AIR CLG COND FAN	AB	36.50	CR HVAC RM	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F54A	0	HVAC / EAST DC SWGR RM A/C UNIT FAN	AB	14.50	HALLWAY AREA	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	F54B	0	HVAC / WEST DC SWGR RM A/C UNIT FAN	AB	14.50	HALLWAY AREA	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	X-34A	0	RBCCW / CEDM COOLER 'A'	RB	38.50	TOP MISSILE SHIELD	38.50	N/A	ABS	CRS	No	Yes	Yes	Yes	No
10	X181A	0	HVAC / 'A' WEST 480V LOAD CENTER ROOM CLG COIL	TB	36.50	WEST 480V SWGR	36.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
11	F22A	0	HVAC / 'A' CONTROL ROOM A/C COMPRESSOR	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
11	F22B	0	HVAC / 'B' CONTROL ROOM A/C COMPRESSOR	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	C58A	0	/ SERVICE WATER PUMP PANEL	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	C58B	0	/ SERVICE WATER PUMP PANEL	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Charbel Abou-Jaoude	C. M. Abou-Jaoude	12-11-95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
14	C58C	0	/ SERVICE WATER PUMP PANEL	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D11	0	ELEC DC / 125VDC DISTRIBUTION PANEL D11	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No
14	D12	0	ELEC DC / 125VDC DISTRIBUTION PANEL D12	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No
14	D21	0	ELEC DC / 125VDC DISTRIBUTION PANEL D21	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No
14	D22	0	ELEC DC / 120VDC DISTRIBUTION PANEL D22	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No
14	DS1	0	ELEC DC / FUSED DISCONNECT SWITCH DS1	AB	14.50	A DC BATT	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	DS2	0	ELEC DC / FUSED DISCONNECT SWITCH DS2	AB	14.50	B DC BATT	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	DV10	0	ELEC DC / 125VDC VITAL PANEL DV10	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	DV20	0	ELEC DC / 125VDC VITAL PANEL DV20	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	FLP-5	0	HVAC / EAST DC SWITCHGEAR ROOM HALON FIRE SYSTEM PANEL	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	FLP-6	0	HVAC / WEST DC SWITCHGEAR ROOM HALON FIRE SYSTEM PANEL	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	VA10	0	ELEC AC / 120VAC VITAL INST PANEL VA10	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	VA20	0	ELEC AC / 120VAC VITAL INST PANEL VA20	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	VA30	0	ELEC AC / 120VAC VITAL INSTRUMENT PANEL VA30	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	VA40	0	ELEC AC / 120VAC VITAL INSTRUMENT PANEL VA40	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	VR11	0	ELEC AC / 120VAC INST PANEL VR11	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No
14	VR21	0	ELEC AC / 120VAC INST PANEL VR21	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No

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Charbel Abou-Jaoude	C M. Abou Jaoude	12.11-95			

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15	DB1	0	ELEC DC / BATTERY 201A (DB1)	AB	14.50	A DC BATT	14.50	N/A	ABS	RRS	Yes	No	No	Yes	No
15	DB2	0	ELEC DC / BATTERY 201B (DB2)	AB	14.50	B DC BATT	14.50	N/A	ABS	RRS	Yes	No	No	Yes	No
16	DC1	0	ELEC AC / A BATTERY CHARGER BUS 201A	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
16	DC2	0	ELEC AC / B BATTERY CHARGER BUS 201B	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
16	VIP 1	0	ELEC DC / INVERTER NO 1	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
16	VIP 2	0	ELEC DC / INVERTER NO 2	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
16	VIP 3	0	ELEC DC / INVERTER NO 3	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
16	VIP 4	0	ELEC DC / INVERTER NO 4	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
17	H7A	0	DG / A EMERGENCY DIESEL GENERATOR	WH	14.50	A D/G	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
17	H7B	0	DG / B EMERGENCY DIESEL GENERATOR	WH	14.50	B D/G	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LT-3001	0	CVCS / RWST LEVEL	YD	14.50	N SIDE RWST	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LT-3002	0	CVCS / RWST LEVEL	YD	14.50	N SIDE RWST	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LT-3003	0	CVCS / RWST LEVEL	YD	14.50	NE SIDE RWST	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LT-3004	0	CVCS / RWST LEVEL	YD	14.50	NE SIDE RWST	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LT-5282	0	COND / CST LEVEL	YD	14.50	CST SHACK	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PDC-6475	0	SW / SW STRAINER A DIFF PRESS CONTROLLER	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PDC-6481	0	SW / SW STRAINER B DIFF PRESS CONTROLER	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PDC-6488	0	SW / SW STRAINER C DIFF PRESS CONTROLER	CW	14.00	SW PUMP	14.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C01	0	/ MAIN CONTROL BOARD C01 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C01R	0	/ MAIN CONTROL BOARD C01 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C01X	0	/ ACCESS CONTROL DOOR ALARM DITRIBUTION PANEL	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	Yes	No

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Charbel Abou-Jaoude	C. M. Abou Jaoude	12-11-95

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20	C02	0	/ MAIN CONTROL BOARD C02 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C02R	0	/ MAIN CONTROL BOARD C02 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C03	0	/ MAIN CONTROL BOARD C03 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C03R	0	/ MAIN CONTROL BOARD C03 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C04	0	/ MAIN CONTROL BOARD C04 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C05	0	/ MAIN CONTROL BOARD C05 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	C05R	0	/ MAIN CONTROL BOARD C05 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	C06	0	/ MAIN CONTROL BOARD C06 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	C06R	0	/ MAIN CONTROL BOARD C06 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	C06X	0	/ MAIN CONTROL BOARD C06X	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	C07	0	/ MAIN CONTROL BOARD C07 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C07R	0	/ MAIN CONTROL BOARD C07 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C08	0	/ MAIN CONTROL BOARD C08 (FRONT)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	No	No
20	C08R	0	/ MAIN CONTROL BOARD C08 (REAR)	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	No	No
20	C10	0	/ SAFE SHUTDOWN PANEL	AB	54.50	UPPER 4160V	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C25A	0	/ CONTROL ROOM VENT CONTROL CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Unk	No	No
20	C25B	0	/ CONTROL ROOM VENT CONTROL CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Unk	No	No
20	C39	0	/ DIESEL GENERATOR H7B CONTROL CABINET	WH	14.50	B D/G	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C70A	0	/ BOTTLE-UP PANEL C70A	AB	36.50	EAST 480V	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C70B	0	/ BOTTLE-UP PANEL C70B	AB	36.50	EAST 480V	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C80	0	/ VITAL SWITCHGEAR VENT CONTROL CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	F22A-PNL	0	HVAC / 'A' CONTROL ROOM A/C COMPRESSOR PANEL	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	F22B-PNL	0	HVAC / 'B' CONTROL ROOM A/C COMPRESSOR PANEL	AB	36.50	CR HVAC RM	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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Charbel Abou-Jaoude	C. M. Abou Jaoude	12-11-95			

