Enclosure B

Seismic Evaluation Report for the Resolution of USI A-46

Boston Edison Company

Pilgrim Nuclear Power Station

Seismic Evaluation Report for the Resolution of USI A-46

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Revision 0

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List of Acronyms

CEA	Concrete Expansion Anchor
EPRI	Electric Power Research Institute
EQE	EQE Engineering
GERS	Generic Equipment Ruggedness Spectra
GIP	Generic Implementation Procedure for the Seismic Verification of
GL	Generic Letter
GRS	Ground Response Spectrum
IRS	In-structure Response Spectra
PNPS	Pilgrim Nuclear Power Station
LAR	Limited Analytical Review
MCC	Motor Control Center
OSVS	Outlier Seismic Verification Sheet
PASS	Plant Area Summary Sheet
PSD	Power Spectral Density
S&A	Stevenson & Associates
SCE	Seismic Capability Engineer
SEWS	Screening Evaluation Work Sheet
SQUG	Seismic Qualification Utility Group
SRT	Seismic Review Team
SSE	Safe Shutdown Earthquake
SSEL	Safe Shutdown Equipment List
SSER	Supplemental Safety Evaluation Report
SVDS	Screening Verification Data Sheet
USI	Unresolved Safety Issue
NRC	Nuclear Regulatory Commission
BECo	Boston Edison Company
ZPA	Zero Period Acceleration

1. Introduction and Seismic Verification Methodology

1.1 Introduction

This report provides the final documentation of the seismic adequacy evaluations performed at Boston Edison Company's (BECo's) Pilgrim Nuclear Power Station (PNPS), for the resolution of Unresolved Safety Issue (USI) A-46, " Seismic Qualification of Equipment in Operating Plants ". USI A-46 was issued by the United States Nuclear Regulatory Commission (NRC) in December 1980 to address the concern with the seismic adequacy of mechanical and electrical equipment in older nuclear power plants. This report describes the methodology used and the results of the seismic reviews of active mechanical and electrical equipment, selected tanks and heat exchangers, and cable and conduit raceways.

1.2 Seismic Verification Methodology

Utilities affected by USI A-46 formed the Seismic Qualification Utility Group (SQUG) in 1982 to develop a consistent industry approach for resolving USI A-46. SQUG utilities, including BECo, with the technical assistance of the Electric Power Research Institute (EPRI), conducted research and studies regarding this issue in order to formulate a thorough and reasoned program to resolve the identified concern. In February 1987, the NRC issued Generic Letter 87-02, " Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue USI A-46 ", [Reference 1] requesting affected licensees to commit to a detailed approach for resolution.

Subsequently, further research conducted by SQUG (and its contractors) and reviewed by the NRC staff resulted in a detailed procedure developed by SQUG called the " Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment " [Reference 2]. Specifically, the NRC staff reviewed Revision 2 of the GIP and accepted (with provisos) the approach in Supplement No. 1 to Generic Letter (GL) 87-02 that Transmits Supplemental Evaluation Report No. 2 (SSER #2) on SQUG Generic Implementation Procedure, Revision 2 as Corrected on February 14, 1992 (GIP-2) [Reference 3]. This GIP version and the clarifications, guidance, and additional requirements provided by the NRC in SSER #2 are the basis for the seismic evaluation of mechanical and electrical equipment at Pilgrim Station for resolution of USI A-46. The GIP Revision 2, referred to as GIP-2 by the NRC, is referred to as the GIP in this report.

The GIP approach relies on developing a safe shutdown equipment list (SSEL) which identifies equipment needed to achieve and maintain hot standby conditions as defined by a nuclear power plant's Technical Specifications. This equipment is then reviewed in accordance with the GIP methodology. By means of plant walkdowns to specifically observe and evaluate each equipment item on the SSEL, an assessment can be made concerning its seismic adequacy. By evaluating seismic demand criteria, selected caveats to ensure similarity to the GIP equipment classes, anchorage capacity, and seismic interaction potential, the trained walkdown engineer can be satisfied that the equipment will not become inoperable due to the plant's design basis seismic event. The basis for this approach is rooted in detailed observations of representative, if not identical, equipment in commercial and industrial facilities that have experienced earthquakes of greater magnitude in California and in other seismically active regions around the world. Each equipment assessment is documented on a Screening

Evaluation Work Sheet (SEWS). Any deficiencies are documented on an Outlier Seismic Verification Sheet(s) (OSVS).

1.3 Report Organization

Section 2 of this report refers the reader to the " Safe Shutdown Equipment List Report " which discusses the development of the safe shutdown path and the resulting Safe Shutdown Equipment List (SSEL) for Pilgrim Station. The " Safe Shutdown Equipment List Report " contains the Seismic Review SSEL whose scope is mirrored in the Screening Verification Data Sheets, (SVDS), in Appendix D. The seismic design basis of Pilgrim Station in-structure seismic spectra and the assessment of it by the NRC are discussed in Section 3. The Pilgrim Station equipment walkdown and results are provided in Section 4. These assessments are summarized in the SVDS in Appendix D. Section 5 provides a detailed listing of exceptions to the rules taken for any equipment item assessment. Section 6 discusses the results of the Tanks & Heat Exchangers assessment. Cable Tray & Conduit Raceway assessments are provided in Section 7. Section 8 provides a listing of outliers and identifies the reasons for which they are outliers. Section 9 provides potential methods for resolution of all remaining outliers.

2. Pilgrim Nuclear Power Station Safe Shutdown Path

For a description of the safe shutdown paths selected to accomplish the safe shutdown function requirements of the GIP, refer to the " Safe Shutdown Equipment List Report ", Reference 14.

3. Pilgrim Station In-Structure Spectra for Seismic Screening

3.1 Pilgrim Station Site

Pilgrim Station is located on the shore of Cape Cod Bay, near Rocky Point, Plymouth, Massachusetts, USGS Coordinates N41-56-30 and W70-35-00. Ground grade at the site is Elevation 23 feet, and the depth to bedrock is approximately 80 to 100 feet. Overburden materials consist of dense to very dense sandy and gravely glacial drift, which has been over ridden and compacted by one or more episodes of continental glaciation. Building structures are embedded at various depths ranging from approximately 4 feet to 50 feet below ground grade, and are surrounded by compacted backfill.

3.2 Description of Pilgrim Design Response Spectra

The peak ground acceleration design basis for Pilgrim Station structures, systems and components is a 0.08g Operating Basis Earthquake (OBE), and 0.15g Safe Shutdown Earthquake (SSE). The ground response spectra type corresponds to the so-called Housner shape and is shown in the UFSAR Figures 2.5-5 and 2.5-6 [Reference 10]. For purposes of dynamic analysis, Bechtel Corporation used a Taft time history, scaled to 0.08g and 0.15g for the OBE and SSE respectively, to generate floor response spectra. Buildings were analyzed using lumped mass " stick " models, with soil springs to account for foundation interaction with the soil. Bechtel prepared horizontal floor response spectra in 1969 for the Reactor, Turbine and Radwaste Buildings as part of the original plant design. Building model development was two dimensional. Vertical response within buildings was assumed to be rigid, and represented by a value equal to two-thirds of the horizontal ground response. Cygna Energy Services used similar techniques in 1981 to prepare floor response spectra for the Emergency Diesel Generator Building and the Intake Structure, in conjunction with work related to NRC I&E Bulletin No. 80-11. Design response spectra for the Reactor Building, Turbine Building, Radwaste Building, Emergency Diesel Generator Building and Intake Structure, are contained in BECo Specification C-114, entitled "Seismic Response Spectra" [Reference 11].

3.3 Characterization of the Pilgrim Design Spectra for Seismic Screening

In accordance with NRC Supplement No. 1 to GL 87-02, detailed information concerning procedures and criteria used to generate the Pilgrim design response spectra, and the Specification C-114 data, was furnished for staff review in BECo's 120 day response document [Reference 6]. The Safety Evaluation for this 120 day response [Reference 4] concluded, among other things, these design spectra were adequate and acceptable, but should be treated as " median centered " because of the lack of consideration of three statistically independent earthquake components, lack of variation of foundation medium properties, and the rigid vertical response assumption. Based on study analyses of Pilgrim's deeply embedded structures performed for BECo by EQE Engineering, additional information [Reference 8], was submitted to NRC staff requesting a re-evaluation of this conclusion for the Reactor, Turbine and Radwaste Buildings. The study data furnished consisted of new Reactor Building response spectra developed using a 0.15g SSE with a R.G. 1.60 ground response spectral shape with a control point in the free field at ground grade, a three dimensional finite

element model of the Reactor Building, soil structure interaction analysis, in accordance with the intent of the applicable guidance contained in NRC Standard Review Plan NUREG 0800 [Reference 9] Sections 3.7.1 and 3.7.2. Selected portions of the Reactor Building soil structure interaction (SSI) spectra developed as part of Reference 8 are included as Appendix G of this report. By comparison, the new spectra demonstrate the conservatism contained in the original Pilgrim design spectra. NRC concurred and modified their position to permit the design spectra for the Reactor, Turbine and Radwaste Buildings to be treated as " conservative design " spectra where they envelop the new spectra, i.e. above 4 Hz. Thus, the Pilgrim design response spectra contained in Specification C-114 was used for seismic demand screening purposes and treated as required by the GIP based on the characterization assigned by NRC review documented in their June 17, 1994 letter: Reevaluation of the Approach for Developing Floor Response Spectra for the Resolution of USI A-46 [Reference 5], is given in Table 3-1 below.

Table 3-1
Characterization of
BECo Specification C-114 Floor Spectra
Based on NRC Staff Review

Location	Characterization of Spec. C-114 Floor Spectra
Reactor Building	Conservative Design for items having fundamental frequency > 4 Hz, otherwise treat as Median Centered
Turbine Building	Conservative Design for items having fundamental frequency > 4 Hz, otherwise treat as Median Centered
Radwaste Building	Conservative Design for items having fundamental frequency > 4 Hz, otherwise treat as Median Centered
Emergency Diesel Generator Building	Median Centered
Intake Structure	Median Centered

4. Results of Screening Verification and Walkdown - Equipment Classes 0 Through 20

The purpose of this section is to describe the Screening Verification and Walkdown performed to verify the seismic adequacy of active mechanical and electrical equipment identified in the Pilgrim Station Safe Shutdown Equipment List (SSEL) Report [Reference 14]. The guidelines contained in this section were used to screen the equipment for seismic adequacy. If the equipment did not pass this screen, it was declared an outlier (see Section 8). Outlier Resolution, described in Section 9, is proposed to be accomplished by various means which may include:

1) more refined or sophisticated methods for verifying seismic adequacy,
2) equipment/anchorage modification,
3) review and refinement of the SSEL logic to eliminate the need for the item.

The SSEL contains a total of 1008 items. Of this total, 22 items are inherently rugged or are part of the NSSS and do not require further evaluation per the GIP. An additional 294 items are covered by the host SEWS per the Rule of the Box and another 47 items are Tanks and Heat Exchangers. The remaining 645 components have individual Screening Evaluation Work Sheets, and appear on the SVDS in Appendix A. Table 4-1 presents a summary of the screening verification results by equipment class. This table also includes the results for Tanks and Heat Exchangers (otherwise identified as Class 21) for completeness. For additional information on Tanks and Heat Exchangers see Section 6.

Table 4-1
Screening Verification Results by Equipment Class

Class	Equipment Name	Total SEWS	Acceptable	Outliers
0	Unclassified	10	0	10
1	Motor Control Centers	10	4	6
2	Low Voltage Switchgear	5	3	2
3	Medium Voltage Switchgear	2	1	1
4	Transformers	9	9	0
5	Horizontal Pumps	19	16	3
6	Vertical Pumps	12	7	5
7	Fluid-Operated Valves	84	82	2
8	Motor and Solenoid-Operated Valves	124	99	25
9	Fans	7	5	2
10	Air Handlers	64	20	44
11	Chillers	2	2	0
12	Air Compressors	2	1	1
13	Motor-Generators	0	0	0
14	Distribution Panels	21	20	1
15	Batteries on Racks	14	14	0
16	Battery Chargers and Inverters	3	3	0
17	Engine-Generators	2	2	0
18	Instruments on Racks	104	80	24
19	Temperature Sensors	60	50	10
20	I & C Panels and Cabinets	91	68	23
21	Tanks and Heat Exchangers	47	33	14
	TOTALS	692	519	173

4.1 Seismic Evaluation Guidelines

The procedure for performing the Screening Verification and Walkdown is based on the following four seismic screening guidelines, as defined in the GIP:

Seismic Capacity Compared to Seismic Demand - The seismic capacity of the equipment, based on earthquake experience data, generic seismic testing data, or equipment-specific seismic qualification data, should be greater than the seismic demand imposed on the equipment by the Safe Shutdown Earthquake (SSE).

Caveats - In order to use the seismic capacity defined by the earthquake experience Bounding Spectrum or the Generic Equipment Ruggedness Spectra (GERS), the equipment should be similar to the equipment in the earthquake experience equipment class or the generic seismic testing equipment class and also meet the intent of the specific caveats for that class of equipment. If equipment-specific seismic qualification data is used, then any specific restrictions or caveats for that qualification data apply instead.

Anchorage - The equipment anchorage capacity, installation, and stiffness should be adequate to withstand the seismic demand from the SSE at the equipment location.

Seismic Interaction - The effect of possible seismic spatial interactions with nearby equipment, systems, and structures should not cause the equipment to fail to perform its intended safe shutdown function.

The evaluation of equipment against each of these four screening guidelines at Pilgrim Station is based upon walkdown observations, calculations, and other supporting data.

4.1.1 *Seismic Capacity Vs. Demand Screening*

Pilgrim Station determined the seismic capacity of safe shutdown equipment using:

- Earthquake experience data with capacity defined by the Bounding Spectrum, or Reference Spectrum depending on the demand spectrum used,
- Generic Equipment Ruggedness Spectra, or
- Equipment-specific seismic qualification data.

The seismic demand for screening an item of equipment is chosen based on the equipment elevation relative to the ground grade, and its fundamental frequency. The ground spectrum was compared to the bounding spectrum for equipment within 40' of grade with an estimated fundamental frequency greater than 8 Hz. Alternatively, the IRS were compared to 1.5 times the Bounding Spectrum (i.e., reference spectrum). The GERS were used infrequently in the capacity vs. demand comparisons. Finally, newer, upgraded equipment that had been seismically qualified in accordance with the IEEE 344 Standard, 1975 Edition or later, was accepted based on this testing documentation and anchorage inspection and design calculations supplemented by a seismic interaction review by the Seismic Review Team (SRT).

For purposes of determining the 40 ' *Above Grade* elevation, effective grade for the site and/or each building must be determined. " Effective grade " at a nuclear plant is defined as the average elevation of the ground surrounding the building along its perimeter. Pilgrim Station effective grade is Elevation 23' (above mean sea level).

4.1.2 Caveat Compliance

The second screening guideline which must be satisfied to verify the seismic adequacy of an item of mechanical or electrical equipment is to confirm that the equipment meets the intent of the specific caveats for the equipment class. This review is necessary when the Bounding Spectrum or the GERS is used to represent the seismic capacity of an item of equipment. If equipment-specific seismic qualification data is used instead, then only the specific restrictions applicable to that equipment-specific qualification data need be applied.

Another aspect of verifying the seismic adequacy of equipment included within the scope of this procedure is explained by the " rule of the box ". For major items included in equipment class, all of the individual components mounted on or in this item are considered to be part of that equipment and do not have to be evaluated separately. However, the walkdown engineers did look for suspicious details or uncommon situations which could make individual components vulnerable.

" Caveats " are defined as the set of inclusion and exclusion rules which represent specific characteristics and features particularly important for seismic adequacy of a particular class of equipment. Appendix B of the GIP contains a summary of the caveats for the earthquake experience equipment class and for the generic seismic testing equipment class.