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20	RC02A1	0	/ ESAS ACTUATION CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC02B	0	/ ESAS ACTUATION CABINET 5	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC02B2	0	/ ESAS ACTUATION CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC02C	0	/ ESAS ACTUATION CABINET 6	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC02C3	0	/ ESAS ACTUATION CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC02D4	0	/ ESAS ACTUATION CABINET	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC05B	0	/ RPS PANEL B LOOP	CB	36.50	CONTROL RM	36.50	N/A	ABS	RRS	Yes	No	Yes	No	No
20	RC30A-1	0	/ SPEC-200 CABINET RC-30A-1	CB	36.50	BEHIND C01R	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	RC30B	0	/ SPEC-200 CABINET RC-30B	CB	36.50	BEHIND C03R	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	RC30B-1	0	/ SPEC-200 CABINET RC-30B-1	CB	36.50	BEHIND C01R	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	RC31A	0	/ SPEC-200 CABINET RC-31A	CB	36.50	NEAR C01	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	RC31B	0	/ SPEC-200 CABINET RC-31B	CB	36.50	NEAR C01	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	RS1	0	ELEC AC / AUTO TRANSFER SWITCH RS1	AB	14.50	EAST DC GEAR	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	RS2	0	ELEC AC / AUTO TRANSFER SWITCH RS2	AB	14.50	WEST DC GEAR	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	T040	0	ELEC / DIESEL GENERATOR PANEL	WH	14.50	A D/G	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	T041	0	ELEC / DIESEL GENERATOR PANEL	WH	14.50	B D/G	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	X169A_PNL	0	/ X169A COMPRESSOR CONTROL PANEL	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	X169B_PNL	0	/ X169B COMPRESSOR CONTROL PANEL	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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SCREENING VERIFICATION DATA SHEET (SVDS)

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21	T40	0	COND / CONDENSATE STORAGE TANK	YD	14.50	CST & HX AREA	14.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	T41	0	CVCS / REFUELING WATER STORAGE TANK	YD	14.50	RWST & HX AREA	14.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	T48A	0	DG / A DIESEL ENGINE FUEL OIL SUPPLY DAY TANK	WH	38.50	DG DAY TANK	38.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	T48B	0	DG / B DIESEL ENGINE FUEL OIL SUPPLY DAY TANK	WH	38.50	DC DAY TANK	38.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	X-24	0	RBCCW / PRIMARY DRAIN TANK AND QUENCH TANK COOLERS	RB	-22.50	NE CORNER	-22.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X169A	0	HVAC / 'A' DC SWGR RM CHILLER CONDENSER	TB	14.50	CHILLER	14.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X169B	0	HVAC / 'B' DC SWGR RM CHILLER CONDENSER	TB	14.50	CHILLER	14.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes

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0	2-HV-261	0	HVAC / LOWER SWGR ROOM FIRE/VENTILATION DAMPER	AB	45.00	CABLE VAULT	45.00	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-262	0	HVAC / LOWER SWGR ROOM VENTILATION DAMPER	AB	45.00	CABLE VAULT	45.00	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-264	0	HVAC / LOWER SWGR ROOM FIRE/VENTILATION DAMPER	AB	45.00	CABLE VAULT	45.00	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-265	0	HVAC / EAST 480V SWGR ROOM FIRE/VENTILATION DAMPER	AB	54.50	UPPER 4160V	56.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-274	0	HVAC / EAST 480V SWGR ROOM FIRE/VENTILATION DAMPER	AB	54.50	UPPER 4160V	66.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-278	0	HVAC / UPPER SWGR ROOM VENTILATION DAMPER	AB	54.50	UPPER 4160V	64.75	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-HV-279	0	HVAC / LOWER SWGR ROOM VENTILATION DAMPER	AB	45.00	CABLE VAULT	45.00	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	2-SW-3.2A-TK	0	SW / AIR ACCUMULATOR FOR 2-SW-3.2A	TB	14.50	TBCCW HX AREA	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	2-SW-3.2B-TK	0	SW / AIR ACCUMULATOR FOR 2-SW-3.2B	TB	14.50	TBCCW HX AREA	14.50	Yes	BS	GRS	Yes	N/A	Yes	Yes	Yes
0	H-26	0	RBCCW / BORIC ACID EVAPORATOR PACKAGE	AB	-5.50	BA EVAPORATOR	-5.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	X-64	0	RBCCW / SAMPLE COOLER (RACK)	AB	14.50	SAMPLE SINK	14.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
0	X-65	0	RBCCW / SAMPLE COOLER (RACK)	AB	14.50	SAMPLE SINK	14.50	N/A	ABS	RRS	Yes	N/A	Yes	Yes	Yes
1	B52	0	ELEC AC / 480V MCC BUS B52 (22-2E)	WH	38.50	EB HVAC RM	38.50	N/A	GERS	CRS	No	Yes	Yes	Yes	No
2	D01	0	ELEC DC / 125VDC EMERGENCY BUS D01	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
2	D02	0	ELEC DC / 125VDC EMERGENCY BUS D02	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
3	24D	0	ELEC AC / 4.16KV EMG BUS 24D (A4)	AB	54.50	UPPER 4160V	54.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
5	P19A	0	CVCS / 'A' BORIC ACID TRANSFER PUMP	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P19B	0	CVCS / 'B' BORIC ACID TRANSFER PUMP	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P41A	0	HPSI / 'A' HPSI PUMP	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

SCREENING VERIFICATION DATA SHEET (SVDS)