Engineering judgment is used to determine whether the specific seismic concern addressed by the caveat is met. Each item of equipment was evaluated to determine whether it meets the specific wording of the applicable caveats and/or their " intent ". However, if an item of equipment meets the " intent " of the caveats, but not the specific wording, that item is considered to have met the caveat. These cases are reported in Section 5 of this report.

4.1.3 Anchorage Adequacy

The screening approach for verifying the seismic adequacy of equipment anchorage is based upon a combination of inspections, analyses, and engineering judgment. Inspections consist of measurements and visual evaluations of the equipment and its anchorage, supplemented by use of plant documentation and drawings. Analyses compare the anchorage capacity to the seismic loading (demand) imposed upon the anchorage. These analyses were done using the guidelines in Section 4 and Appendix C of the GIP. Engineering judgment is also an important element in the evaluation of equipment anchorage. As a general rule, all significantly sized equipment was rigorously analyzed to determine anchor bolt forces. Small equipment, weighing usually 50 pounds or less, was accepted based on judgement if a comparison of estimated anchor bolt forces and the size and strength of the as-found anchorages indicated that sufficient anchorage strength existed.

The four main steps used to evaluate seismic adequacy of equipment anchorages at Pilgrim Station followed the guidance of the GIP and are shown below:

- Anchorage Installation Inspection
- Anchorage Capacity Determination
- Seismic Demand Determination
- Comparison of Capacity to Demand

The first main step in evaluating the seismic adequacy of anchorages is to check the anchorage installation and its connection to the base of the equipment. This inspection consists of visual checks and measurements along with a review of plant documentation and drawings where necessary, and an anchor bolt tightness and embedment check for anchorages utilizing concrete expansion anchors.

All accessible anchorages were visually inspected. A check of the following equipment anchorage attributes was made:

1. Equipment Characteristics
2. Type of Anchorage
3. Size and Location of Anchorage
4. Installation Adequacy
5. Embedment Length
6. Gap at Threaded Anchors
7. Spacing Between Anchorages
8. Edge Distance
9. Concrete Strength and Condition
10. Concrete Crack Locations and Sizes
11. Essential Relays in Cabinets
12. Equipment Base Stiffness/Prying Action
13. Equipment Base Strength/Structural Load Path
14. Embedment Steel and Pads

The predominant expansion anchor type at Pilgrim Station as part of the original construction and through approximately 1982 is the Phillips RedHead shell anchor. Wej-it wedge anchors have also been identified to a more limited extent [Reference 16]. During the period when modifications were being made for I&E Bulletins Nos. 79-02, 79-14 and 80-11, Boston Edison adopted the Hilti Kwik Bolt and Sleeve Anchor as its standard expansion anchors for reinforced concrete and masonry respectively. During this period the Parabolt wedge anchor was also specified for selected applications.

For the installation adequacy review of all accessible expansion anchors, a tightness check or a tug test was performed to detect gross installation defects (such as oversized concrete holes, total lack of preload, loose nuts, damaged subsurface concrete, and missing plug for shell types) which would leave the anchor loose in the hole. The tightness check for expansion anchors was accomplished either by the use of a calibrated torque wrench or by applying a torque to the anchor by hand to confirm the anchor was " wrench tight ". If the anchor bolt or nut rotates less than about ¼ turn, then the anchor is considered tight. A tightness check or tug test was performed on all accessible expansion anchors for equipment. The tug test simply involves pulling on the device (say, a wall-mounted transmitter) with a force exerted by the SCE to confirm that the anchorage is tight and free from gross installation defects. In a limited number of instances the installation adequacy review identified outlier bolts. These bolts were repaired or discounted during the capacity/demand review. In addition, a random embedment spot check on selected shell anchors was performed to ensure that the shell and equipment base were not in contact so as to invalidate the results of the tightness check.

The second main step in evaluating the seismic adequacy of anchorages is to determine the allowable capacity of anchors used to secure an item of equipment. The allowable capacity is obtained by multiplying the nominal allowable capacities by the applicable capacity reduction factors using formulas presented in Chapter 4 of the GIP. The nominal capacities and reduction factors are obtained from Appendix C of the GIP based on the results of the

anchorage installation inspection checks. The nominal allowable capacities incorporate a design safety factor of 3 between the ultimate and allowable (working) capacities.

Pullout and shear capacities for anchors are based on having adequate stiffness in the base of the equipment and on not applying significant prying action to the anchor. If Check 12, Base Stiffness and Prying Action, from Part II, Chapter 4 of the GIP shows that stiffness is not adequate or that significant prying action is applied to the anchors, then the Seismic Capability Engineers lowered the allowable capacity loads accordingly.

The third step in evaluating the anchorages is to determine the seismic demand imposed on the equipment. The demand load is established based on the type of demand spectrum used. If IRS are used, additional factors of conservatism may be applied to establish the demand load. This is necessary since the IRS are characterized as either " conservative design or median centered" depending on equipment frequency and the building in which the equipment is located. The details of spectra characterization for seismic screening purposes may be found in Section 3.3. The demand load is the product of the appropriate spectral acceleration value times the weight of the equipment item. Table C.1-1 of the GIP is used, in general, to establish the fundamental frequency and equipment damping for the given classes of equipment. If the item is deemed rigid, the zero period acceleration (ZPA) is used. If the item is deemed flexible, the peak of the response spectrum may be used for initial screening. If the fundamental frequency is estimated or calculated, then the largest spectral acceleration in the range from that estimated frequency to the ZPA is used.

The fourth and final step to complete the anchorage adequacy evaluation compares the seismic demand to the anchorage capacity. If the demand is less than the capacity, the anchorage is acceptable; otherwise, the equipment item is declared an outlier.

4.1.4 Seismic Interaction Checks

The fourth and final screening guideline used to verify the seismic adequacy of an item of mechanical or electrical equipment was to confirm no adverse seismic spatial interactions with nearby equipment, systems, and structures which could cause the equipment to fail to perform its intended safe shutdown function. The interactions of concern are (1) proximity effects, (2) structural failure and falling, and (3) flexibility of attached lines and cables. Guidelines for judging interaction effects when verifying the seismic adequacy of equipment are presented in Appendix D of the GIP.

During the plant walkdowns at Pilgrim Station, the SRTs identified a number of localized interaction concerns which were classified as outliers. These outliers and potential methods for resolution are discussed in detail in Sections 8 and 9.

Overhead piping systems and ductwork were observed in plant areas containing USI A-46 equipment during the walkdowns. As a result, the SRTs identified four ductwork vulnerabilities and noted the systems were otherwise well supported. Refer to Outliers O11, O23, O53 and O59 for additional information.

4.2 Outlier Resolution

An outlier is defined as an item of equipment which does not meet the screening guidelines previously noted. An outlier may be shown to be adequate for seismic loading by performing

additional evaluations. These additional evaluations and alternate methods will be documented.

4.3 Seismic Capability Engineers and Peer Reviewer

The station walkdowns were conducted during a combination of on-line and outage plant conditions during the 1992 to 1996 time frame. The Seismic Capability Engineers for the Pilgrim Station walkdown were Messrs. W. Djordjevic, J. O'Sullivan and T. Tracy of Stevenson and Associates (S&A); and Messrs. W.R. Kline, J.G. Dyckman, J.A. Kalb, S.C. Chugh and C.T. Pitts of Boston Edison Company. All have been SQUG trained and certified. Their resumes are provided in Appendix C.

An independent evaluation and peer review of the walkdown process was performed by Dr. John Stevenson of S&A during August 1994. As required by the GIP, the review included an assessment of the walkdown and analyses by audit and sampling to identify any errors. Dr. Stevenson conducted a one day walkdown to ascertain completeness and correctness of the USI A-46 walkdown. His review included comparing completed SEWS with equipment previously inspected by the SRTs. Dr. Stevenson also reviewed the documentation packages the SRTs used to determine equipment design details that could not be readily determined by walkdown. Dr. Stevenson concluded that the walkdowns were being conducted competently and the findings made were appropriate. Appendix E provides documentation of Dr. Stevenson's peer review and BECo's resolution of peer review comments requiring action.

4.4 Other Types of Seismic Evaluations and Interfaces

In addition to the seismic evaluations covered in this section for active mechanical and electrical equipment, seismic evaluations for two other types of equipment are covered in other sections as follows:

- Section 6 - Tanks and Heat Exchangers Review
- Section 7 - Cable and Conduit Raceways Review

A separate Relay Evaluation Report has been prepared to document the results of the relay functionality review required in Section 6 of the GIP. A list of SSEL cabinets and panels containing essential relays is given in Appendix B.

While these other seismic evaluations can generally be performed independently from those for active mechanical and electrical equipment, there are a few areas where an interface with the Relay Functionality Review is appropriate:

- Any cabinets containing essential relays, as determined by the relay review, are evaluated for seismic adequacy using the guidelines contained in this section.
- A capacity reduction factor is applied to expansion anchor bolts which secure cabinets containing essential relays. The capacity reduction factor is discussed in Section 4.4 and Appendix C of the GIP.
- Seismic interaction, including bumping which does not cause damage, is not allowed on cabinets containing essential relays. This limitation is discussed in Section 4.5 of the GIP.

- In-cabinet amplification factors for cabinets containing essential relays have been estimated, using the guidelines in Section 6 of the GIP, by the Seismic Capability Engineers for use in the Relay Functionality Review.

4.5 Documentation

Pilgrim Station summarized the results of the equipment Screening Verification and Walkdown in the Screening Verification Data Sheets (SVDS) contained in Appendix D. Complete review information for each piece of equipment may be found in the Screening Evaluation Work Sheets (SEWS) which are maintained in the project file. The project file also contains the SEWS for Class 21 equipment, Heat Exchangers and Tanks, and Plant Area Summary Sheets (PASS) for the Cable Tray & Conduit Raceway Reviews.

5. GIP Deviations and Commentary on Meeting The Intent of Caveats

No programmatic or significant deviations from the GIP were taken while performing the walkdowns and seismic adequacy evaluations at Pilgrim Station for resolution of USI A-46. Interpretations were made with respect to the wording of the GIP caveats versus the caveat's intent. This section lists the bases for SRT conclusions that the intent of an affected caveat has been met. All other equipment not listed in this table met the caveat rules as stated in the GIP or was declared to be an outlier.

Table 5-1
Commentary Regarding GIP Equipment
Meeting the Intent of the Caveats

ID	Class	Caveat	Comments
B10, B14, B15, B17, B18, B20	1	Bounding Spectrum - 1	These MCC's are 15" deep and do not have structural top bracing. Inclusion in the experience database requires bracing for MCC's narrower than 18". These MCC's were seismically tested to criteria which predates IEEE 344-75. The seismic test has been reviewed and found to be as severe as an IEEE344-75 test thus meeting the intent of this caveat.
P205, X203	5	Bounding Spectrum - 2	The pump (P205) and turbine (X203) are on different skids supported on a common concrete pedestal. Therefore, there is no potential for differential movement between pump and driver, so the intent of this caveat is met.
AO1301-12, AO1301-34	7	Bounding Spectrum - 7	The yoke and valve body are both supported, but not independently, meeting the intent of the caveat.
PSV4020 PSV4563A PSV4563B PSV4563C PSV4565A PSV4565B PSV4582A PSV4582B PSV4582C PSV4582D RV9085A RV9085B RV9085C RV9085D RV9085E RV9085F RV9085G RV9085H	7	Bounding Spectrum - 4	The pipe diameter for all of these valves is ¾" which is less than the minimum 1" diameter required by the caveat. All of these valves are lightweight, and the SRT judged them seismically acceptable on the pipe diameter. The PSV series valves weigh less than 10 lb., and the RV series weigh 2.5 lb.

MO1001-36A MO1001-36B MO1201-5 MO1301-49	8	Bounding Spectrum - 5	These motor operated valves exceed the weight limits of Figure B.8-1. The valve weight and operator cantilever length meet the intent of the caveat using the methodology of GIP Rev 2A which allows the operator weight or length to exceed the Figure B.8-1 by up to 30% provided that the product of the weight times the length does not exceed the limits of Figure B.8-1.
MO3800 MO3801 MO3805 MO3806 MO3808 MO3813 MO4083 MO4084	8	Bounding Spectrum - 3	These motor operated valves have cast iron valve actuator support brackets. A stress analysis of the yokes determined that the stresses all fall below 20% of the minimum ultimate strength which meets the intent of the caveat.
VAC205A-1 VAC205D-1	10	Bounding Spectrum - 5	VAC205A-1 and VAC205D-1 are installed in line. Vibration isolators that are under the supports, are unhoused and unconfined. The duct is so well supported that the SRT judged that the fan will not displace. Therefore, the isolator springs are judged to meet the intent of the caveat.
D16, D17	14	Bounding Spectrum - 1	D16 and D17 contain relays, but all of the relays have been evaluated as non-essential. D16 and D17 therefore meet the intent of the caveat.
MO202-5A MO202-5B	8	Bounding Spectrum - 5	The operator weight, the offset and the pipe diameter exceed the limits of Table B8.1. The intent of the caveat is met based on vendor qualification which demonstrates the structural integrity of the valve and its parts for the seismic plus rated load condition.
MO2301-4	8	Bounding Spectrum - 5	This motor operated valve exceeds the weight limits of Figure B.8-1. The intent of the caveat is met based on vendor qualification which demonstrates the structural integrity of the valve and its parts for the seismic plus rated load condition.

6. Results of the Tanks and Heat Exchanger Review

The screening evaluations described in this section for verifying the seismic adequacy of Class 21 tanks and heat exchangers include those generic features which experience has shown can be vulnerable to seismic loading. The evaluations include the following features:

- Check that the shell of large, flat-bottom, vertical tanks will not buckle. Loading on these types of tanks include the effects of hydrodynamic loading and tank wall flexibility.
- Check that the component anchor bolts and their embedments have adequate strength against breakage and pullout.
- Check that the anchorage connection between the anchor bolts and the component shell (e.g., saddles, legs, chairs, etc.) have adequate strength.
- Check that the attached piping has adequate flexibility to accommodate the motion of large, flat-bottom, vertical tanks.

The Seismic Capability Engineers reviewed each component to verify it met the intent of Section 7 of the GIP. The review consisted of a walkdown and an initial evaluation using the step-by-step screening guidelines. The objective of the walkdown was to confirm as-found conditions to be used during the step-by-step screening, to identify for evaluation any potentially unacceptable spatial interactions or degraded conditions, to inspect anchorage connections and anchor bolt installations, and to determine the need to consider the effect of piping nozzle reactions on load path stresses. Review results are documented in the SEWS for each component.

The types of loading and analysis methods described in Section 7 of the GIP for tanks and heat exchangers were developed specifically for: (1) large, flat-bottom, cylindrical, vertical, storage tanks; and (2) horizontal cylindrical tanks and heat exchangers with support saddles made of plates. Class 21 items outside the bounds of the parameters and assumptions in GIP Table 7-1 (vertical tanks) or Table 7-6 (horizontal tanks and heat exchangers) for applicability of the step-by-step screening, were reviewed by component-specific evaluations. Such items were not immediately classified as outliers if they were smaller in size than the generic parameters (See Table 6-1, items 1, 17, 18, 20, 21, 22 and 23). In general, component-specific evaluations were performed using an approach similar to the one contained in EPRI NP-5228-SL, Rev. 1, Vol. 4, entitled " Guidelines for Tanks and Heat Exchangers " [Reference 19], as applicable. Review results are documented in the component SEWS, and any supporting calculations are referenced in the SEWS Comments section.

The results of the tank and heat exchanger evaluations are summarized in Table 6-1. When outlier conditions were identified during the course of the initial evaluation, component-specific evaluations were performed to address them. All outlier conditions were resolved by these evaluations. Components were formally designated to be outliers, or to have outlier conditions, under the following circumstances:

- The item did not satisfy the parameters and assumptions for applicability of the step-by-step screening and it is larger than the minimum size parameters, or,
- The step-by-step screening evaluation was applicable and the initial results did not satisfy the guideline requirements.

Table 6-1
Tank & Heat Exchanger Evaluation Results

No.	ID	Description	Type	Screening Result and Resolution
1	CONPOT	HPCI Exhaust Drain Line Pot	0.83'R vertical tank with legs	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
2	305-125	RPS N2/Water Accumulator	small accumulator	**Acceptable** - Rule-of-the-box with HCUs
3	305-128	RPS Scram Wtr Accumulator	small accumulator	**Acceptable** - Rule-of-the-box with HCUs
4	E122A&B	TBCCW Heat Exchangers	3'D horizontal heat exchangers	**Outlier** - Anchorage capacity < demand. **Resolved** by component-specific evaluation
5	E204	RCIC Turbine Lube Oil Cooler	very small unit	**Acceptable** - Rule-of-the-box with X202
6	E205	HPCI Turbine Lube Oil Cooler	very small unit	**Acceptable** - Rule-of-the-box with X203
7	E206A&B	Fuel Pool Cooling Heat Exchangers	1.06'D horizontal heat exchangers	**Outlier** - Anchorage capacity < demand. **Resolved** by component-specific evaluation
8	E207A&B	RHR Heat Exchangers	1.86'R vertical heat exchangers	**Outlier** - GIP Tables 7-1 & 7-6 not applicable. **Resolved** by component-specific evaluation
9	E209A&B	RBCCW Heat Exchangers	4.25'D horizontal heat exchangers	**Outlier** - As-built baseplate anomalies & anchorage capacity < demand **Resolved** by component-specific evaluation & design change modification (FRN 95-01-60)
10	E211A&B	RBCCW Recirc. MG Set Oil Cooler	1.67'D horizontal heat exchangers	**Acceptable** - Meets GIP 7.4.2
11	E212A&B	CRD Pump Oil Coolers	very small unit	**Acceptable** - Rule-of-the-box with P209
12	E213A&B	RBCCW Recirc. Pmp Seal Wtr Clr	internal to Recirc Pump	**Acceptable** - Rule-of-the-box with Recir. Pump (NSSS component)
13	E214A&B	RBCCW Recirc. Pmp Lube Oil Clr	internal to Recirc Pump	**Acceptable** - Rule-of-the-box with Recirc. Pump (NSSS component)
14	E216A&B	RWCU Heat Exchangers	1.06'D horizontal heat exchangers	**Outlier** - GIP Tables 7-6 not applicable. **Resolved** by component-specific evaluation
15	T124A&B	DG Day Tanks	4'D horizontal tank	**Acceptable** - Meets GIP 7.4.2
16	T126A&B	DG Main Storage Tanks	10.5'D horizontal buried tank	**Outlier** - GIP Table 7-6 not applicable **Resolved** - Component-specific evaluation
17	T146A,B,C&D	DG Air Start Receiver Tanks	1.5'R vert tank on support stand	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
18	T150A,B,C&D	DG Turbo Air Receiver Tanks	1.5'R vert tank on support stand	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
19	T151A&B	DG Turbo Air Receiver Tanks	4'D horizontal tank	**Outlier** - GIP Table 7-6 not applicable. **Resolved** by component-specific evaluation.
20	T201A&B	RBCCW Surge Tank	2'R vertical tank	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
21	T220 A,B,C&D	Steamline Isol Vlv Air Accumulator	0.58'R vert tank on support stand	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
22	T220 E,F,G&H	Steamline Isol Vlv Air Accumulator	0.58'R vert tank on support stand	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)
23	T221A,B,C&D	ADS Nitrogen Accumulator	0.58'R vert tank on support stand	**Acceptable** - Component-specific evaluation (GIP Table 7-1 not applicable)

7. Results of the Cable Tray and Conduit Raceway Review

The results of the Cable Tray and Conduit Review may be found in a stand alone report which is included as Appendix F of this report.

8. Description of Outliers

This section discusses the outliers identified during the USI A-46 walkdowns conducted at Pilgrim Station. The outliers are a result of equipment reviews, tanks & heat exchanger reviews and cable tray and conduit raceway reviews. Relay outliers are discussed in the Relay Evaluation Report for Resolution of USI A-46 [Reference 15]. Section 9 provides a discussion of the disposition or corrective action, as appropriate, for each remaining outlier discussed below and also for the single remaining conduit and cable tray outlier.

An outlier is an item of equipment which does not comply with all of the screening guidelines provided in the GIP. The GIP guidelines are intended to be used as a generic basis for a preliminary screening evaluation of the seismic adequacy of equipment. If an item of equipment fails to pass these generic screens, it may still be shown to be adequate by additional evaluations. Most outlier conditions are minor items which were not considered to be nonconforming or degraded and did not present a concern for equipment operability. Supporting comments regarding STR judgments, safety implications and operability concerns are contained in the outlier summaries that follow.

As part of the SEWS review process, Boston Edison used pertinent design basis information along with engineering judgment to determine if any outlier condition could be considered nonconforming or degraded, or otherwise warranting further review to confirm equipment operability. In a few instances, outlier conditions were identified that were nonconforming or degraded, and a corrective action process document known as a Problem Report was initiated to cause the appropriate steps to be taken to conform to regulatory requirements. Outliers O23, O56 and O58 are examples of this situation. Sometimes during the screening evaluation, nonconforming or degraded conditions were not found, however the SRT never-the-less judged it to be prudent to perform further reviews to establish whether an outlier condition could be an operability concern. The extent of these reviews varied depending on the specific outlier condition. In the case of some of the heat exchangers, formal calculations were prepared to confirm conformance to design basis requirements. Outliers O54 through O57 are examples, and these efforts resulted in outlier resolution.

8.1 General Interaction Issues

Three instances of potential seismic interaction issues that are not specifically addressed by the GIP were observed in the plant by the Peer Reviewer. These issues involve design details that have a potential to affect USI A-46 equipment. These general interaction issues and the action required to verify that they are not a concern for USI A-46 equipment are discussed below.

G1. **Finding(s)**: In a few instances, chains that appeared to be smaller than the generally used chain size were observed supporting overhead lights. The peer review recommended that this concern be evaluated and that any light support chains of less than sufficient capacity be replaced.
Status: Open. To be addressed during the outlier resolution phase.

G2. **Finding(s)**: In the Reactor Building, a gas bottle was observed to be secured with a single horizontal chain. The peer review recommended that as a minimum a horizontal chain at two locations or a bottom restraint shoe combined with a single chain at partial height are required to secure compressed gas bottles for seismic loading conditions.
Status: Open. To be addressed during the outlier resolution phase.

G3. **Finding(s)**: In a few instances, fire extinguishers were observed to have supporting brackets with restraining tabs which might not prevent the fire extinguisher from slipping off the bracket during an earthquake, being damaged and becoming a missile which could potentially damage plant equipment.
Status: Open. To be addressed during the outlier resolution phase.

8.2 Equipment, Tank, Heat Exchanger, Cable Tray and Conduit Outliers:

A total of 183 outliers were identified during the seismic verification walkdowns and analytical reviews. This total includes 182 pieces of mechanical and electrical equipment including the tanks and heat exchangers. In addition, the single conduit and cable tray outlier is also included in this section. 29 of the 183 outliers were added to the SSEL after the last plant outage and are located in areas that are not accessible during power operation. These 29 outliers do not have known deficiencies but have been classified as outliers pending successful completion of a walkdown during the next plant outage.

The 182 component outliers plus the single conduit and cable tray outlier are combined into 67 groups of similar outlier type. They are discussed below.

O1. **Equipment ID:** T214A & T214B
Outlier Finding(s): RBCCW shielded sample chambers T214A & T214B are Class 0 items. As a result, their capacity cannot be established by the GIP. In addition they are anchored by friction clips which are not a recognized form of anchorage according to the GIP.
Safety Implications: No. The existing anchorage is substantial. Capacity will be established by additional evaluation and is expected to be adequate.
Outlier Status: Open

O2 **Equipment ID:** PSD-68 and PSD1301-9,
Outlier Finding(s): PSD-68, the HPCI Turbine Exhaust Rupture Disk and PSD1301-9, the RCIC Exhaust Line Rupture Disk are Class 0 items. As a result, their capacity cannot be established by the GIP.
Outlier Status: Resolved. The rupture disks are in-line devices in a seismically supported piping system. They are bolted between flanges

and, thus, are not subjected to external mechanical load. The rupture disks are seismically adequate based on SRT review and judgment.

O3 **Equipment ID:** ST1301-2, ST1301-3, ST2301-5 & ST2301-6
Outlier Finding(s): RCIC steam traps ST1301-2 & ST1301-3 and HPCI steam traps ST2301-5 & ST2301-6 are Class 0 items. As a result their capacity cannot be established by the GIP.
Outlier Status: Resolved. The steam traps are in-line devices in a seismically supported piping system. They are rugged valve like steel castings. The steam traps are seismically adequate based on SRT review and judgment.

O4 **Equipment ID:** HCU-EAST and HCU-WEST
Outlier Finding(s): These components are the control rod drive hydraulic control units located on the east and west sides of the Reactor Building. They are Class 0 items. As a result their capacity cannot be established by the GIP and they are outliers. Their anchorage type is also a GIP outlier.
Outlier Status: Resolved. The HCUs and their anchorage have been verified by alternate methods as discussed in Section 9.3.

O5 **Equipment ID:** MCC B10
Outlier Finding(s): Demand per Conservative IRS exceeds seismic capacity.
Safety Implications: No. Additional evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O6 **Equipment ID:** MCC's B17, B20, D7 and D10
Outlier Finding(s): MCC's have spatial interactions with the MCC enclosures.
Safety Implications: No. The spatial interaction will not result in damage to the MCC's. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O7 **Equipment ID:** MCC D8
Outlier Finding(s): MCC D8 has 2 loose cabinet to base channel bolts at the front of the 2nd to 3rd sections. These loose bolts are a relay and load path concern. The MCC is an outlier for this reason.
Outlier Status: Resolved. Bolts tightened per MR19301573 on 7/19/93.

O8 **Equipment ID:** Switchgear B1
Outlier Finding(s): 480V Switchgear B1 does not have front anchorage. Uplift is not a concern but distortion may degrade switchgear capacity. B1 also has a spatial interaction with a cable tray.

Safety Implications: No. The switchgear anchorage is adequate for uplift and shear. The spatial interaction will not result in damage to the switchgear. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O9 **Equipment ID:** Switchgear B3
Outlier Finding(s): 480V Switchgear B3 will not be denergized until Refueling Outage 11 in April 1997 and as a result was not accessible due to electrical safety concerns. Anchor bolt tightness could not be performed. Internal inspection including anchor bolt checks must be done. The switchgear is an outlier for these reasons.
Safety Implications: No.
Outlier Status: Open

O10 **Equipment ID:** Switchgear A6
Outlier Finding(s): 4160V Switchgear A6 has three spatial interactions with cable tray and conduit.
Safety Implications: No. The spatial interaction will not result in damage to the switchgear. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O11 **Equipment ID:** Pumps P202A, P202B & P202C
Outlier Finding(s): RBCCW Pumps P202A, P202B & P202C have a potential interaction hazard with a ventilation duct located above which has an unusual support system.
Safety Implications: No. Further evaluation of the duct supports is expected to demonstrate that they are acceptable.
Outlier Status: Open

O12 **Equipment ID:** Pumps P208A, P208B, P208C, P208D & P208E
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity. The pumps also do not satisfy the column length caveats.
Safety Implications: No. Vendor qualification analysis is on file for the pumps. The outlier is a GIP screening issue and is expected to be resolved by review of the vendor analysis.
Outlier Status: Open

O13 **Equipment ID:** CV302-22B & CV302-24B
Outlier Finding(s): Control valves CV302-22B & CV302-24B have an interaction concern with an overhead light on open S-Hook which could fall and impact an air supply line to the valve.
Outlier Status: Resolved. S-hook fixed per MR19600726 0n 3/37/96.

O14 **Equipment ID:** MO1400-24A & MO1400-24B
Outlier Finding(s): Motor operated valves do not meet the GIP screening criteria.
Safety Implications: No. Vendor qualification analysis is on file for the valves. The outlier is a GIP screening issue and is expected to be resolved by review of the vendor analysis.
Outlier Status: Open

O15 **Equipment ID:** MO1400-25A & MO1400-25B
Outlier Finding(s): Motor operated valves do not meet the GIP screening criteria.
Safety Implications: No. Vendor qualification analysis is on file for the valves. The outlier is a GIP screening issue and is expected to be resolved by review of the vendor analysis.
Outlier Status: Open

O16 **Equipment ID:** MO1400-4B
Outlier Finding(s): Motor operated valve MO1400-4B has a potential interaction involving the handwheel and motor casing and an adjacent platform.
Safety Implications: No. MOV operability is not affected by the potential interference however preferred practice is to provide adequate clearance.
Outlier Status: Open

O17 **Equipment ID:** VEX104A-BDD & VEX104B-BDD
Outlier Finding(s): Ventilation backdraft dampers VEX104A-BDD & VEX104B-BDD are degraded and broken.
Operability Concern: The operability impact on Intake Structure ventilation could not be determined at the time of initial walkdown and screening. Problem Report PR93.9245 was written to address the potential operability impact on safety related ventilation. It was subsequently determined that there was no operability issue.
Outlier Status: Resolved. A design change made by Field Revision Notice (FRN) 96-01-18 was issued to remove these back draft dampers from the ventilation system. As a result they have been deleted from the SSEL and are no longer classified as A46 equipment.

O18 **Equipment ID:** VSF-103A & VSF-103B
Outlier Finding(s): CRHEAFS supply fans VSF-103A & VSF-103B drive motor and fan are not mounted on a common base and are supported by rubber vibration isolators.
Safety Implications: No. The fan and motor are of small size and weight and the supports are substantial.
Outlier Status: Open

O19 **Equipment ID:** AOX1, AOX3, AOX4, AOX6, VSF103A-BDD and VSF103B-BDD
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity for CRHEAFS dampers AOX1, AOX3, AOX4, AOX6, VSF103A-BDD and VSF103B-BDD.
Safety Implications: No. Further evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O20 **Equipment ID:** VAC-201A, VAC-201B, VAC-202A, VAC-202B, VAC-203A, VAC-203B, VAC-204A, VAC-204B, VAC-204C, VAC-204D, VAC207A, VAC207B, VAC207C & VAC207D and drywell equipment area coolers VAC205B-1, VAC205B-2, VAC205C-1 & VAC205C-1
Outlier Finding(s): Equipment area coolers and drywell equipment area coolers are supported by vibration isolators. The capacity of the base mounting on these components is not documented in existing records.
Safety Implications: No. Additional evaluation of the base design details on these components is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O21 **Equipment ID:** VAC204A-BDD & VAC204B-BDD
Outlier Finding(s): Equipment area cooler back draft dampers VAC204A-BDD & VAC204B-BDD are supported on structural steel in an unconventional manner. They could be postulated to slide.
Safety Implications: No. Additional evaluation of the support details is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O22 **Equipment ID:** VCRF-101A & VCRF-101B
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity for CRHEAFS Filter Heaters VCRF-101A & VCRF-101B.
Safety Implications: No. Additional evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O23 **Equipment ID:** VD206A, VD206B, VD206C & VD206D
Outlier Finding(s): The ductwork plenums connected to the duct supporting dampers VD206A, VD206B, VD206C & VD206D have potential seismic interactions with a pressurized water filled ½" dia. wet pilot line for the Pilotex spray nozzles which are part of the fire protection system for the Diesel Generators. A broken wet pilot line may be a spray hazard which could affect the diesel generators. Limited degradation of the plenum wall base anchorage in one instance and two instances of degraded plenum hangers were also observed.
Operability Concern: Yes. The SRT considered the spray hazard to be a potential operability concern for the diesel generators and initiated Problem Report PR95.9494 to address the concern. It was determined

that the piping would maintain its integrity and as a result, operability of the diesel generators is not a concern. The results of this review are documented in PR95.9494.02. The limited degradation of the plenum wall base anchorage and two instances of degraded plenum hangers were not considered to have safety implications based on the walkdown observations of the plenum configuration and anchorage. See Section 9 for additional information.
Outlier Status: Open

O24 **Equipment ID:** K103A
Outlier Finding(s): Diesel Generator A Air Start Compressor K103A has a potential interaction hazard with an open S-hook on a overhead florescent light fixture.
Outlier Status: Resolved. Open S-hook closed per MR19600726 on 3/27/96.