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
5	P41B	0	HPSI / 'B' HPSI PUMP	AB	-45.50	C SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
5	P41C	0	HPSI / 'C' HPSI PUMP	AB	-45.50	B SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
6	P42A	0	LPSI / A LOW PRESSURE SAFETY INJECTION PUMP ASSEMBLY	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
6	P42B	0	LPSI / B LOW PRESSURE SAFETY INJECTION PUMP ASSEMBLY	AB	-45.50	B SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
7	2-CH-192	0	CVCS / RWST HEADER OUTLET CONTROL VALVE	AB	-25.50	CH PMP AREA	-25.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-198	0	RCS / RCP BLEEDOFF CONTROL VALVE	EB	-5.50	W PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-210X	0	CVCS / DILUTION CONTROL VALVE	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-506	0	RCS / RCP BLEEDOFF INSIDE CTMT CONTROL VALVE	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-510	0	CVCS / BORIC ACID PUMP RECIRCULATION VALVE	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-511	0	CVCS / BORIC ACID PUMP RECIRCULATION VALVE	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-512	0	CVCS / VCT MAKEUP CONTROL VALVE	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-515	0	RCS / LETDOWN HEADER SIAS ISOLATION	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-516	0	RCS / LETDOWN HEADER CIAS CTMT ISOLATION	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-517	0	CVCS / AUX SPRAY CHARGING HEADER SUPPLY VALVE	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-518	0	CVCS / LOOP 2A CHARGING HEADER	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CH-519	0	CVCS / LOOP 1A CHARGING HEADER	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-CN-241	0	COND / CONDENSATE STORAGE TANK TO HOTWELL LEVEL CONTROL VALVE	TB	14.50	NE CORNER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-FW-12A	0	AFW / #1 S/G AUXILIARY FEED SUPPLY AIR ASSIST CHECK VALVE	EB	38.50	E PP PEN	38.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes

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Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
7	2-FW-12B	0	AFW / #2 S/G AUX FEED SUPPLY AIR ASSIST CHECK VALVE	EB	38.50	W PP PEN	38.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-FW-5A	0	AFW / #1 S/G MAIN FEED SUPPLY AIR ASSIST CHECK VALVE ASSEMBLY	EB	38.50	E PP PEN	38.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-FW-5B	0	AFW / #2 S/G MAIN FEED SUPPLY AIR ASSIST CHECK VALVE ASSEMBLY	EB	38.50	W PP PEN	38.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-190A	0	MS / #1 STEAM GENERATOR ATMOSPHERIC DUMP CONTROL VALVE	EB	54.50	E PP PEN	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-190B	0	MS / #2 STEAM GENERATOR ATMOSPHERIC DUMP CONTROL VALVE	EB	54.50	W PP PEN	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-220A	0	MS / STEAM GENERATOR SURFACE BLOWDOWN CONTROL VALVE	EB	-5.50	E PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-220B	0	MS / STEAM GENERATOR SURFACE BLOWDOWN CONTROL VALVE	EB	-5.50	E PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-239	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-240	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-241	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-242	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-243	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-244	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-245	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes

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7	2-MS-246	0	MS / #2 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	W SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-247	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-248	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-249	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-250	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-251	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-252	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-253	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-254	0	MS / #1 STEAM GENERATOR SAFETY RELIEF VALVE	EB	54.50	E SRV PLATFORM	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-64A	0	MS / #1 STEAM GENERATOR MAIN STEAM ISOLATION VALVE	EB	54.50	E PP PEN	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-MS-64B	0	MS / #2 STEAM GENERATOR MAIN STEAM ISOLATION VALVE	EB	54.50	W PP PEN	54.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
7	2-RB-13.1A	0	RBCCW / A SHUTDOWN COOLING HEAT EXCHANGER OUTLET STOP VALVE	AB	-45.50	SDC HX AREA	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-RB-13.1B	0	RBCCW / B SHUTDOWN COOLING HEAT EXCHANGER OUTLET STOP VALVE	AB	-45.50	SDC HX AREA	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-RB-4.1B	0	RBCCW / RBCCW HEAT EXCHANGER 18A HEADER B OUTLET VALVE	AB	-25.50	RBCCW HX	-25.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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7	2-RB-4.1E	0	RBCCW / RBCCW HEAT EXCHANGER 18C HEADER A OUTLET VALVE	AB	-25.50	RBCCW HX	-25.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-RB-68.1A	0	RBCCW / ESF ROOM COOLING 36A RBCCW OUTLET VALVE	AB	-45.50	A SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-RB-68.1B	0	RBCCW / ESF ROOM COOLING 36B RBCCW OUTLET VALVE	AB	-45.50	B SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-RC-200	0	RCS / PRESSURIZER SAFETY VALVE	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes
7	2-RC-201	0	RCS / PRESSURIZER SAFETY VALVE	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes
7	2-RC-402	0	RCS / PRESSURIZER PORV	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes
7	2-RC-404	0	RCS / PRESSURIZER PORV	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes
7	2-RC-406	0	RCS / REACTOR VESSEL DRAIN HEADER CONTROL VALVE	RB	-3.50	ALL AREAS	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SI-306	0	LPSI / SHUTDOWN COOLING FLOW CONTROL VALVE ASSEMBLY	AB	-45.50	A SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SI-657	0	LPSI / SHUTDOWN COOLING HEAT EXCHANGER FLOW CONTROL VALVE	AB	-45.50	A SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-102	0	SW / 'A' SERVICE WATER HEADER CHILLER X-170 CONTROL VALVE	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	2-SW-104	0	SW / 'B' SERVICE WATER HEADER CHILLER X-170 CONTROL VALVE	TB	14.50	CHILLER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-CH-501	0	CVCS / VCT TO CHARGING SYSTEM OUTLET VALVE	AB	-25.50	DEGASIFIER	-25.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-CH-508	0	CVCS / B BAT OUTLET GRAVITY FEED	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-CH-509	0	CVCS / A BAT OUTLET GRAVITY FEED	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-CH-514	0	CVCS / BORIC ACID PUMP DISCHARGE TO CHARGING PUMP SUCTION	AB	-5.50	BAST AREA	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-RC-403	0	RCS / PRESSURIZER PORV BLOCK VALVE	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes
8	2-RC-405	0	RCS / PRESSURIZER PORV BLOCK VALVE	RB	38.50	PRESS TOP	38.50	N/A	ABS	CRS	Yes	Yes	N/A	Yes	Yes