O25 **Equipment ID:** D36
Outlier Finding(s): Panel D36 is an outlier because it is mounted to a block wall. The GIP only covers anchors installed in structural concrete.
Outlier Status: Resolved. Panel anchorage was determined to be adequate by the SRT.

O26 **Equipment ID:** C2205A & C2205B
Outlier Finding(s): Reactor Protection (RPS) and NSSS Instrument Racks C2205A & C2205B have potential interaction hazards involving :
1) an overhead light with an open S hook,
2) a nearby scaffold and
3) an equipment cage that requires additional bracing.
Safety Implications: No. In the judgment of the SRT, RPS Racks C2205A & C2205B would not be damaged or degraded by the potential seismic interaction. The interaction will be addressed during the outlier resolution phase.
Outlier Status: As indicated below. See Section 9 for details.
1) close open light S-hook, **Resolved** by MR19600726 on 3/27/96
2) remove nearby scaffold, **Open**
3) add additional bracing to equipment cage, **Open**

O27 **Equipment ID:** C2206A & C2206B
Outlier Finding(s): Reactor Protection and NSSS Instrument Racks C2206A & C2206B have a potential interaction hazard involving an overhead light with an open S-hook.
Outlier Status: Resolved. Open S-hook closed per MR19600726 on 3/27/96.

O28 **Equipment ID:** C2250A & C2250B
Outlier Finding(s): HPCI Instrument Rack C2250A & C2250B have a potential interaction hazard involving a nearby cart on wheels that may impact the rack.

Safety Implications: No. The HPCI Instrument Rack C2250A & C2250B would not be damaged or degraded by the potential seismic interaction. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O29 **Equipment ID:** C2251A & C2251B
Outlier Finding(s): Jet Pump Instrument Racks C2251A & C2251B have potential interaction hazards involving an overhead light with an open S-hook.
Outlier Status: Resolved. Open S-hook closed per MR19600726 on 3/27/96.

O30 **Equipment ID:** C2252A & C2252B
Outlier Finding(s): Jet Pump Instrument Racks C2252A & C2252B have a potential spatial interaction hazard between C2252A and adjacent rack C2204. There is no gap and the racks are not bolted together.
Safety Implications: No. The spatial interaction will not damage the racks. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O31 **Equipment ID:** C83
Outlier Finding(s): Rack C83 contains SSEL switches LS3502B and LS3507B which are mercury switches. These switches are considered chatter prone per the GIP.
Outlier Status: Resolved. Switches LS3503B and LS3508B are classified as 'Seismic Review Only' per the SSEL because the pressure boundary should remain intact for proper functioning of level instruments that share the same instrument line. Chatter due to these switches is acceptable. Their use is therefore of no consequence.

O32 **Equipment ID:** FSE-101 & FSE-102
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity for these small and rugged CRHEAFS flow switches.
Safety Implications: No. Additional evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O33 **Equipment ID:** LS2351A
Outlier Finding(s): Level switch LS2351A has a potential interaction hazard with adjacent instrument 9-LS-5066.
Safety Implications: No. The level switch will not be damaged by the potential interaction. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O34 **Equipment ID:** RHS-1A & RHS-1B
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity for these small and rugged CRHEAFS switches.
Safety Implications: No. Additional evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O35 **Equipment ID:** TS1A, TS1B, TS2A, TS2B, TS3A, TS3B, TS4A & TS4B
Outlier Finding(s): Demand per Conservative IRS exceeds Capacity for these small and rugged CRHEAFS switches.
Safety Implications: No. Additional evaluation is expected to demonstrate that capacity exceeds demand.
Outlier Status: Open

O36 **Equipment ID:** TSD45 & TSD46
Outlier Finding(s): Equipment area cooler controls TSD45 & TSD46 are located below unsecured grating which is an interaction hazard for the controls.
Safety Implications: No. Grating details will be revised. See Section 9 for details.
Outlier Status: Open

O37 **Equipment ID:** C103A, C103B & C103C
Outlier Finding(s): Diesel Generator A Control Panels C103A, C103B & C103C have a spatial interaction with a conduit exiting the cabinet roof that is in contact with a wall bracket. There is also a rod hung 1" fire pipe that can swing into the conduit. Diesel Generator A Control Panels C103A, C103B & C103C are rugged and would not be damaged or degraded by the potential interaction hazard.
Safety Implications: No. The spatial interaction will not damage the panels. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O38 **Equipment ID:** C110
Outlier Finding(s): Diesel Generator A Pump Control Panel C110 is an outlier because it is anchored to a block wall. The wall is safety-related however the GIP does not cover anchors installed in block walls.
Safety Implications: No. Additional evaluation is expected to demonstrate that the anchorage is adequate.
Outlier Status: Open

O39 **Equipment ID:** C2228-A1, C2228-A2, C2229-B1, C2229-B2
Outlier Finding(s): RPS Analog Trip Cabinets C2228-A1, C2228-A2, C2229-B1, C2229-B2 have spatial interactions with the conduit entry box on the cabinet roofs because it is fastened to exterior framing and not to the cabinets and could impact the cabinets.

Safety Implications: No. The spatial interaction will not damage the cabinets. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O40 **Equipment ID:** C2233B

Outlier Finding(s): Analog Trip System Cabinet C2233B has a potential spatial interaction with an overhead light that might swing and hit the cabinet. This a relay concern.
Safety Implications: No. The spatial interaction will not damage the cabinet. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O41 **Equipment ID:** C2261

Outlier Finding(s): RHR A Loop Instrument Rack C2261 contains a computer device identified as a Kaye Instruments "Solid State Scanner". This item is well mounted; however, seismic capacity is unknown. The cabinet anchorage is adequate from a strength standpoint but the cabinet has a 3/8" gap along the east edge which exceeds the GIP allowed ¼" gap under cabinets.
Safety Implications: No. The equipment anchorage is substantial and additional evaluation is expected to demonstrate that the capacity exceeds the demand.
Outlier Status: Open

O42 **Equipment ID:** C64

Outlier Finding(s): SSW HVAC Control Panel C64 is an outlier for the following reasons:
1) A pressure regulating valve in the pneumatic copper piping running to the panel is not properly secured to the wall.
2) Adjacent 2" PVC piping is unsecured (missing U-bolt). It could thus impact into the wall and crack, spraying fluid on panel.
Outlier Status: Resolved,

1) WRT22245 written to refasten valve to the wall. Work complete.
2) Missing U-bolt replaced under MR19402687. Work complete.

O43 **Equipment ID:** C903

Outlier Finding(s): Control Panel C903 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; two anchors with greater than ¼" gap, two anchors are bottomed out and not fully engaged and seven anchors with slotted holes. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.

Safety Implications: No. The anchorage is adequate. The outlying anchor bolt conditions will be addressed during the outlier resolution phase.
Outlier Status: Open

O44 **Equipment ID:** C904

Outlier Finding(s): Control Panel C904 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; seven anchors with greater than ¼" gap, and two anchors are bottomed out and not fully engaged. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.
Safety Implications: No. The anchorage is adequate. The outlying anchor bolt conditions will be addressed during the outlier resolution phase.
Outlier Status: Open

O45 **Equipment ID:** C905

Outlier Finding(s): Control Panel C905 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; four anchors with greater than ¼" gap, two anchors with slotted holes. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.
Safety Implications: No. The anchorage is adequate. The outlying anchor bolt conditions will be addressed during the outlier resolution phase.
Outlier Status: Open

O46 **Equipment ID:** C927

Outlier Finding(s): Control Panel C927 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; two anchors are bottomed out and not fully engaged and seven anchors have slotted holes. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint, but the anchors not fully engaged are a relay concern. C927 also has rule of the box items PSX5 and PSY5 mounted on slide out drawers that are missing retaining screws.
Safety Implications: No. The anchorage is adequate. The outlying anchor bolt conditions will be addressed during the outlier resolution phase.
Outlier Status:

1) Outlier anchor conditions - **Open**
2) Replace retaining screws for PSX5 and PSY5 - **Resolved** per WRT 020395, work complete.

O47 **Equipment ID:** Control Room Ceiling

Outlier Finding(s): The Control Room Ceiling and overhead lights present a potential interaction hazard for the control room. The control

room ceiling and overhead was inspected from the floor and also from above by removing selected ceiling tiles and using a ladder to allow the SRT to view the area above the panels and ceiling. Inspection results were favorable and only a limited number of locations were observed to have anomalies consisting of open S-hooks, missing light cover screws or unattached ceiling tie wires.
Outlier Status: Resolved. The anomalies observed in the control room ceiling have been repaired per MR19600726 on 3/27/96.

O48 **Equipment ID:** C1, C2, C8, C10, C910, C921 and C928

Outlier Finding(s): A number of anchor bolt anomalies and installation problems were observed during the inspections in control panels C1, C2, C8, C10, C910, C921 and C928. These anomalies did not preclude a successful anchorage evaluation in any instance because the capacity of outlier bolts was discounted in the evaluations. They are summarized below:
1) C1 - One anchor with an approximately 1/8" gap.
2) C2 - One anchor with an approximately 1/8" gap.
3) C8 - One anchor bolt is on a high stack of shims.
4) C10 - One anchor bolt is on a high stack of shims.
5) C910 - One anchor bolt is not fully engaged.
6) C921 - One anchor bolt is not fully engaged.
7) C928 - Ten anchors have slotted holes.
Safety Implications: No. The anchorage is adequate. The outlying anchor bolt conditions will be addressed during the outlier resolution phase.
Outlier Status:
1) through 6), **Open**
7) **Resolved**, Shear capacity of anchors is discounted in the anchorage evaluation.

O49 **Equipment ID:** C930 and C932

Outlier Finding(s): RCIC Relay Vertical Board C930 and Channel A Vertical Board C932 are bolted together; however, adjacent vertical board C938 is not bolted to the line-up. This is an interaction hazard.
Safety Implications: No. The spatial interaction will not damage the cabinets. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O50 **Equipment ID:** D32

Outlier Finding(s): Panel D32 is an outlier because it is mounted to a safety related block wall. The GIP does not cover anchors installed in block walls.
Outlier Status: Resolved, The panel anchorage installation is adequate based on SRT inspection and evaluation.

O51 **Equipment ID:** D33

Outlier Finding(s): Panel D33 has an interaction hazard involving a 6.5" fire pipe which is in contact with an attached conduit. Panel D33 would not be damaged or degraded by the interaction hazard.
Safety Implications: No. The spatial interaction will not damage the cabinets. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O52 **Equipment ID:** N/A-45-1

Outlier Finding(s): N/A-45-1 is the RPIS Translation Electronics. This item is located in Panel C927 and consists of printed circuit cards mounted in a hinged rack. This is an outlier because the seismic capacity of the card mounts or card rack is not established.
Safety Implications: No. Additional evaluation is expected to demonstrate that the capacity exceeds the demand.
Outlier Status: Open

O53 **Equipment ID:** Y12

Outlier Finding(s): Panel Y12 has a potential interaction hazard with an overhead duct that might swing and bump an attached conduit.
Safety Implications: No. The spatial interaction will not damage the panel. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O54 **Equipment ID:** E122A, E122B, E206A & E206B

Outlier Finding(s): TBCCW Heat Exchangers E122A & E122B and Fuel Pool Cooling Heat Exchangers E206A & E206B have anchorage capacity which was less than demand when evaluated by Section 7 of the GIP.
Outlier Status: Resolved by a component specific evaluation.

O55 **Equipment ID:** E207A & E207B

Outlier Finding(s): GIP Section 7 is not applicable to RHR Heat Exchangers E207A & E207B because of their vertical orientation.
Outlier Status: Resolved by a component specific evaluation.

O56 **Equipment ID:** E209A & E209B

Outlier Finding(s): RBCCW Heat Exchangers E209A & E209B - Anchorage capacity was less than demand when evaluated by Section 7 of the GIP and base plate anomalies were observed. Problem Report PR95.9027 documents nonconforming baseplate anchor bolt conditions.
Outlier Status: Resolved by a component specific evaluation and a modification.

O57 **Equipment ID:** E216A & 216B, T126A & T126B and T151A & T151B
Outlier Finding(s): GIP Table 7-6 is not applicable to RWCU Heat Exchanger E216A & E216B, DG Main Storage Tanks T126A & T126B and DG Turbo Air Receiver Tanks T151A & T151B.
Outlier Status: Resolved by a component specific evaluation.

O58 **Equipment ID:** C2230
Outlier Finding(s): Instrument Rack C2230 had one concrete anchor which failed the tightness check.
Outlier Status: Resolved. The anchor was repaired under MR 19300887 on 8/24/93.

O59 **Equipment ID:** J600, J602, J603, J604, J605 & J606.
Outlier Finding(s): J600, J602, J605 and J606 - The subject junction boxes house essential relays. The duct the junction boxes are attached to is well supported from an overall standpoint however the local portion of the duct at the junction box attachment is flexible light gage sheet metal and has a low estimated frequency.
Outlier Finding(s): J603 & J604 - These junction boxes are located adjacent to each other and are supported by a horizontal run of duct. The duct is well supported from an overall strength standpoint however the supports are flexible and as a result have a low estimated frequency. The following outlying conditions exist: 1) Demand per Conservative IRS exceeds Capacity, 2) demonstrate that the duct structure is adequate to support the essential relays, 3) the duct has a potential interaction with adjacent cable tray support frames and 4) two unattached strap hangers were observed on the duct.
Safety Implications: No. The current support conditions will not result in damage to the junction boxes. Additional evaluation is expected to demonstrate that the capacity exceeds the demand and that the duct support structure is adequate. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O60 **Equipment ID:** MO202-5A & MO202-5B
Outlier Finding(s): Flex from the motor operator passes through the grating at Elev. 23' in the drywell. There is a potential rubbing interaction between the flex and the grating.
Safety Implications: No. Potential interaction between the valve parts and the grating is not a concern based on the existing clearance and the massive size and strength of the valve assembly and will be addressed during the outlier resolution phase.
Outlier Status: Open

O61 **Equipment ID:** Cable Tray and Conduit Outlier
Outlier Finding(s): A interaction hazard consisting of a small unanchored hot water tank located on a platform above safety related

conduit was identified in the Machine Shop area of the Radwaste Building at elevation 23.0'.
Safety Implications: No. Damage to the conduit is highly unlikely. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O62 **Equipment ID:** C108
Outlier Finding(s): 1) Panel C108 has an interaction concern with an overhead light on an open S-Hook which could fall and impact the cabinet. 2) Several Unistrut nuts do not have the grooves lined up with the strut edge.
Outlier Status: Resolved. The panel is rugged and would not be damaged by the light fixture if it hit the panel. In addition, the capacity of the panel mounting bolts as installed is more than adequate to support the light cabinet.

O63 **Equipment ID:** MO3808
Outlier Finding(s): MO3808 has a potential interaction hazard involving the sluice gate power operator which is stored in the vicinity. The power operator could fall and impact the motor operator.
Outlier Status: Resolved. Subsequent inspection confirms that the power operator is properly restrained and is, therefore, not an interaction hazard.