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8	2-SI-614	0	SI / #1 SAFETY INJECTION TANK OUTLET VALVE	RB	14.50	NE CORNER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-615	0	LPSI / LPSI HEADER TO LOOP 1A INJECTION VALVE	EB	-5.50	W PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-624	0	SI / #2 SAFETY INJECTION TANK OUTLET VALVE	RB	14.50	SE CORNER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-625	0	LPSI / LPSI HEADER TO LOOP 1B INJECTION VALVE	EB	-5.50	W PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-634	0	SI / #3 SAFETY INJECTION TANK OUTLET VALVE	RB	14.50	SW CORNER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-635	0	LPSI / LPSI HEADER TO LOOP 2A INJECTION VALVE	EB	-5.50	W PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-644	0	SI / #4 SAFETY INJECTION TANK OUTLET VALVE	RB	14.50	NW CORNER	14.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-645	0	LPSI / LPSI HEADER TO LOOP 2B INJECTION VALVE	EB	-5.50	W PP PEN	-5.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-651	0	SI / SHUTDOWN COOLING SUCTION HEADER CTMT ISOLATION VALVE	RB	-3.50	SW CORNER	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-652	0	SI / SHUTDOWN COOLING SUCTION HEADER ISOLATION VALVE	RB	-22.50	SW CORNER	-22.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-654	0	HPSI / B HPSI HEADER STOP VALVE	AB	-45.50	B SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	2-SI-656	0	HPSI / A HPSI HEADER STOP VALVE	AB	-45.50	A SAFEGUARDS	-45.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
9	F15A	0	HVAC / 'A' ESF ROOM COOLING FAN	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
9	F15B	0	HVAC / 'B' ESF ROOM COOLING FAN	AB	-45.50	B SAFEGUARDS	-25.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	X36A	0	HVAC / 'A' SAFEGUARDS (ESF) ROOM AIR REC FAN CLG COIL	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	X36B	0	HVAC / 'B' SAFEGUARDS (ESF) ROOM AIR REC FAN CLG COIL	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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11	F1A	0	RBCCW / WASTE GAS COMPRESSOR 'A' & AFTERCOOLER	AB	-25.50	WASTE GAS COMP	-25.50	N/A	ABS	RRS	Yes	Yes	Yes	Unk	Unk
11	F1B	0	RBCCW / WASTE GAS COMPRESSOR 'B' & AFTERCOOLER	AB	-25.50	WASTE GAS COMP	-25.50	N/A	ABS	RRS	Yes	Yes	Yes	Unk	Unk
14	NPY402	0	/ PRESSURIZER FORV REMOTE PANEL	AB	14.50	EAST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
14	NPY404	0	/ PRESSURIZER PORV REMOTE PANEL	AB	14.50	WEST DC GEAR	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	C126	0	BA / RACK C126 FOR BORIC ACID TANK LEVEL INSTRUMENT	AB	-5.50	RACK C126	-5.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	C140	0	/ INSTRUMENT RACK C140	CE	-3.50	C140	-3.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C172	0	/ INSTRUMENT RACK C172	CE	14.50	C172	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C173	0	/ INSTRUMENT RACK C173	CE	14.50	C173	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C203	0	/ INSTRUMENT RACK C203	CE	14.50	C203	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C204	0	/ INSTRUMENT RACK C204	CE	14.50	C204	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C205	0	/ INSTRUMENT RACK C205	CE	14.50	C205	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C206	0	/ INSTRUMENT RACK C206	CE	14.50	C206	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C207	0	/ INSTRUMENT RACK C207	CE	14.50	C207	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C211	0	/ INSTRUMENT RACK C211	CE	-3.50	C211	-3.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C252	0	/ INSTRUMENT RACK C252	CE	14.50	C252	14.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C254	0	/ INSTRUMENT RACK C254	CE	-3.50	C254	-3.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C255	0	/ INSTRUMENT RACK C255	CE	-3.50	C255	-3.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT-8113	0	CSAS / CONTAINMENT PRESSURE TRANSMITTERS	AB	-5.50	E PEN	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT-8114	0	CSAS / CONTAINMENT PRESSURE TRANSMITTERS	AB	-5.50	E PEN	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT-8115	0	CSAS / CONTAINMENT PRESSURE TRANSMITTERS	AB	-5.50	W PEN	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT-8116	0	CSAS / CONTAINMENT PRESSURE TRANSMITTERS	AB	14.50	W PEN	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

Certification:

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Approved: (Signatures of all Seismic Capability Engineers on the Seismic Review Team (SRT) are required; there should be atleast two on the SRT. All signatories should agree with all the entries and conclusions. One signatory should be a licensed professional engineer.)

Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95

Certification:

The information provided to the Seismic Capability Engineers regarding systems and operations of the equipment contained in the SVDS is, to the best of our knowledge and belief, correct and accurate.

Approved: (One signature of Systems or Operations Engineer is required if the Seismic Capability Engineers deem it necessary.)

Print or Type Name	Signature	Date

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
18	TT-351X	0	/ SHUTDOWN COOLING TEMPERATURE TRANSMITTER	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	TT-351Y	0	/ SHUTDOWN COOLING TEMPERATURE TRANSMITTER	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
19	TE-112CA	0	RCS / RCS LOOP 1A COLD LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-112CC	0	RCS / RCS LOOP 1A COLD LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-112HA	0	RCS / RCS LOOP 1 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-112HB	0	RCS / RCS LOOP 1 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-112HC	0	RCS / RCS LOOP 1 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-112HD	0	RCS / RCS LOOP 1 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 1	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122CB	0	RCS / RCS LOOP 2B COLD LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122CD	0	RCS / RCS LOOP 2B COLD LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122HA	0	RCS / RCS LOOP 1 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122HB	0	RCS / RCS LOOP 2 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122HC	0	RCS / RCS LOOP 2 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE-122HD	0	RCS / RCS LOOP 2 HOT LEG TEMPERATURE RTD	CE	-3.50	LOOP 2	-3.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

Certification:

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Approved: (Signatures of all Seismic Capability Engineers on the Seismic Review Team (SRT) are required; there should be atleast two on the SRT. All signatories should agree with all the entries and conclusions. One signatory should be a licensed professional engineer.)

Certification:

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Approved: (One signature of Systems or Operations Engineer is required if the Seismic Capability Engineers deem it necessary.)

Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
19	TE-351X	0	/ SHUTDOWN COOLING TEMPERATURE ELEMENT	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes
19	TE-351Y	0	/ SHUTDOWN COOLING TEMPERATURE ELEMENT	AB	-45.50	A SAFEGUARDS	-45.50	N/A	ABS	RRS	Yes	Yes	N/A	Yes	Yes

Certification:

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Approved: (One signature of Systems or Operations Engineer is required if the Seismic Capability Engineers deem it necessary.)

Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

SCREENING VERIFICATION DATA SHEET (SVDS)

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
21	H-24	0	RBCCW / DEGASIFIER VENT CONDENSER	AB	-25.50	DEGASIFIER	-25.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	T3	0	RBCCW / RBCCW SURGE TANK	EB	71.00	RBCCW SURGE TANK	71.00	N/A	N/A	N/A	N/A	N/A	No	N/A	No
21	T38	0	RCS / PZR RELIEF QUENCH TANK	CE	-3.50	C140	-3.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	T8A	0	BA / BORIC ACID TANK	AB	-5.50	BAST AREA	-5.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	T8B	0	BA / BORIC ACID TANK	AB	-5.50	BAST AREA	-5.50	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes
21	X-51	0	RBCCW / DEGASIFIER EFFLUENT COOLER	AB	-5.50	DEGASIFIER	-5.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X-82	0	RBCCW / QUENCH TANK HEAT EXCHANGER	EB	38.50	E PP PEN	38.50	N/A	N/A	N/A	N/A	N/A	No	N/A	No
21	X18A	0	RBCCW / A RBCCW HEAT EXCHANGER	AB	-25.50	RBCCW HX	-25.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X18B	0	RBCCW / B RBCCW HEAT EXCHANGER	AB	-25.50	RBCCW HX	-25.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X18C	0	RBCCW / C RBCCW HEAT EXCHANGER	AB	-25.50	RBCCW HX	-25.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X20A	0	RBCCW / A SPENT FUEL POOL COOLING HEAT EXCHANGER	AB	-5.50	SFP HEAT EXCHANGER	-5.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X20B	0	RBCCW / B SPENT FUEL POOL COOLING HEAT EXCHANGER	AB	-5.50	SFP HEAT EXCHANGER	-5.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X21	0	CVCS / REGEN HEAT EXCHANGER	RB	5.50	C RCP AREA	5.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X22	0	RBCCW / LETDOWN HEAT EXCHANGER	AB	-5.50	LETDOWN HX AREA	-5.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X23A	0	LPSI / A SHUTDOWN COOLING HEAT EXCHANGER	AB	-45.50	A SAFEGUARDS	-45.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes
21	X23B	0	LPSI / B SHUTDOWN COOLING HEAT EXCHANGER	AB	-45.50	B SAFEGUARDS	-45.50	N/A	N/A	N/A	N/A	N/A	Yes	N/A	Yes

Certification:

All the information contained on this Screening Verification Data Sheet (SVDS) is, to the best of our knowledge and belief, correct and accurate. "All information" includes each entry and conclusion (whether verified to be seismically adequate or not).

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Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
5	P11A	0	RBCCW / A RBCCW PUMP	AB	-25.50	RBCCW HX	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P11B	0	RBCCW / B RBCCW PUMP	AB	-25.50	RBCCW HX	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P11C	0	RBCCW / C RBCCW PUMP	AB	-25.50	RBCCW HX	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			
Charbel Abou-Jaoude	C. M. Abou Jaoude	12.11.95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
4	UB5	0	ELEC AC / 480V XFMR TO 22E	TB	36.50	WEST 480V SWGR	36.50	N/A	ABS	CRS	No	No	Yes	Yes	No
4	UB6	0	ELEC AC / 480V XFMR TO 22F	AB	36.50	EAST 480V	36.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
5	P18A	0	CVCS / A CHARGING PUMP	AB	-25.50	CH PMP AREA	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P18B	0	CVCS / B CHARGING PUMP	AB	-25.50	CH PMP AREA	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P18C	0	CVCS / C CHARGING PUMP	AB	-25.50	CH PMP AREA	-25.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
8	2-CH-910	0	CVCS / CHEMICAL METERING PUMP OUTLET SOLENOID VALVE	AB	-25.50	CH PMP AREA	-25.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Sing Chu	Sing Chu	12/11/95			
Charbel Abou-Jaoude	C. M. Abou-Jaoude	12-11-95			

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
3	24E	0	ELEC AC / 4.16KV EMG BUS 24E (A5)	AB	31.50	LOWER 4160V	31.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
20	C38	0	/ DIESEL GENERATOR H7A CONTROL CABINET	WH	14.50	A D/G	14.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
Robert Courcy	R. J. Courcy	12/11/95
Charbel Abou-Jaoude	C. M. Abou-Jaoude	12.11.95

Certification:

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Print or Type Name	Signature	Date

Eq. Cl	Eq. ID	Rev No	Sys/Eq. Desc	Bldg.	Fl El.	Rm or Rw/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
3	24C	0	ELEC AC / 4.16KV EMG BUS 24C (A3)	AB	31.50	LOWER 4160V	31.50	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes

Certification:

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Print or Type Name	Signature	Date	Print or Type Name	Signature	Date
Robert Courcy	R. Courcy	12/11/95			
Dimitrios Antonopoulos	D. Antonopoulos	12/11/95			

ATTACHMENT G

OSVS

(See Table of Contents for Page Numbers)

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : 22E-MCC (Rev. 0)	Class : 1. Motor Control Centers	
Description : 480V BUS 22E (B05) MCC SECTION		
Building : TB / WH	Floor El. : 36.50 / 38.50	Room, Row/Col : WEST 480V SWGR & EB HVAC RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> The conservative FRS is not enveloped by 1.5 X BS for 22E-MCC and function during GERS for B52 MCC.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
22E-MCC and B52.

<table>
<tr><td colspan="2">NUSCO MILLSTONE UNIT 2
OUTLIER SEISMIC VERIFICATION SHEET (OSVS)</td><td>GIP Rev 2, Corrected 2/14/92
Sheet 2 of 2</td></tr>
<tr><td>ID : 22E-MCC (Rev. 0)</td><td colspan="2">Class : 1. Motor Control Centers</td></tr>
<tr><td colspan="3">Description : 480V BUS 22E (B05) MCC SECTION</td></tr>
<tr><td>Building : TB / WH</td><td>Floor El. : 36.50 / 38.50</td><td>Room, Row/Col : WEST 480V SWGR & EB HVAC RM</td></tr>
</table>

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

Sing Chen 12/9/95

C.M. Abu Dawdie 12.11-95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : 22E (Rev. 0)	Class : 2. Low Voltage Switchgear	
Description : 480V BUS 22E (B05,		
Building : TB	Floor El. : 36.50	Room, Row/Col : WEST 480V SWGR

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The conservative FRS is not enveloped by 1.5 X BS.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed above will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C. M. Abou Daoud 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : 22F (Rev. 0)	Class : 2. Low Voltage Switchgear	
Description : 480V BUS 22F (B06)		
Building : AB	Floor El. : 36.50	Room, Row/Col : EAST 480V

1. OUTLIER ISSUE DEFINITION Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	
Anchorage	X
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The front of 22F SWGR sections were not anchored to the embedded plate.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Install missing plug welds in the front of SWGR sections per manufacturer provided holes.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

An ACR was generated to rectify this adverse condition and plug welds were installed in the front per manufacturer recommendations (reference ACR 00501 dated 2/21/95 and NNECo calc No. NCR95149-1195M2). Consequently, a safety evaluation was generated indicating 22F does not have any safety concerns and is operable as-is. The ACR work was performed during RFO12 under work order M2 95-03188. The outlier has been resolved. Therefore, this component has been verified as seismically adequate.