O64 **Equipment ID:** C61
Outlier Finding(s): 1) Panel base detail has thin material (10 ga.) with an eccentric load path and 2) the anchorage type is not covered by the GIP.
Safety Implications: No. Panel C61 contains controls for drywell cooling area coolers which are non-safety and as a result the outlier findings do not effect safety-related components.
Outlier Status: Open

O65 **Equipment ID:** C208
Outlier Finding(s): Panel C208 houses essential relays. It is free from direct impact hazards but is connected to the top of MCC B17 by conduit that runs between C208 and MCC B17. C208 is also mounted to the environmental enclosure which surrounds MCC B17. MCC B17 is classified as an outlier because it can impact the environmental enclosure around it, which is a spatial interaction. C208 is classified as an outlier because it is potentially subject to the spatial interaction between MCC B17 and its environmental enclosure.
Safety Implications: No. The spatial interaction will not damage the panel. The interaction will be addressed during the outlier resolution phase.
Outlier Status: Open

O66 **Equipment ID:** MO4038A thru F, MO4039A thru F, MO4040A, B and MO4041A, B
Outlier Finding(s): These valves are located in the drywell and are inaccessible during plant operation. The valves are classified as outliers pending successful completion of walkdown screening and evaluation.
Safety Implications: No.
Outlier Status: Open

O67 **Equipment ID:** VAC205B1-BDD, VAC205B2-BDD, VAC205C1-BDD, VAC205C2-BDD, VAC205E1-BDD, VAC205E2-BDD, VAC205F1-BDD, VAC205F2-BDD, VAC206A1-BDD, VAC206A2-BDD, VAC206B1-BDD and VAC206B2-BDD
Outlier Finding(s): These backdraft dampers are located in the drywell and are inaccessible during plant operation. The backdraft dampers are classified as outliers pending successful completion of walkdown screening and evaluation.
Safety Implications: No.
Outlier Status: Open

9. Resolution of Outliers

9.1 Outlier Resolution

All of the open outliers, for Equipment Classes 1 throught 21, discussed in Section 8 are shown in Table 9-1 and 9-2. The resolution block provides a summary of the outlier finding that is recorded on the OSVS form along with the completed, in-progress or proposed resolutions. The single remaining Cable Tray & Conduit Raceway outlier is summarized in Section 9.2 and also included in Table 9.2 as outlier O61.

TABLE 9.1
OPEN GENERAL INTERACTION ISSUES

ID	EQUIPMENT	ISSUE FINDING	RESOLUTION OPTION
G1	Lights over SSEL equipment.	In a few instances, smaller than normal size chains were observed supporting overhead lights.	Verify adequacy of light supporting chains in the process buildings. Replace any chains that are not adequate.
G2	High pressure gas bottle.	In one instance, a gas bottle was secured with a horizontal chain at a single location.	Survey gas bottles in the process buildings to assure that restraints are adequate for seismic loads. Revise PNPS Procedure 1.4.36 to require two restraints in lieu of the currently specified single restraint. Modify any restraints that are not adequate.
G3	Fire extinguishers	Supporting knobs were observed to be less than ½" high in some instances.	Survey supports to assure that extinguisher can't fall off and be subject to damage. Replace any supports that are not adequate.

TABLE 9.2
A46 OPEN EQUIPMENT OUTLIERS

ID	EQUIPMENT	OUTLIER FINDING	RESOLUTION OPTION
O1	RBCCW shielded sample chambers T214A & T214B	RBCCW shielded sample chambers T214A & T214B are Class 0 items. As a result their capacity cannot be established by the GIP. In addition, they are anchored by friction clips, which are not a recognized form of anchorage according to the GIP.	Confirm adequacy of equipment capacity and anchorage.
O5	MCC B10	Demand per Conservative IRS exceeds seismic capacity.	Verify adequacy of equipment capacity.
O6	MCC's B17, B20 , D7 & D10	MCC's have spatial interactions with MCC enclosures.	Resolve spatial interactions based on evaluation or modification.
O8	480V Switchgear B1	480V Switchgear B1 does not have front anchorage. Uplift is not a concern but distortion may degrade switchgear capacity. B1 also has a spatial interaction with a cable tray.	Confirm anchorage adequacy and resolve the spatial interaction based on additional evaluation or modification.
O9	480V Switchgear B3	480V Switchgear B3 will not be deenergized until Refueling Outage 11 in April 1997 and as a result was not accessible due to electrical safety concerns. Anchor bolt tightness cannot be performed. Internal inspection including anchor bolt checks must be done. The switchgear is an outlier for these reasons.	Perform internal inspection including anchor bolt check. Complete screening and document results in a SEWS revision.
O10	4160V Switchgear A6	4160V Switchgear A6 has three spatial interactions with cable tray and conduit.	Resolve spatial interactions based on evaluation or modification.
O11	RBCCW Pumps P202A, P202B & P202C	RBCCW Pumps P202A, B & C have a potential interaction hazard with a ventilation duct located above which has an unusual support system.	Resolve potential interaction based on evaluation of duct supports.
O12	SSW Pumps P208A,P208B, P208C, P208D & P208E	Demand per Conservative IRS exceeds Capacity. The pumps also do not satisfy the column length caveats.	Demonstrate that actual capacity exceeds demand based on review of existing vendor component qualification.

O14	Motor operated valves MO1400-24A & MO1400-24B	Motor operated valves do not meet the GIP screening criteria.	Demonstrate that actual capacity exceeds demand based on review of valve analysis on file or by alternate methods.
O15	Motor operated valves MO1400-25A & MO1400-25B	Motor operated valves do not meet the GIP operator weight limits or pass a 3g load evaluation.	Demonstrate that actual capacity exceeds demand based on review of valve analysis on file or by alternate methods.
O16	Motor operated valve MO1400-4B	Motor operated valve MO1400-4B has a potential interaction involving the handwheel and motor casing and an adjacent platform.	Determine that actual valve movements are less than the clearance or modify platform.
O18	CRHEAFS supply fans VSF103A & VSF103B	CRHEAFS supply fans VSF-103A & VSF-103B motor and fan are not mounted on a common base and are supported by rubber vibration isolators with unknown capacity.	Demonstrate that capacity of vibration isolators exceeds demand by additional evaluation or modify to provide adequate capacity. Address the fact that drive motor and fan are not on a common base.
O19	CRHEAFS dampers AOX1, AOX3, AOX4, AOX6 and CRHEAFS backdraft dampers VSF103A-BDD and VSF103B-BDD	Demand per Conservative IRS exceeds capacity.	Demonstrate that actual capacity exceeds demand based on additional evaluation.
O20	Equipment area coolers: VAC201A,VAC201B, VAC202A, VAC202B, VAC203A, VAC203B, VAC204A, VAC204B, VAC204C, VAC204D, VAC207A, VAC-207B, VAC207C, VAC207D, and drywell equipment area coolers: VAC205B-1, VAC205B-2, VAC205C-1, & VAC205C-2	Equipment area coolers are supported on rubber vibration isolators of unknown capacity.	Demonstrate that capacity of vibration isolators exceeds demand by additional evaluation or modification.
O21	Equipment area cooler backdraft dampers VAC204A-BDD & VAC204B-BDD	Equipment area cooler backdraft dampers VAC204A-BDD & VAC204B-BDD are supported on structural steel in an unconventional manner. They could be postulated to slide. The seismic review team recommended further evaluation to resolve the outlier.	Demonstrate that anchorage is adequate or modify.

O22	CRHEAFS Filter Heaters VCRF-101A & VCRF-101B	Demand per Conservative IRS exceeds capacity.	Demonstrate that capacity exceeds demand by additional evaluation.
O23	The ductwork plenums connected to duct supporting VD206A, VD206B, VD206C & VD206D	The ductwork plenums connected to the duct supporting VD206A, VD206B, VD206C & VD206D have potential seismic interactions with a pressurized water filled 1/2" dia. wet pilot line for the Pilotex spray nozzles which are part of the fire protection system for the Diesel Generators. A broken wet pilot line may be a spray hazard which could affect the diesel generators. Limited degradation of the plenum wall base anchorage in one instance and two instances of degraded plenum hangers were also observed.	Evaluate the potential spray hazard to the diesel generators. This evaluation will be conducted under Problem Report PR95.9494. Fix degraded plenum wall base anchorage and degraded plenum hangers. DG A Duct Base - WRT35485 was written to initiate repairs. DG A Rod Hanger - WRT35486 was written to initiate repairs. DG B Rod Hanger - WRT35486 was written to initiate repairs.
O26	RPS and NSSS Instrument Rack C2205A & C2205B	Racks have a potential interaction hazard involving a nearby scaffold and a fence that is not properly braced.	Relocate scaffold member . Will be resolved by FRN 96-01-13. This FRN has been issued for construction. Brace fence. Will be resolved by FRN 96-01-45. This FRN has been issued for construction.
O28	HPCI Instrument Racks C2250A & C2250B	Racks have a potential interaction hazard involving a nearby cart on wheels that may impact the rack.	Secure cart. Will be resolved by FRN 96-01-45. This FRN has been issued for construction.
O30	Jet Pump Instrument Rack C2252A & C2252B	Jet Pump Instrument Racks C2252A & C2252B have a spatial interaction hazard between C2252A and adjacent rack C2204. There is no gap and the racks are not bolted together.	Resolve spatial interactions based on evaluation or modification.
O32	CRHEAFS Flow Switches FSE-101 & FSE-102	Demand per Conservative IRS exceeds capacity.	Demonstrate that actual capacity exceeds demand by additional evaluation.
O33	Level Switch LS2351A	Level switch has a potential spatial interaction with adjacent instrument 9-LS-5066.	Resolve spatial interactions based on evaluation or modification.
O34	CRHEAFS humidity switches RHS-1A & RHS-1B	Demand per Conservative IRS exceeds capacity.	Demonstrate that actual capacity exceeds demand by additional evaluation.

O35	CRHEAFS temperature switches TS1A, TS1B, TS2A, TS2B, TS3A, TS3B, TS4A & TS4B	Demand per Conservative IRS exceeds capacity.	Demonstrate that actual capacity exceeds demand by additional evaluation.
O36	TSD45 & TSD46	Equipment area cooler controls TSD45 & TSD46 are located below unsecured grating which is an interaction hazard for the controls.	Will be resolved by FRN 95-01-66 which revises the grating details. This FRN has been issued for construction.
O37	Diesel Generator A Control Panels C103A, C103B & C103C	Diesel Generator A Control Panels C103A, C103B & C103C have spatial interactions with a conduit exiting the cabinet roof that is in contact with a wall bracket. There also is a rod hung 1" fire pipe that can swing into the conduit.	Resolve spatial interactions based on evaluation or modification.
O38	Panel C110	C110 is an outlier because it is mounted to a block wall. The blockwall is safety-related however the GIP does not cover anchors installed in block walls.	Verify and document anchorage qualification
O39	RPS Analog Trip Cabinets C2228-A1, C2228-A2, C2229-B1 & C2229-B2	There is a spatial interaction with the conduit entry box on the cabinet roofs because it is fastened to exterior framing and not the cabinets and could impact the cabinets.	Resolve spatial interaction based on evaluation or modification.
O40	Analog Trip System Cabinet C2233B	Cabinet has a potential interaction with an overhead light which could swing and hit the cabinet.	Resolve spatial interaction based on evaluation or modification.
O41	RHR A Loop Instrument Rack C2261	RHR A Loop Instrument Rack C2261 contains a computer device identified as a Kaye Instruments "Solid State Scanner". This item is well mounted; however, seismic capacity is unknown. The cabinet anchorage is adequate from a strength standpoint, but the cabinet has a 3/8" gap along the east edge which exceeds the GIP allowed ¼" gap in cabinets.	Verify the computer device seismic capacity considering the gap at the base.

O43	Main Control Panel C903	Control Panel C903 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; two anchors with greater than ¼" gap, two anchors are bottomed out and not fully engaged and seven anchors with slotted holes. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.	Resolve/ evaluate outlying anchor conditions.
O44	Main Control Panel C904	Control Panel C904 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; seven anchors with greater than ¼" gap, and two anchors are bottomed out and not fully engaged. Anchors with greater than ¼" gap are a relay concern. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.	Resolve/ evaluate outlying anchor conditions.
O45	Main Control Panel C905	Control Panel C905 is an outlier because of anchor bolt conditions. The outlying anchor conditions are; four anchors with greater than ¼" gap, two anchors with slotted holes. Anchors with greater than ¼" gap are a relay concern. The anchorage evaluation neglected the outlier bolts and was successful from a strength standpoint.	Resolve/ evaluate outlying anchor conditions.
O46	Main Control Panel C927	The C927 anchorage strength evaluation is acceptable. Outlying anchors were observed but were not included in the strength evaluation .The outlying anchor conditions are; two anchors not fully engaged and seven anchors with slotted holes.	Resolve/ evaluate outlying anchor conditions.

O48	Panel C1 - Anchor anomalies	The anchorage strength is acceptable. An outlying anchor was observed but was not included in the strength evaluation .The outlying anchor condition is one anchor with an approximately 1/8" gap.	Resolve/ evaluate outlying anchor condition.
	Panel C2 - Anchor anomalies	The anchorage strength is acceptable. An outlying anchor was observed but was not included in the strength evaluation. The outlying anchor condition is one anchor with an approximately 1/8" gap.	Resolve/ evaluate outlying anchor condition.
	Panel C8- Anchor anomalies	The anchorage strength is acceptable. An outlying anchor was observed but was not included in the strength evaluation. The outlying anchor condition is one anchor on a high stack of shims.	Resolve/ evaluate outlying anchor condition.
	Panel C10 - Anchor anomalies	Panel is not in the A46 scope but an outlying anchor was observed. The outlying anchor condition is one anchor on a high stack of shims.	Resolve/ evaluate outlying anchor condition.
	Panel C910- Anchor anomalies	The anchorage strength is acceptable. An outlying anchor was observed but was not included in the strength evaluation The outlying anchor condition is one anchor which was not fully engaged.	Resolve/ evaluate outlying anchor condition.
	Panel C921 - Anchor anomalies	The anchorage strength is acceptable. An outlying anchor was observed but was not included in the strength evaluation. The outlying anchor condition is one anchor which was not fully engaged.	Resolve/ evaluate outlying anchor condition.
O49	Vertical Board C930 and C932	There is a spatial interaction hazard between C930 and C932 which are bolted together and adjacent vertical board C938 is not bolted to the line-up. There is no gap.	Resolve spatial interactions based on evaluation or modification.
O51	Panel D33	D33 has a spatial interaction hazard involving a 6.5" fire pipe which is hard against an attached conduit. This is a relay concern.	Resolve spatial interactions based on evaluation or modification.

O52	N/A-45-1 (RPIS Translational Electronics)	This item is located in C927 and consists of printed circuit cards mounted in a hinged rack. This an outlier because the seismic capacity of the card mounts and card rack is not known.	Determine seismic capacity of card mounts and card rack and establish that capacity exceeds demand.
O53	Panel Y12	Panel has a potential spatial interaction with an overhead duct that might swing and hit an attached conduit.	Resolve spatial interactions based on evaluation or modification.
O59	J600, J602, J603, J604, J605 & J606	J600, J602, J605 and J606 - The subject junction boxes house essential relays. The duct the junction boxes are attached to is well supported from an overall standpoint however the local portion of the duct at the junction box attachment is flexible light gage sheet metal and has a low estimated frequency. J603 & J604 - These junction boxes are located adjacent to each other and supported by a horizontal run of duct. The duct has flexible supports and as a result a low estimated frequency. The following outlying conditions exist: 1) Demand per Conservative IRS exceeds capacity. 2) The duct has a low estimated frequency . Structural adequacy to support relays should be demonstrated. 3) The duct has a potential interaction with adjacent cable tray support frames. 4) Two unattached strap hangers were observed on the duct.	J600, J602, J605 and J606 - Further evaluation is required to demonstrate that the duct structure is adequate to support the essential relays. J603 & J604 - 1) Verify that actual capacity exceeds demand based on additional evaluation. 2) Verify that the duct structure is adequate to support the essential relays. 3) resolve the potential spatial interaction. 4) Fix two strap hangers. WRT 035491 written to initiate repair.
O60	MO202-5A & MO202-5B	Flex from motor operator passes through an opening in the grating at Elev. 23' in the drywell. There is a potential rubbing interaction between the flex and the grating.	Resolve the potential rubbing interaction by locally modifying the grating opening.