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and satisfies the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: W. Autongwelk Date: 12/11/95

C. M. Abu Taveda 12/11/95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : UB5 (Rev. 0)	Class : 4. Transformers	
Description : 480V XFMR TO 22E		
Building : TB	Floor El. : 36.50	Room, Row/Col : WEST 480V SWGR

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	X
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> The conservative FRS is not enveloped by 1.5 X BS.
>
> Caveat 4 - Transformer coils are not top braced or have "A" frame, external evaluation of coil support indicated that hold-down bolts for the transformer should be A-325 or better. The SRT could not confirm bolt material during walkdown. Reference VECTRA Calc. No. MP2ORT, section 5.4, Rev. 0.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Review spectra exceedance based on IPEEE assessment and determine if median-centered spectra are needed to resolve the capacity vs. demand outlier condition.
>
> Confirm that the transformer hold-down bolt material is A-325 or better. If not replace existing bolts with A-325 bolts. Otherwise the transformer evaluation may be further refined based on less conservative spectra.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : UB5 (Rev. 0)	Class : 4. Transformers	
Description : 480V XFMR TO 22E		
Building : TB	Floor El. : 36.50	Room, Row/Col : WEST 480V SWGR

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: Sing Chen Date: 12/8/95

C. M. Allen Tondre 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : 2-CHW-11 (Rev. 0)	Class : 7. Fluid-Operated Valves	
Description : CHILLED WATER SUPPLY HDR XTIE CONTROL VALVE		
Building : TB	Floor El. : 14.50	Room, Row/Col : TBCCW PP&HX

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

Valve actuator is independently braced to building steel cross bracing at column line E.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Review piping isometric and/or piping calculation to determine seismic stresses at valve yoke.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed above will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: R. Antonopoulos (signature) Date: 12/9/95

C.M. Van Tassell (signature) 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : F38A (Rev. 0)	Class : 9. Fans	
Description : 'A' DG ROOM VENT FAN		
Building : WH	Floor El. : 14.50	Room, Row/Col : A D/G

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The conservative FRS is not enveloped by 1.5 X BS.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Spectra exceedance has been resolved. See discussion below.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

This OSVS is generated for F38A and F38B.

Capacity vs. Demand - The existing design for the Warehouse Structure (a two story Bldg. founded on a controlled soil backfill at El. 14'-6") are very conservative and result in an exceedance of the response spectrum for frequencies above approximately 8 Hz.
Based on the use of vibration isolators at the fan support points, and the presence of flexible duct connections on both ends of the fan, the SRT estimates that the overall frequency will be below 5 Hz. The conservative design spectra are well enveloped for frequencies between 2 and 7 Hz. The site spectrum is very well enveloped by the Bounding Spectrum. The fan is supported from elevation 36' (i.e., 22' from grade, < 40') but does not meet the 8 Hz caveat of the GIP because of the vibration isolators.
It is the SRT's judgment that the spectra exceedance are of no consequences for the seismic adequacy of this component in view of the following:

- Conservative Design Spectra is used for Capacity vs. Demand comparison.
- Spectra with high frequency content is typically not damaging for a mechanical component such as a fan (damage typically attributed to structural type failures or clearance concerns)
- Similar fans mounted on vibration isolators with lateral stops are very well represented in the earthquake experience data, and the 8 Hz rule may not be appropriate for such components.

Therefore the SRT judges that this fan meets the intent of the GIP screening and is seismically adequate.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : F38A (Rev. 0)	Class : 9. Fans	
Description : 'A' DG ROOM VENT FAN		
Building : WH	Floor El. : 14.50	Room, Row/Col : A D/G

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and satisfies the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Autonopoulos Date: 12/11/95

C. M. Abu Awdee 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : F52 (Rev. 0)	Class : 9. Fans	
Description : EAST 480V ROOM SUPPLY FAN		
Building : AB	Floor El. : 54.50	Room, Row/Col : UPPER 4160V

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The realistic FRS is not enveloped by 1.5 X BS. See discussion below.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Spectra exceedance has been resolved.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

Capacity vs. Demand - This fan is suspended from elevation 71'-6" of the Auxiliary Bldg. with lateral braces to the wall between elevations 54'-6" and 71'-6" in the upper switchgear room. The realistic spectra at elevation 71'-6" is enveloped by the Reference Spectrum in the E-W direction but exceeds it in the N-S direction by about 15% for frequencies between 8 Hz and 30 Hz. Based on the use of vibration isolators at the fan support points, and the presence of flexible duct connections on both ends of the fan, the SRT estimates that the overall frequency will be below 5 Hz.

The SRT judges the spectra exceedance in the N-S direction to be minor, and that the fan is seismically adequate based on the following:

- The exceedance are small (approx. 15%) and occur in the higher frequencies which are typically not damaging for a mechanical component, and will not result in structural type failures,
- The isolators (Vibration Eliminator Comp. model 2KW1-ST2) are specifically designed to accommodate and limit vertical and lateral displacements, and are very rugged for this relatively light weight fan.

Therefore the SRT judges that this fan meets the intent of the GIP and is seismically adequate.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : F52 (Rev. 0)	Class : 9. Fans	
Description : EAST 480V ROOM SUPPLY FAN		
Building : AB	Floor El. : 54.50	Room, Row/Col : UPPER 4160V

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and satifies the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Autonoprole Date: 12/11/95

C. M. Abu Rendu 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : F14C (Rev. 0)	Class : 10. Air Handlers	
Description : 'C' CONTAINMENT RECIRCULATION COOLING UNIT FAN		
Building : RB	Floor El. : 36.50	Room, Row/Col : N. END FUEL POOL

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	X
Caveats	
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The conservative FRS is not enveloped by 1.5 X BS.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Generate realistic, median-centered, in-structure SSE spectra for the Reactor building internal structure at floor El. 38'-6" or evaluate the components based on conservative design spectra. It should be noted that the SRT considers the design basis FRS to be very conservative based on the results obtained when the Auxiliary building median-centered spectra were developed under VECTRA Calc. No. 0024-00099-A46-1.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

No additional action required (see comment below)

3. COMMENTS

This OSVS is generated for the following SSEL components:
F14C, F14D, and X-34A.

VECTRA Calc. No. 0024-00099.000-DES-5, Rev. 0 was performed to qualitatively estimate A-46 median-centered spectra for the Reactor building internal structure at floor El. 38'-6". The calculation concluded that if median-centered spectra were to be generated for the Reactor building at El. 38'-6", they will be enveloped by 1.5 X Bounding spectra of USI A-46. In addition, original qualification analysis (Reference Westinghouse Seismic Analysis Report N0. TO-JRP-84 titled Reactor Containment Fan Coolers Nuclear Power Station- Unit 2 Millstone Point Co.) exist for these components which demonstrated their seismic adequacy. Therefore, the SRT considers that the outlier has been resolved and these components have been verified as seismically adequate.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : F14C (Rev. 0)	Class : 10. Air Handlers	
Description : 'C' CONTAINMENT RECIRCULATION COOLING UNIT FAN		
Building : RB	Floor El. : 36.50	Room, Row/Col : N. END FUEL POOL

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and satisfies the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C. M. Abu Tawdre 12-11-95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : F1A (Rev. 0)	Class : 11. Chillers	
Description : WASTE GAS COMPRESSOR 'A' & AFTERCOOLER		
Building : AB	Floor El. : -25.50	Room, Row/Col : WASTE GAS COMP

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	
Anchorage	
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

Block walls surrounding compressor dc not have safety related marking. The SRT conservatively assumed that seismic interaction with Waste Gas Compressor can not be precluded.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Perform an IPEEE evaluation to determine whether or not the block walls should be evaluated to determine their seismic capacity since the Waste Gas Compressor is a pressure boundary for the RBCCW system.
>
> The IPEEE group performed an evaluation (reference NU Memo NE-95-SAB-322, dated 8/8/95) and concluded the following:
> "Due to its small size (1" - line # 1"-HBD(B)-114), a break in this line would not cause a significant flow diversion such that normal system makeup would be overwhelmed and lead to RBCCW system failure. Therefore, further evaluation of the block walls surrounding the Waste Gas Compressor is unnecessary.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
F1A, and F1B.

Based on the evaluation performed in step 2a above, the outlier has been resolved. Therefore, this component requires no further action.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : F1A (Rev. 0)	Class : 11. Chillers	
Description : WASTE GAS COMPRESSOR 'A' & AFTERCOOLER		
Building : AB	Floor El. : -25.50	Room, Row/Col : WASTE GAS COMP

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and satifies the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: Sing Chu Date: 12/9/95

D. Antonopoulos 12/9/95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VER!FICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : D11 (Rev. 0)	Class : 14. Distribution Panels	
Description : 125VDC DISTRIBUTION PANEL D11		
Building : AB	Floor El. : 14.50	Room, Row/Col : EAST DC GEAR

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> D11 and D12 are not bolted to adjacent VR11 distribution panel. Similarly, D21 and D22 are not bolted to VR21. The SRT is of the opinion that adjacent cabinets should be bolted together even though no essential relays are present; the basis for this recommendation is the data represented in EPRI GERS report (NP-5223-SL) for distribution panels. The report indicated that circuit breakers were more sensitive to high frequency input. Therefore bolting the cabinets together eliminates any pounding and any potential breaker trips would be precluded.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Bolt D11 and D12 to VR11; D21 and D22 to VR21. The subject distribution panels should be bolted at the top.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
D11, D12, VR11
D21, D22, VR21

By bolting the distribution panels as discussed in 2a above the seismic impact is eliminated and therfore any potential breaker trips are precluded.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : D11 (Rev. 0)	Class : 14. Distribution Panels	
Description : 125VDC DISTRIBUTION PANEL D11		
Building : AB	Floor El. : 14.50	Room, Row/Col : EAST DC GEAR

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C.M. Abu Bakr 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : DB1 (Rev. 0)	Class : 15. Batteries on Racks	
Description : BATTERY 201A (DB1)		
Building : AB	Floor El. : 14.50	Room, Row/Col : A DC BATT

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	X
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> The battery racks bolts do not meet the GIP screening criteria due to the gaps under the base being as large as 2.75". Therefore, the anchorage capacity does not exceed the demand due to high shear and tension forces on the bolts as a result of the large gaps under the base. Also, the longitudinal bracing on the front of the rack is intermittent, therefore given the gaps under the anchorage load redistribution to locations with no gap may cause load path concern with the rack members.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> A number of different options are available in order to resolve the outlier:
> - Grout all gaps under base that are larger than 1/4".
> - Install additional cross-bracing in the front of the racks to distribute longitudinal forces to more bolts.
> - Provide bolting of the top back members of the rack to the wall behind.
> - Perform necessary structural evaluation of the battery racks to determine if recommended changes will meet the GIP criteria.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> Design engineers to discuss options with plant construction and evaluate accordingly

3. COMMENTS

This OSVS is generated for the following SSEL components:

DB1 and DB2

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : DB1 (Rev. 0)	Class : 15. Batteries on Racks	
Description : BATTERY 201A (DB1)		
Building : AB	Floor El. : 14.50	Room, Row/Col : A DC BATT

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C. M. Abu Bunde 12-11-95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : C01X (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : ACCESS CONTROL DOOR ALARM DITRIBUTION PANEL		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	
Seismic Interaction	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

Some internal relay panels are loose and/or missing bolts for C01X cabinet.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Loose bolts on internal panels may be due to maintenance activities during the outage. Verify that missing bolts are installed to relay panels inside C01X cabinet.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed above will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: A. Antonopoulos Date: 12/9/95

C. M. Abu Tarsha 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : C05 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : MAIN CONTROL BOARD C05 (FRONT)		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> Top bolt between adjacent cabinets C05 and C06 is loose.
>
> For C05 cabinet bottom wireway cover not secured, no screws.
>
> C05R and C06R are bolted together with three bolts. There is a 1/8" gap at top and 1/4" gap on bottom bolt on the C06R side.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Tighten top bolt between C05 and C06 cabinets. In addition, secure wireway cover at bottom of C05 cabinet.
>
> Shim and tighten top and bottom bolts between C05R and C06R cabinets.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
C05
C05R
C06
C06R

The preferred method for tieing cabinets together to prevent seismic impact is by bolting but any other methods are acceptable provided an evaluation is performed.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : C05 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : MAIN CONTROL BOARD C05 (FRONT)		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: R. Antonopoulos (signature) Date: 12/9/95

C. M. Abou Bandee (signature) 12.11-95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : C08 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : MAIN CONTROL BOARD C08 (FRONT)		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	
Anchorage	
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> There is a line of lockers 43" away south of C08 and C08R cabinets which may cause seismic interaction. Although there are no essential relays within these cabinets, the SRT recommends that the lockers be secured or removed as part of good housekeeping practices.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Potential interaction has been resolved.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
C08, and C08R.