O61	Cable Tray and Conduit Outlier	A interaction hazard consisting of an unanchored hot water tank located on a platform above safety related conduit was identified in the Machine Shop area of the Radwaste Building at elevation 23.0'.	Resolve interaction hazard based on evaluation or modification.
O64	C61	1) Panel base detail has thin material (10 ga.) with an eccentric load path, and 2) the anchorage type is not covered by the GIP.	Demonstrate adequacy of panel details and anchorage based on evaluation or modification.
O65	C208	C208 is classified as an outlier because it is potentially subject to vibration resulting from the spatial interaction between MCC B17 and its environmental enclosure.	Resolve spatial interactions based on evaluation or modification.
O66	MO4038A thru F, MO4039A thru F, MO4040A, B and MO4041A, B	These valves are located in the drywell and are inaccessible during plant operation. The valves are classified as outliers pending successful completion of walkdown screening and evaluation.	Perform inspection including anchor anchorage check. Complete screening and document results in a SEWS revision.
O67	VAC205B1-BDD, VAC205B2-BDD, VAC205C1-BDD, VAC205C2-BDD, VAC205E1-BDD, VAC205E2-BDD, VAC205F1-BDD, VAC205F2-BDD, VAC206A1-BDD, VAC206A2-BDD, VAC206B1-BDD& VAC206B1-BDD	These backdraft dampers are located in the drywell and are inaccessible during plant operation. The backdraft dampers are classified as outliers pending successful completion of walkdown screening and evaluation.	Perform inspection including anchor anchorage check. Complete screening and document results in a SEWS revision.

9.2 Cable Tray and Conduit Raceway Systems Outlier Resolution

The Cable Tray and Conduit Raceway Review, included as Appendix F, identified eight (8) of the twenty-five (25) LARs as outliers. LAR #s 3, 11, 12, 13, 14, 15, 21 and 22 are analytical outliers and were resolved during the analysis phase. An additional falling hazard outlier consisting of a small unanchored hot water tank located on a platform above some wall mounted safety related conduit was identified in the Machine Shop area of the Radwaste Building at elevation 23.0'. This outlier is the only cable tray and conduit outlier awaiting resolution. It is identified as outlier O61 and included in Table 9.2 above.

9.3 Alternate Reactor Building In-Structure Spectra for Outlier Resolution

Section 3.0 discusses the in-structure spectra contained in BECo Specification C-114, entitled " Seismic Response Spectra ". These licensing basis design response spectra are approved by the staff for resolution of USI A-46, and have been used for the seismic screening evaluation results contained in this report. Boston Edison proposes as an additional option the use of alternative Reactor Building in-structure response spectra contained in Appendix G [Reference 17]. These spectra were previously considered by the NRC staff as the basis to justify treating portions the Specification C-114 spectra as Conservative Design. Based on a recent request, the previously submitted supporting documentation for the spectra is currently undergoing staff review. These alternative Reactor Building spectra use time history inputs based on a R.G. 1.60 ground response spectral shape, with a control point in the free field at ground grade, anchored at Pilgrim's 0.15g Safe Shutdown Earthquake (SSE). Response is calculated using a new, state-of-the-art, three dimensional finite element building model, soil-structure interaction analyses, and in accordance with the intent of the guidance contained in NRC Standard Review Plan NUREG 0800 Section 3.7.1 and 3.7.2. Although not required for the completion of outlier resolution, we would propose the use of the alternate Reactor Building in-structure response spectra upon NRC approval.

10. References

1) Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46 ", USNRC, Washington, D.C., February 19, 1987.
2) "Generic Implementation Procedure (GIP), for Seismic Verification of Nuclear Plant Equipment ", Revision 2, Corrected, 2/14/92, Seismic Qualification Utility Group.
3) " Supplemental Safety Evaluation Report No. 2 (SSER #2) on GIP-2 ", USNRC, Washington, D.C., May 22, 1992.
4) "Safety Evaluation of Pilgrim Nuclear Power Station (PNPS) Response to Generic Letter 87-02 ", Supplement 1, USNRC, Washington, D.C., November 18, 1992.
5) " Reevaluation of the Approach for Developing Floor Response Spectra for the Resolution of USI A-46 (Generic Letter 87-02, Supplement 1) ", USNRC, Washington, D.C., June 17, 1994.
6) "Response to Supplement 1 to Generic Letter 87-02 on SQUG Resolution of USI A-46 ", Letter No. BECo 92-109, R.A. Anderson (BECo) to USNRC, September 21, 1992.
7) Not Used
8) "Additional Response to Generic Letter 87-02, Supplement 1 ", Letter No. BECo 94-016, E.T. Boulette (BECo) to USNRC, February 9, 1994.
9) " Standard Review Plan " - NUREG 0800, USNRC, Washington, D.C.
10) BECo, "Updated Final Safety Analysis Report for Pilgrim Nuclear Power Station "
11) "Seismic Response Spectra ", BECo Specification No. C-114-ER-Q, Revision EO, March 3, 1989.
12) EPRI Report NP-5228-SL, " Seismic Verification of Nuclear Plant Equipment Anchorage (Revision 1). "Volume 1, Electric Power Research Institute, Palo Alto, CA, prepared by URS/John A. Blume & Associates, Engineers, June, 1991.
13) Not Used
14) Boston Edison Company, "Safe Shutdown Equipment List Report for Pilgrim Nuclear Power Station", Revision 0, September 1996.
15) BECo Pilgrim Nuclear Power Station, " Relay Evaluation Report for Resolution of USI A-46 ", Revision 0, September 1996.
16) BECo Nuclear Engineering Civil/Structural Department Memo 96-82 (NESD 96-82), " " Types of Concrete Anchors in Use at Pilgrim Station ", dated May 1, 1996.
17) "Request for Approval of Alternate Reactor Building Response Spectra ", Letter No. BECo 94-036, E.T. Boulette(BECo) to USNRC, April 1, 1994.
18) "Peer Review of Pilgrim Nuclear Power Station Resolution of USI A-46 ", Letter No.91C2672A, LTR8.22, John D. Stevenson (Stevenson and Associates) to Mr. Charles Pitts (BECo), February 19, 1996.
19) EPRI Report NP-5228-SL, " Seismic Verification of Nuclear Plant Equipment Anchorage (Revision 1). "Volume 4, "Guidelines on Tanks and Heat Exchangers", Electric Power Research Institute, Palo Alto, CA, prepared by URS/John A. Blume & Associates, Engineers, June, 1991.

11. Appendix A: Seismic Safe Shutdown Equipment List (SSEL)

This report is based on the Seismic Review Safe Shutdown Equipment List. The Seismic Review Safe Shutdown Equipment List is included in Reference 14.

12. Appendix B: SSEL Panels and Cabinets Housing Essential Relays

Table 12.1
SSEL Panels and Cabinets Housing Essential Relays

ID	DESCRIPTION
A5	4KV Emergency Bus
A6 *	4KV Emergency Bus
AA504	4KV Undervoltage Relay Cabinet
AA604	4KV Undervoltage Relay Cabinet
B1 *	480V Emergency Bus Load Center
B10	Swing MCC
B14	MCC
B15	MCC
B17 *	MCC
B18	MCC (with Enclosure)
B20*	MCC (with Enclosure)
B2	480V Emergency Bus Load Center
B3	480V Emergency Bus Load Center
B4	480V Emergency Bus Load Center
B6	480V Emergency Swing Bus LC
C1	Feedwater& Cond Bench Board
C101	DG A Generator Control
C102	DG B Generator Control
C103B *	DG A Engine Control Panel
C103C *	DG A Engine Gage Panel
C104B	DG B Engine Control Panel
C104C	DG B Engine Gage Panel
C208*	Drywell Cooling Fan Train A Relay Rack
C209	Drywell Cooling Fan Train B Relay Rack
C2201	Core Spray A Instrument Rack
C2228-A1*	Analog Trip Cabinet A1
C2228-A2*	Analog Trip Cabinet A2
C2229-B1*	Analog Trip Cabinet B1
C2229-B2*	Analog Trip Cabinet B1
C2233A	Analog Trip System
C2233B *	Analog Trip System
C2250A *	HPCI Instrument Rack
C2250B *	HPCI Instrument Rack
C2257A	HPCI Instrument Rack
C2257B	RCIC Instrument Rack
C2258	RCIC Instrument Rack
C2260	Core Spray B Instrument Rack
C5	Protective Relaying
C6	Load Shedding Panel
C89	Diesel A Vent Control Panel
C90	Diesel B Vent Control Panel
C903 *	Rx & Cont Cooling Bench Board
C904 *	Rx Wtr Clnup Recirc Bench Board
C905 *	Rx Control Bench Board

C915	Channel A Prim Isol & Rx Prot
C917	Channel B Prim Isol & Rx Prot
C928	Rod Manual Control Panel
C930 *	RCIC Relay Vertical Board
C932 *	Channel A Vertical Board
C933	Channel B Vertical Board
C939	HPCI Relay Vertical Board
C941	Prim Cont Isol Relay Cab Inbd
C942	Prim Cont Isol Relay Cab Outbd
D32	D16 Contrl Logic Y10 Switching
D33 *	D17 Contrl Logic Y10 Switching
D7 *	125VDC MOV MCC
D8	125VDC MOV MCC
D9	250 VDC MCC
J315	Junction Box housing Essential Relays TS1360-15A & TS1360-17A
J317	Junction Box housing Essential Relay TS1360-17B
J599	Junction Box housing Essential Relays TS1360-14C & TS1360-16C
J600 *	Junction Box housing Essential Relays TS1360-15C & TS1360-17C
J601	Junction Box housing Essential Relay TS1360-16D
J602 *	Junction Box housing Essential Relay TS1360-17D
J603 *	Junction Box housing Essential Relays TS2370C & TS2372C
J604 *	Junction Box housing Essential Relays TS2370D & TS2372D
J605 *	Junction Box housing Essential Relays TS2371C & TS2373C
J606 *	Junction Box housing Essential Relays TS2371D & TS2373D
X107A	DG A Engine & Generator
X107B	DG B Engine & Generator
Y10	125VDC Control Power Trans
Y11	Auto Transfer Switch for Y1
Y12*	Auto Transfer Switch for Y2

Notes:

1. The * symbol denotes the associated piece of equipment has an outlier condition which involves a spacial interaction, a gap at an anchor or other conditions which require resolution in equipment supporting essential relays.

13. Appendix C: Walkdown Personnel Resumes

WALTER DJORDJEVIC

EDUCATION:

B.S. - Civil Engineering, University of Wisconsin at Madison, 1974
M.S. - Structural Engineering, Massachusetts Institute of Technology, 1976

REGISTRATION:

State of California, State of Wisconsin, Commonwealth of Massachusetts, State of Michigan

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., President 1983 - present; Vice President and General Manager of the Boston area office, 1983 - 1995
URS/John A. Blume & Associates, Engineers, Boston, Massachusetts, General Manager, 1980 - 1983; San Francisco, California, Supervisory Engineer, 1979 - 1980
Impell Corporation, San Francisco, California, Senior Engineer, 1976 - 1979
Stone & Webster Engineering Corporation, Boston, Massachusetts, Engineer, 1974 - 1976

PROFESSIONAL EXPERIENCE:

Mr. Djordjevic founded the Stevenson & Associates Boston area office in 1983 and serves as President and General Manager. He has performed over a thousand hours of onsite seismic walkdowns for using the EPRI - SQUG methodology for resolution of the USI A-46 and seismic IPEEE issues. He is one of the most experienced seismic walkdown, screening and verification engineers having personally participated in seismic walkdowns at 26 U.S. nuclear units.

In 1994 he performed seismic walkdowns and analysis of the Tooele Chemical Demilitarization Facility in support of a seismic quantitative risk assessment. Prior to the formulation of the current seismic screening criteria, Mr. Djordjevic performed seismic analyses at the eight SEP nuclear plants, and prototype seismic screening walkdowns on the Hanford Purex facility, and the Savannah River L and P reactors.

Under contract to the SQUG, Mr. Djordjevic authored sections of the Generic Implementation Procedure, now in broad use for seismic walkdown screening methodologies. Together with other S&A engineers, Mr. Djordjevic developed GENRS, a of the software product sponsored by the SQUG which establishes in-cabinet amplification factors for GIP relay evaluations.

Mr. Djordjevic is expert in the area of seismic fragility analysis and dynamic qualification of electrical and mechanical equipment. He has participated in and managed over twenty major projects involving the evaluation and qualification of vibration sensitive equipment and seismic hardening of equipment. As demonstrated by his committee work and publications, Mr. Djordjevic has participated in and contributed steadily to the development of equipment qualification and vibration hardening methodology.

S&A

PROFESSIONAL GROUPS:

Member, Institute of Electrical and Electronics Engineers, Nuclear Power Engineering Committee Working Group SC 2.5 (IEEE-344)

Chairman, American Society of Civil Engineers Nuclear Structures and Materials Committee, Working Group for the Analysis and Design of Electrical Cable Support Systems

Member, American Society of Mechanical Engineers Operation, Application, and Components Committee on Valves, Working Group SC-5

THOMAS J. TRACY

EDUCATION:

B.S. - Civil Engineering, Worcester Polytechnic Institute - 1972
M.S. - Structural Engineering, Northeastern University - 1976
MBA - Worcester Polytechnic Institute - (1996)

REGISTRATION:

Commonwealth of Massachusetts

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., Woburn Massachusetts, Vice President, 1989 - present
Boston Edison Company, Braintree Massachusetts, Civil/Structural Division Manager, 1982 - 1989
Stone & Webster Engineering Corporation, Boston Massachusetts, Marketing Engineer 1980 - 1982, Structural Engineer 1979 - 1980, Engineer 1972 - 1979

PROFESSIONAL EXPERIENCE:

Mr. Tracy has twenty four years experience, primarily in the Civil and Structural Engineering of large nuclear power generation facilities. His experience covers: 1) direct performance of Civil Engineering; 2) supervision of a utility Civil Engineering Division; and, 3) financial, legal, insurance, and marketing activities for a large full service Architect Engineering firm. As a Vice President for Stevenson & Associates he is responsible for marketing and project management. He served as project manager on the IPEEE/A-46 projects for the Boston Edison Co., the Omaha Public Power District, and the New York Power Authority. He also served as the S&A project manager for the seismic probabilistic safety assessment of the four Chemical Demilitarization Facilities for the U.S. Army. He holds SQUG certification as a seismic walkdown engineer, and completed the EPRI IPEEE add on certification training.

As the Nuclear Engineering Civil/Structural Division Manager for an operating utility, he exercised responsibilities for both technical and administrative management. During this time, he was responsible for capital projects totaling over $40 million, and an annual operating budget of $1 million. His responsibilities as a Division Manager included review and approval of all design changes, and development, review, revision and implementation of engineering department procedures.

Mr. Tracy conceived of and implemented the first Standing Design Change package for Boston Edison. The Standing Design Change represents a concept whereby individual design modifications that satisfy strict technical scope and administrative limitations may be released in a streamlined fashion. He also implemented a design specification development program that produced over two dozen general use specifications for ongoing operations, maintenance and modification support.

S&A

As a Division Manager, he assumed Department level management assignments including overall budget management of a $9 million operating budget, and approval authority over all Nuclear Engineering Department purchase orders totaling $10 million annually.

He spent 15 months on a four unit nuclear power construction site as the resident Structural Engineer with responsibility for evaluation and authorization of all field change requests. During this period he developed and implemented a design control process for field pipe supports and electrical hangers, supervising the activities of twelve designers.

He spent three years on a developmental project to assemble prevailing design concepts for nuclear plants into an optimum composite concept called the Reference Plant. This activity involved developing interdisciplinary design control processes as well as actual design configuration.

INTERESTS:

Mr. Tracy served on the Town school board continuously from 1980 through 1992, serving four years as Chairman and as six years as Vice Chairman. He also chaired the Uxbridge School Building Committee responsible for a $9 million renovation to three school facilities that was successfully completed within the original budget.