The SRT performed an additional walkdown at the MP2 control room on 11/3/95 to assess the housekeeping corrective actions that have taken place since the seismic walkdown. The walkdown confirmed that the seismic interaction concerns have been removed (reference NU Millstone Station Materiel Condition Program Manual, for addressing seismic interaction concerns). Therefore, the seismic interaction outlier has been resolved.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : C08 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : MAIN CONTROL BOARD C08 (FRONT)		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and the outlier issues listed on the previous page satisfies the requirements for this item of equipment for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C.M. Abu Rawde 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : C25A (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL ROOM VENT CONTROL CABINET		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	X
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

> Adjacent cabinet C80 is not bolted to C25B, since C25A and C25B cabinets act as one unit, seismic impact is not precluded. In addition, C80 cabinet is not bolted to adjacent C26 cabinet.
>
> There are file cabinets located approx. 24" behind C25A and B cabinets which may cause seismic interaction. The SRT considers this seismic interaction as part of good housekeeping practices and notified MP2 station personnel.
>
> C25A and C25B cabinet anchorage is inaccessible and is not shown on civil drawings. Therefore, the SRT could not evaluate the seismic adequacy of the anchorage.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

> Bolt cabinet C80 to adjacent C25B and C26 cabinets.
>
> Perform additional documentation search to see if the C25A and C25B anchorage details can be found to determine the seismic adequacy of the anchorage. Based on the result of anchorage reviews at MP2 the SRT has good confidence that the anchorage details are adequate.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

> N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:
C25A, C25B, and C80.

The SRT performed an additional walkdown at the MP2 control room on 11/3/95 to assess the housekeeping corrective actions that have taken place since the seismic walkdown. The walkdown confirmed that the seismic

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : C25A (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL ROOM VENT CONTROL CABINET		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

interaction concerns have been removed (reference NU Millstone Station Materiel Condition Program Manual, for addressing seismic interaction concerns). Therefore, the seismic interaction outlier has been resolved.

The preferred method for tieing cabinets together to prevent seismic impact is by bolting but any other methods are acceptable provided an evaluation is performed.

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antongrodis Date: 12/9/95

C. M. AbuRendre 12-10-95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : RC02A1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : ESAS ACTUATION CABINET		
Building : CB	Floor El. : 36.50	Room, Row/Col : CONTROL RM

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	X
Anchorage	
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

RC02A1 is part of the ESAS cabinets, the TSI C20 cabinet at South side and the Annunciator logics RC22 cabinet at North side are not bolted to ESAS cabinets. In addition, C06X cabinet is not bolted to adjacent TSI C20 and C08X cabinets. Therefore, seismic impact is not precluded.

Similarly, seismic impact is not precluded for the RPS panel RC05B which is one section of the single cabinet RC05 and is located next to RC05A section which is not bolted to adjacent cabinet RC05E.

There are file cabinets located approx. 39" behind the ESAS and C06X cabinets which may cause seismic interaction.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Bolt the ESAS cabinets to adjacent TSI C20 and RC22 cabinets. Similarly, bolt cabinet RC05A to RC05E, and cabinet C06X to TSI C20 and C08X.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

This OSVS is generated for the following SSEL components:

RC02A1
RC02B
RC02B2
RC02C
RC02C3
RC02D4
RC05B
C06X

The SRT performed an additional walkdown at the MP2 control room on 11/3/95 to assess the housekeeping corrective actions that have taken place since the seismic walkdown. The walkdown confirmed that the seismic interaction concerns have been removed (reference NU Millstone Station Materiel Condition Program Manual, for addressing seismic interaction concerns). Therefore, the seismic interaction outlier has been resolved.

The preferred method for tieing cabinets together to prevent seismic impact is by bolting but any other methods are acceptable provided an evaluation is performed.

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: D. Antonopoulos Date: 12/9/95

C. M. Abu Zawde 12.11.95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : T3 (Rev. 0)	Class : 21. Tanks and Heat Exchangers	
Description : RBCCW SURGE TANK		
Building : EB	Floor El. : 71.00	Room, Row/Col : RBCCW SURGE TANK

1. OUTLIER ISSUE DEFINITION - Tanks and Heat Exchangers

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Shell Buckling	
Anchor Bolts and Embedment	X
Anchorage Connections	X
Flexibility of Attached Piping	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

Tank T3 does not meet the GIP screening criteria since it is a large vertical tank supported by legs. A detailed tank evaluation was performed to qualify the tank anchorage and connections between anchor bolts and the tank shell. See VECTRA Calc No. MP2ORT3, section 5.1, Rev. 0 for the tank evaluation. Based on the evaluation, the tank anchor bolts fail due to insufficient tension capacity; the tank legs fail in bending; and the concrete floor punching shear capacity is exceeded.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Outlier has been resolved.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

When the A-46 outlier condition was discovered a temporary design was installed to resolve the outlier prior to start-up. PDCR 2-95-040 has been prepared and approved to replace the temporary design with a permanent design modification. [Reference NNECO calc. No. 95-ENG-1198 M2, Rev. 1 dated 11/6/95].
In addition, an Operability Evaluation of the RBCCW Surge Tank T3 was performed (VECTRA Calc No. MP2T3OPER Rev. 0). The evaluation concluded that tank T3 was operable under normal operating conditions.

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : T3 (Rev. 0)	Class : 21. Tanks and Heat Exchangers	
Description : RBCCW SURGE TANK		
Building : EB	Floor El. : 71.00	Room, Row/Col : RBCCW SURGE TANK

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: Sing Chu _______________ Date: 12/9/95

D. Antongiovanni _______________ 12/9/95

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 2
ID : X-82 (Rev. 0)	Class : 21. Tanks and Heat Exchangers	
Description : QUENCH TANK HEAT EXCHANGER		
Building : EB	Floor El. : 38.50	Room, Row/Col : E PP PEN

1. OUTLIER ISSUE DEFINITION - Tanks and Heat Exchangers

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Shell Buckling	
Anchor Bolts and Embedment	X
Anchorage Connections	
Flexibility of Attached Piping	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

Quench tank Hx X-82 does not meet the GIP screening criteria since the tank anchorage capacity does not exceed the demand and the concrete pedestal on the fixed end connection is cracked. Refer to VECTRA calc. No. MP2ORT3, section 5.3, Rev. 0 for tank evaluation.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Structurally repair the cracked pedestal. When the concrete pedestal is repaired the X-82 anchorage will be seismically acceptable per VECTRA anchorage evaluation that is attached to the SEWS.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

N/A

3. COMMENTS

NUSCO MILLSTONE UNIT 2 OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 2 of 2
ID : X-82 (Rev. 0)	Class : 21. Tanks and Heat Exchangers	
Description : QUENCH TANK HEAT EXCHANGER		
Building : EB	Floor El. : 38.50	Room, Row/Col : E PP PEN

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: Sing Chu Date: 12/9/95

D. Autonopoulos 12/9/95

ATTACHMENT H

Raceway Review Area Summary Sheets

(See Table of Contents for Page Numbers)