JOHN J. O'SULLIVAN

EDUCATION:

MS - Massachusetts Institute of Technology, 1988
BSE - Princeton University, 1983

PROFESSIONAL HISTORY:

Stevenson & Associates, Woburn, MA, Group Manager, 1996 - present; Senior Engineer, 1988 - 1995
Draper Laboratories, Cambridge, MA, Draper Fellow, 1986 - 1988
RCA Astro-Electronics, Hightstown, NJ, Design Engineer, 1983 - 1986

PROFESSIONAL EXPERIENCE:

Mr. O'Sullivan is currently a Group Manager at S&A. . His background includes design, analysis and testing of civil and mechanical structures, development of analytical software packages, and project engineering of comprehensive structural evaluation programs In recent years, he has been extensively involved in seismic evaluation of civil structures and mechanical equipment for the nuclear power industry.

He has completed training as a Seismic Qualification Engineer for the Nuclear Regulatory Commission's USI A-46 program for the seismic verification of electrical and mechanical equipment at operating nuclear power facilities. He served as the Project Engineer for the Monticello A-46 project, performing screening walkdowns and analyses, preparing the final report, and performing outlier resolution. He has also conducted A-46 walkdowns at Pilgrim and has performed walkdowns and analysis for the NRC's Individual Plant Examination for External Events program at Millstone Point (Units 1 and 2) and Connecticut Yankee.

Mr. O'Sullivan is an accomplished structural analyst. He has been responsible for the generation of in-structure response spectra used in A-46 and IPEEE evaluations, and has performed numerous fragility evaluations on civil structures and equipment. Mr. O'Sullivan contributed to the development of EPRI/SQUG Generic Implementation Procedure for resolution of USI A-46. He is a co-author of EPRI Report NP-7146 related to seismic response of electrical cabinets and principal investigator for the recent EPRI/SQUG effort to expand the scope of the methods presented in NP-7146. He also performed much of the in-situ testing that forms the basis for those efforts Mr. O'Sullivan also has extensive knowledge on the seismic fragility of vertical storage tanks.

Mr. O'Sullivan has extensive computer and software development skills and has created a number of commercial, PC based, engineering software packages. Applications include analysis of equipment base anchorage by using linear programming theory (program ANCHOR), a Windows-based program for the analysis of motor operated valves (MOVALVE), and a Windows-based program for seismic response of buildings and equipment (EDASPw).

S&A

Mr. O'Sullivan is also actively involved in prediction, measurement and control of vibration in microelectronics facilities. For clients such as IBM, DEC, and Motorola, he has conducted site surveys, performed vibration testing and consulted on facility structural design.

While at RCA Astro-Electronics and Draper Laboratories, Mr. O'Sullivan was involved in the design and analysis of spacecraft structures. His experience includes structural design of Space Shuttle payloads, analysis of Space Station design concepts, and performance analysis of space-based structures under active control.

KEY PUBLICATIONS:

"Guidelines for Development of In-Cabinet Seismic Demand for Devices Mounted in Electrical Cabinets," with Walter Djordjevic, EPRI NP-7146-SL R1, June 1995.

"Vibration Monitoring in Microelectronics Facilities," SPIE Symposium on Optical Science and Engineering, Vol. 1619, November, 1991.

"Guidelines for Development of In-Cabinet Amplified Response Spectra for Electrical Bench-boards and Panels," with Walter Djordjevic, EPRI NP-7146-SCCML, December, 1990.

RESUME

Name: William R. Kline
Position: Group Manager
Group: Nuclear Engineering Services

EDUCATION

M.B.A., Lehigh University, Bethlehem, PA
M.S., Civil Engineering, University of Pittsburgh, Pittsburgh, PA
B.S., Civil Engineering, Carnegie-Mellon University, Pittsburgh, PA

PROFESSIONAL REGISTRATION

Registered Professional Engineer PE-030579-E - Pennsylvania

SPECIALTIES/EXPERTISE

SQUG Certification: SQUG Walkdown Screening and Seismic Evaluation Training Course.

Seismic IPE Add-On Training Course

EXPERIENCE PROFILE

Total Years Engineering Experience: 18

Employer	Position	Function
BECo	Group Manager	Nuclear Engineering Services Group: Manager responsible for Mechanical, Civil/Structural, Electrical, Instrumentation & Control, Systems & Safety Analysis, and Materials Engineering support management.
	Dept. Manager	Production Engineering Department Manager responsible for engineering support of BECo fossil generating stations.
	Division Manager	Civil/Structural Engineering and staff management.
	Senior Engineer	Civil/Structural Design Engineering assignments.
PA Pwr. & Light	Project Engineer	Civil/Structural Design Engineering assignments.

Dated 7/5/96

RESUME

Name: John G. Dyckman
Position: Principal Engineer
Department: Civil/Structural/Mechanical
Group: Nuclear Engineering

EDUCATION

M.S., Civil Engineering, Northeastern University, Boston, MA
B.S., Civil Engineering, Worcester Polytechnic Institute

PROFESSIONAL REGISTRATION

Registered Professional Engineer #27157 - Massachusetts

PROFESSIONAL MEMBERSHIPS

American Society Of Civil Engineers, Member

SPECIALTIES/EXPERTISE

SQUG Certification: SQUG Walkdown Screening and Seismic Evaluation Training Course

EXPERIENCE PROFILE

Total Years Engineering Experience: 30

Employer	Position	Function
BECo	Principal Engineer	Civil/Structural engineering and staff assignments
Cygna	Engineering Manager	Engineering consulting
Stone & Webster	Sr. Structural Engineer	Power plant engineering and design

Dated 5/28/96

RESUME

Name: Subhash C. Chugh
Position: Senior Engineer
Department: Mechanical/Civil/Structural

EDUCATION

MBA, Kellogg Graduate School of Management, Northwestern University, Evanston, IL
BS, Civil Engineering, Osmania University, Hyderabad, India

SPECIALTIES/EXPERTISE

Structural Engineering
Project Management
Field Construction Management
SQUG Walkdown Screening and Seismic Evaluation Certification
Relay Seismic Qualification

EXPERIENCE PROFILE

Total Engineering Experience	26 Years
Nuclear Industry Experience	20 Years
Fossil Industry Experience	1 Year
Petroleum/Refining Industry Experience	3 Years
Commercial Eng./Architectural Industry Experience	2 Years

Dated 8/13/96

RESUME

Name: Jeffrey A. Kalb
Position: Senior Engineer
Department: Civil/Structural/Mechanical
Group: Nuclear Engineering

EDUCATION

B.S., Civil Engineering, University of Rhode Island

SPECIALTIES/EXPERTISE

SQUG Certification: SQUG Walkdown Screening and Seismic Evaluation Training Course

EXPERIENCE PROFILE

Total Years Engineering Experience: 23

Employer	Position	Function
BECo	Senior Engineer	Civil/Structural engineering and staff assignments
Impell	Supervisor	Engineering consulting
Cygna	Supervisor	Engineering consulting
Stone & Webster	Structural Engineer	Power plant engineering and design

Dated 5/29/96

RESUME

Name: Charles T. Pitts
Position: Senior Engineer
Department: Civil/Structural/Mechanical
Group: Nuclear Engineering

EDUCATION

M.S., Civil Engineering, Northeastern University, Boston, MA
B.S., Civil Engineering, Northeastern University, Boston, MA

PROFESSIONAL REGISTRATION

Registered Professional Engineer #28351 - Massachusetts

PROFESSIONAL MEMBERSHIPS

American Society Of Civil Engineers, Member

SPECIALTIES/EXPERTISE

Structural Engineering
Safety System Modifications
Field Engineering and Design
SQUG - Generic Implementation Plan (GIP) Evaluations and Reviews

EXPERIENCE PROFILE

Total Years Engineering Experience:	25
Years Nuclear Experience:	20
Construction/Site Experience:	15

Dated 5/17/96

14. Appendix D: Screening Verification Data Sheets (SVDS)

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	HCU-EAST	1	03 / RPS CRD HYDRAULIC CONTROL UNIT	RB	23.00	72 HCU	23.00	N/A	DOC	RRS	No	Yes	No	Yes	No
0	HCU-WEST	1	03 / RPS CRD HYDRAULIC CONTROL UNIT	RB	23.00	73 HCU	23.00	N/A	DOC	RRS	No	Yes	No	Yes	No
7	PSV1401-28B	1	14 / Core Spray B Discharge Relief	RB	-10.00	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
15	147R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	148R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	149R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	150R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	151R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	158R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	160R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	161R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	162R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	163R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	Yes	Yes	Yes
15	164R	0	46 / Emergency AC Lighting Unit	RW	37.00	CR	37.00	N/A	GERS	RRS	Yes	Yes	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.)

Print or Type Name	Signature	Date
JG DYCKMAN		5/20/96
W DJORDJEVIC		5/21/96

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 Row/Cl	Base El.	<40'?	Cap. Spec.	Demd. Spec	Cap > Demd?	Caveats OK?	Anchor OK?	Interact OK?	Equip OK?
0	PSD-68	0	23 / HPCI TURB EXH RUPTURE DISC	RB	-17.50	HPCI	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
0	PSD1301-9	0	13 / RCIC Exhaust Line Rupture Disc	RB	-17.50	SW QD	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
0	ST1301-2	0	13 / RCIC Exhaust Line Steam Trap	RB	-17.50	SW QD	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
0	ST1301-3	0	13 / RCIC Exhaust Line Steam Trap	RB	-17.50	SW QD	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
0	ST2301-5	0	23 / HPCI TURB EXH DRAIN TO TORUS	RB	-17.50	HPCI	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
0	ST2301-6	0	23 / HPCI TURB EXH DRAIN TO TORUS	RB	-17.50	HPCI	-17.50	N/A	DOC	RRS	No	Yes	Yes	Yes	No
5	P204A	0	30 / RBCW RWCU PMP COOLING SYSTEM	RB	51.00	RWCU PMP	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P204B	0	30 / RBCW RWCU PMP COOLING SYSTEM	RB	51.00	RWCU PMP	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	X203	1	23 / HPCI Turbine	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	AO220-45	0	54 / Reactor Sample Line Isolation	RB	51.00	RWCU	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV6031	0	03 / Tip Purge Supply Relief Valve	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1201-5	0	12 / RWCU Suction Line Isolation	RB	51.00	RWCU HT	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1201-80	0	12 / RWCU Return Line Isolation	RB	51.00	RWCU HT	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1400-25A	0	14 / Core Spray A Injection Valve	RB	51.00	RWCU HT	51.00	Yes	BS	GRS	Yes	No	N/A	Yes	No
8	MO3805	0	29 / SSW LP B TBCCW HX OUTLET	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO3806	0	29 / SSW LP B RBCCW HX OUTLET	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO3808	0	29 / SSW LOOP A HEADER ISOL	INTK	25.50	A COMP	38.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO3813	0	29 / SSW LOOP B HEADER ISOL	INTK	25.50	B COMP	38.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4065	0	30 / RBCCW FUEL POOL	RB	74.00	FP HT EX	74.25	N/A	GERS	RRS	Yes	Yes	N/A	Yes	Yes
8	MO4083	0	30 / RBCCW HX E209B BYPASS	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4084	0	30 / RBCCW HX E209A BYPASS	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV220-45	0	54 / Rx Sample Line Control Sol	RB	51.00	RWCU	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4569A	0	61 / Turbo Air Inlet Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4569B	0	61 / Turbo Air Inlet Valve	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4570A	0	61 / Turbo Air Inlet Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4570B	0	61 / Turbo Air Inlet Valve	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	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.)

Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5/22/96
W DJORDJEVIC	[signature]	5/21/96

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?
10	VD206A	0	24 / DG X107A Radiator Inlet Damper	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
10	VD206B	0	24 / DG X107A Radiator Inlet Damper	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
10	VD206C	0	24 / DG X107B Radiator Inlet Damper	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
10	VD206D	0	24 / DG X107B Radiator Inlet Damper	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
10	VD207A	0	24 / DG Space A Air Inlet Damper	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VD207B	0	24 / DG Space B Air Inlet Damper	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
11	E201	1	13 / RCIC Bar Condenser/Vacuum Tank	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
12	K103A	0	61 / DG A Air Start Compressor	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
14	16L	0	46 / Emergency AC Lighting Panel	RW	23.00	STAIRWH	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
X 14	~~25L~~	0	46 / Emerg DC Lighting Dist Panel	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
X 14	~~U25~~	0	46 / Panel 25L DC Contactor	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2207A	0	45 / Recirc Instrument Rack	RB	2.90	CRD QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2207B	0	45 / Recirc Instrument Rack	RB	2.90	CRD QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS37	0	03 / ControlValve Fast Close Relay	TB	51.00	TB DECK	51.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
18	PS38	0	03 / ControlValve Fast Close Relay	TB	51.00	TB DECK	51.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
18	PS3828A	0	29 / SSW LP A PUMP CNTRL & ALARM	INTK	25.50	A COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS3828B	0	29 / SSW LP A PUMP CNTRL & ALARM	INTK	25.50	A COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS3829A	0	29 / SSW LP B PUMP CNTRL & ALARM	INTK	25.50	B COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS3829B	0	29 / SSW LP B PUMP CNTRL & ALARM	INTK	25.50	B COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS39	0	03 / ControlValve Fast Close Relay	TB	51.00	TB DECK	51.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
18	PS40	0	03 / ControlValve Fast Close Relay	TB	51.00	TB DECK	51.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
18	PT3828	0	29 / SSW LP A PUMP DISCH.	INTK	25.50	A COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT3829	0	29 / SSW LP B PUMP DISCH.	INTK	25.50	B COMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	RHS-1A	0	24 / CRHEAF TRAIN A HUMIDITY SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
18	RHS-1B	0	24 / CRHEAF TRAIN B HUMIDITY SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
20	C1	0	45 / Feedwater & Cond Bench Board	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C108	0	45 / PANEL C108	RW	51.00	#2FRM	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C109	0	45 / PANEL C109	RW	51.00	#2FRM	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

Certification: (X DELETED FROM SSEL)

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Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5/22/96
W DJORDJEVIC	[signature]	5/21/96

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

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?
20	C111	0	45 / DG B Pump Control Panel	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C174	1	45 / PASS Isolation Vlv Control	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C175	1	45 / PASS Isolation Vlv Control	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2	0	45 / Turbine Bench Board	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2204	0	45 / Accumulator Monitor Panel	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2222	0	45 / Accumulator Monitor Panel	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C3	0	45 / Auxiliary Power Bench Board	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C4	0	45 / INST PANEL C4	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C5	0	45 / Protective Relaying	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C6	0	45 / Load Shedding Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C7	0	45 / Ctmt Isol & Ventilation VB	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C8	0	45 / Auxiliary Power Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C89	0	45 / Diesel A Vent Control Panel	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C90	0	45 / Diesel B Vent Control Panel	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C902	0	45 / CONTROL RM PANEL	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C903	0	45 / Rx & Cont Cooling Bench Board	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	No	Yes	No
20	C904	0	45 / Rx Wtr Cleanup Recirc Bench Bd	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	No	Yes	No
20	C905	0	45 / Rx Control Bench Board	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	No	Yes	No
20	C910	0	45 / CONTROL RM PANEL	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C915	0	45 / Channel A Prim Isol & Rx Prot	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C917	0	45 / Channel B Prim Isol & Rx Prot	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C918	0	45 / FW & RECIRC VERT BRD	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C919	0	45 / Process Instrumentation VB	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C921	0	45 / Nuclear Stm Temp Recorder VB	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C927	0	45 / RPIS Control Rod Position Cab	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	No	Yes	No
20	C928	0	45 / Rod Manual Control Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C932	0	45 / Channel A Vertical board	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	No	Yes	Yes	No
20	C933	0	45 / Channel B Vertical Board	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5/22/96
W DJORDJEVIC		5/24/96

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?
20	C939	0	45 / HPCI RELAY VERTICAL BOARD	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C941	0	45 / Prim Cont Isol Relay Cab Inbd	RW	23.00	CSR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C942	0	45 / Prim Cont Isol Relay Cab Outbd	RW	23.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	N/A-45-1	0	45 / RPIS TRANSLATION ELECTRONICS	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	No	Yes	Yes	No

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CT PITTS	Charles T. Pitts	5/22/96
W DJORDJEVIC	W Djordjevic	5/21/96

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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?
0	T214A	0	30 / RBCCW SHIELDED SAMPLE CHAMBER	AXBAY	23.00	All Locati	23.00	Unk	Unk	Unk	Unk	Unk	No	Yes	No
0	T214B	0	30 / RBCCW SHIELDED SAMPLE CHAMBER	AXBAY	23.00	All Locati	23.00	Unk	Unk	Unk	Unk	Unk	No	Yes	No
1	B10	0	46 / Swing MCC	RW	23.00	CSR	37.00	N/A	ABS	CRS	No	Yes	Yes	Yes	No
1	B15	0	46 / MCC	AXBAY	3.00	COMP A	3.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
1	B17	0	46 / MCC (with Enclosure)	RB	23.00	EAST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
1	B20	0	46 / MCC (with Enclosure)	RB	23.00	EAST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
1	D10	0	46 / MCC, 250VDC Power Bus	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
1	D7	0	46 / 125VDC MCC MOV Dist.	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
1	D8	1	46 / 125VDC MCC	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
1	D9	0	46 / 250VDC MCC	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
2	B1	1	46 / 480V Emergency Bus	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	No	Yes	No	No
2	B3	0	46 / 480V Emergency Bus	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	No	Yes	No
2	B4	0	46 / 480V Emergency Bus	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
2	B6	1	46 / 480V Emergency Swing Bus	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
3	A5	0	46 / 4KV Emergency Bus	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
3	A6	0	46 / 4KV Emergency Bus	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
4	X18	0	46 / Stndby Trnsfrmer Instr & Vital	RW	23.00	CSR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	PSV1001-22A	0	10 / RHR A Loop Discharge Relief	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV1001-22B	0	10 / RHR B Loop Discharge Relief	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4334	0	09 / Nitrogen Header Relief Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4085B	0	30 / RBCCW LOOP A NE LOAD	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
10	VD208A	0	24 / DG A Space Sec Air Inlt Damper	DG A	23.00	DG A	34.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	VD208B	0	24 / DG B Space Sec Air Inlt Damper	DG B	23.00	DG A	34.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
10	VSF103A-BDD	0	24 / CRHEAF TRAIN A FAN BCKDRFT DMP	RW	75.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	VSF103B-BDD	0	24 / CRHEAF TRAIN B FAN BCKDRFT DMP	RW	71.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
14	D16	0	46 / 125VDC Control Bus A	TB	37.00	A SWGR	37.00	N/A	GERS	CRS	Yes	Yes	Yes	Yes	Yes

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CT PITTS	Charles T. Pitts	5/22/96
JOHN OSULLIVAN	John O'Sullivan	5/21/96

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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?
14	D17	0	46 / 125VDC Control Bus B	TB	23.00	B SWGR	23.00	N/A	GERS	CRS	Yes	Yes	Yes	Yes	Yes
14	D29	0	46 / Current Limiter Fault Protect	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D30	0	46 / Current Limiter Fault Protect	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D31	0	46 / Current Limiter Fault Protect	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D36	0	46 / 125VDC Distribution Panel A	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	No	No	Yes	No
14	D4	0	46 / 125VDC Distribution Panel A	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D5	0	46 / 125VDC Distribution Panel B	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	D6	0	46 / 125VDC Distribution Panel C	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y1	0	46 / 120V AC Instrument Bus	RW	23.00	MG SET	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y2	0	46 / Vital Services Power Supply	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C129A	0	45 / Containmnt Press Sw Instr Rack	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	C129B	0	45 / Containmnt Press Sw Instr Rack	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	C2201	0	45 / Core Spray Instr Rack A	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2205A	0	45 / Reactor Prot & NSS Instr Rack	RB	51.00	EAST	51.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2205B	0	45 / Reactor Prot & NSS Instr Rack	RB	51.00	EAST	51.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2206A	0	45 / Reactor Prot & NSS Instr Rack	RB	51.00	WEST	51.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2206B	0	45 / Reactor Prot & NSS Instr Rack	RB	51.00	WEST	51.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2250A	0	45 / HPCI INSTRUMENT RACK	RB	-17.50	RB SMP	-17.50	Yes	BS	GRS	Yes	Yes	Yes	No	No
18	C2250B	0	45 / HPCI INSTRUMENT RACK	RB	-17.50	RB SMP	-17.50	Yes	BS	GRS	Yes	Yes	Yes	No	No
18	C2251A	1	45 / Jet Pump Instrument Rack	RB	23.00	EAST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2251B	1	45 / Jet Pump Instrument Rack A	RB	23.00	EAST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	No	No
18	C2259	0	45 / RHR A loop Instrument Rack	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	DPT1001-604A	0	10 / Torus Water Level Transmitter	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	DPT1001-604B	0	10 / Torus Water Level Transmitter	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FSE-101	0	24 / CRHEAF TRAIN A FLOW SWITCH	RW	73.50	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
18	FSE-102	0	24 / CRHEAF TRAIN B FLOW SWITCH	RW	73.50	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No

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JOHN OSULLIVAN	John Osullivan	5/21/96

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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?
18	FT6240	0	29 / SSW FLOW-RBCCW LP A	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS2351A	0	23 / HPCI TORUS LVL TO VLV CONTROL	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	No	No
18	LS2351B	0	23 / HPCI TORUS LVL TO VLV CONROTL	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT504A	0	45 / RPS-First Stage Turb. Press.	TB	51.00	TB DECK	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT504B	0	45 / RPS-First Stage Turb. Press.	TB	51.00	TB DECK	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT504C	0	45 / RPS-First Stage Turb. Press.	TB	51.00	TB DECK	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT504D	0	45 / RPS-First Stage Turb. Press.	TB	51.00	TB DECK	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	X206A	0	10 / Condensing Pot Torus Level	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	X206B	0	10 / Condensing Pot Torus Level	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
19	TE5021-01A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-02A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-03A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-04A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-05A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-06A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-07A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-08A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-09A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-10A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-11A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-12A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5021-13A	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-01B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-02B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-03B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-04B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-05B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-06B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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JOHN OSULLIVAN	John Osullivan	5/21/96

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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	TE5022-07B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-08B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-09B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-10B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-11B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-12B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE5022-13B	0	10 / Torus Water Temp Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
20	AA504	0	46 / 4KV Undervoltage Relay Cab	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	AA604	0	46 / 4KV Undervoltage Relay Cab	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C101	0	45 / DG A Generator Control	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C102	0	45 / DG B Generator Control	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C103A	0	45 / DG A Auxiliaries Control	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C103B	0	45 / DG A Engine Control Panel	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C103C	1	45 / DG A Engine Gage Panel	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C104A	0	45 / DG B Auxiliaries Control	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C104B	0	45 / DG B Engine Control Panel	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C104C	1	45 / DG B Engine Gage Panel	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C110	0	45 / DG A Pump Control Panel	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
20	C160	0	45 / DG A ASP	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2229-B1	0	45 / RPS Analog Trip Cabinet	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C2229-B2	1	45 / RPS Analog Trip Cabinet	RW	23.00	CSR	37.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C2233A	0	45 / Analog Trip System	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2233B	0	45 / Analog Trip System	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C2261	0	45 / CRD Instrument Cabinet	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
20	D32	0	46 / D16 Contrl Logic Y10 Switching	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	No	No	Yes	No
20	D33	0	46 / D17 Contrl Logic Y10 Switching	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	Y10	0	46 / Auto Transfer Switch	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	Y11	0	46 / Auto Transfer Switch	RW	23.00	MG SET	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5/22/96
JOHN OSULLIVAN	John Osullivan	5/21/96

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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?
20	Y12	0	46 / Auto Transfer Switch for Y2	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No

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1	B14	0	46 / MCC	AXBAY	3.00	COMP B	3.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
1	B18	1	46 / MCC (with Enclosure)	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P202A	0	30 / RBCCW PUMP A LOOP A	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
5	P202B	0	30 / RBCCW PUMP B LOOP A	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
5	P202C	0	30 / RBCCW PUMP C LOOP A	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
5	P202D	0	30 / RBCCW PUMP D LOOP B	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P202E	0	30 / RBCCW PUMP E LOOP B	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P202F	0	30 / RBCCW PUMP F LOOP B	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	VRV261-96A	0	54 / RV203-3A Torus Disch Vac Rel	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-96B	0	54 / RV203-3B Torus Disch Vac Rel	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-96C	0	54 / RV203-3C Torus Disch Vac Rel	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-16	0	13 / RCIC Stream Line Isolation Vlv	RB	41.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO3800	0	29 / SSW LP A RBCCW HX OUTLET	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO3801	0	29 / SSW LP A TBCCW HX OUTLET	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV220-44	0	54 / Rx Sample Line Control Sol	RB	74.00	DW	74.25	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
14	Y3	0	46 / Safeguard Control Power	RW	23.00	MG SET	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y4	0	46 / Safeguard Control Power	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2230	0	45 / EAST SDIV INSTRUMENT RACK	RB	23.00	EAST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	C2231	0	45 / WEST SDIV INSTRUMENT RACK	RB	23.00	WEST	23.00	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
19	TE9019	0	09 / Drywell Temperature Element	RB	38.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE9044	0	09 / Drywell Temperature Element	RB	38.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
20	C61A	0	45 / EAC Safeguards Area Vent Cntrl	RB	23.00	E WALL	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C61B	0	45 / EAC Safeguards Area Vent Cntrl	RB	23.00	E WALL	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C84	0	45 / DG Storage Tank Lvl Instr Rack	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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CT PITTS	Charles T. Pitts	5/22/96
WR KLINE	William R Kline	5/21/96

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2	B2	1	46 / 480V Emergency Bus	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5-20-96
TJ TRACY	Thomas J. Tracy	5-20-96

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4	X20	0	46 / Transformer to C511	RW	23.00	MG SET	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
4	X21	0	46 / 4KV/480V Transformer	TB	37.00	A SWGR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
4	X22	0	46 / 4KV/480V Transformer	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P206	1	13 / RCIC PUMP	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
8	MO1001-28B	0	10 / RHR B Loop LPCI Injection	RB	23.00	B VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-29B	0	10 / RHR B Loop LPCI Injection	RB	23.00	B VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-43B	0	10 / RHR Pump B SDC Intertie	RB	-6.00	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-7B	0	10 / RHR Pump P203B Suction	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-7C	0	10 / RHR Pump P203C Suction	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-7D	0	10 / RHR Pump P203D Suction	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO202-5A	0	10 / Recirculation Pump A Discharge Isolation Valve	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	No	No
8	MO202-5B	0	10 / Recirculation Pump B Discharge Isolation Valve	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	No	No
8	MO2301-4	0	23 / HPCI STEAM SUPPLY	RB	40.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-5	0	23 / HPCI STEAM SUPPLY	RB	23.00	B VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
9	VEX104A	1	24 / SSW Exhaust Fan	INTK	25.60	A PUMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
9	VEX104B	1	24 / SSW Exhaust Fan	INTK	25.60	B PUMP	38.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
9	VSF-103A	0	24 / CRHEAF TRAIN A SUPPLY FAN	RW	73.50	#2FRM	81.00	N/A	ABS	RRS	No	Unk	Unk	Yes	No
9	VSF-103B	0	24 / CRHEAF TRAIN B SUPPLY FAN	RW	73.50	#2FRM	81.00	N/A	ABS	RRS	No	Unk	Unk	Yes	No
10	AOX1	0	24 / CRHEAF TRAIN B INTK DAMPER	RW	71.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	AOX3	0	24 / CRHEAF NORML TRAIN B INTK DMPR	RW	75.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	AOX4	0	24 / CRHEAF TRAIN A INTK DAMPER	RW	78.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	AOX6	0	24 / CRHEAF NORML TRAIN A INTK DMPR	RW	75.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
10	VAC206A-1	0	30 / RBCCW DRYWELL EAC	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC206A-2	0	30 / RBCCW DRYWELL EAC	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VCRF-101B	0	24 / CRHEAF TRAIN B FILTER HEATR	RW	78.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
14	C511	0	46 / RPS Power Distribution Panel	RW	23.00	MG SET	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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JA KALB	Jeffrey A. Kalb	5/22/96

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14	D37	0	46 / 125VDC Distribution Panel B	TB	23.00		23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y31	0	46 / H2/O2 Power Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y41	0	46 / H2/O2 Power Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y6	0	46 / Power to MCC Fan Control	RB	23.00	MCC B17	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y7	0	46 / Power to MCC Fan Control	RB	23.00	MCC B18	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
14	Y8	0	46 / Power to MCC Fan Control	RB	23.00	MCC B20	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2252A	0	45 / Jet Pump Instrument Rack A	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	No	Yes	Yes	No
18	C2252B	0	45 / Jet Pump Instrument Rack B	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	No	Yes	Yes	No
18	C2257B	1	45 / RCIC Instrument Rack	RB	-17.50	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2260	0	45 / Core Spray Instr Rack B	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2262	0	45 / RHR B Loop Instrument Rack	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE1360-3	0	13 / RCIC Pump Flow Element	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE6240	0	29 / SSW Loop A Flow Element	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE6241	0	29 / SSW Loop B Flow Element	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	J315	0	46 / J-Box for TS1360-15A and 17A	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	J317	0	46 / J-Box for TS1360-17B	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	J599	0	46 / J-Box for TS1360-14C and 16C	RB	23.00	TIP RM	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	J600	0	46 / J-Box for TS1360-15C and 17C	RB	23.00	TIP RM	23.00	N/A	ABS	RRS	Yes	No	Yes	Yes	No
18	J601	0	46 / J-Box for TS1360-16D	RB	23.00	TIP RM	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	J602	0	46 / J-Box for TS1360-17D	RB	23.00	TIP RM	23.00	N/A	ABS	RRS	Yes	No	Yes	Yes	No
18	J603	0	46 / J-Box for TS2370C and TS2372C	RB	23.00	NORTH	51.00	N/A	ABS	RRS	No	No	Yes	No	No
18	J604	0	46 / J-Box for TS2370D and TS2372D	RB	23.00	NORTH	51.00	N/A	ABS	RRS	No	No	Yes	No	No
18	J605	0	46 / J-Box for TS2371C and TS2373C	RB	23.00	TIP RM	23.00	N/A	ABS	RRS	Yes	No	Yes	Yes	No
18	J606	0	46 / J-Box for TS2371D and TS2373D	RB	23.00	TIP RM	23.00	N/A	ABS	RRS	Yes	No	Yes	Yes	No
18	PS1360-21A	0	13 / Pump Suction Pressure	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-69A	0	45 / Suppr Pool Bottom Press Trans	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-69B	0	45 / Suppr Pool Bottom Press Trans	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C150	0	45 / SSW/RBCCW ALT SHUTDOWN PANEL	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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20	C151	0	45 / SSW/RBCCW ALT SHUTDOWN PANEL	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C154	0	45 / RCIC ALT SHUTDOWN PANEL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C156	0	45 / ADS ALT SHUTDOWN PANEL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C157	0	45 / ADS ALT SHUTDOWN PANEL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C159	0	45 / RCIC Remote Shutdown Panel	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C161	0	45 / DG B ASP	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C170	1	45 / Post Accident Monitoring Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C171	1	45 / Post Accident Monitoring Panel	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C2228-A1	1	45 / RPS Analog Trip Cabinet	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C2228-A2	2	45 / RPS Analog Trip Cabinet	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
20	C930	0	45 / RCIC Relay Vertical Board	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	No	Yes	Yes	No
20	EPA1-6	0	46 / RPS Elec Protection Assembly	RW	23.00		23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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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
CT PITTS	Charles T. Pitts	5/22/96
JA KALB	Jeffrey A. Kalb	5/22/96

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?
4	X55	0	46 / Transformer to Y3/Y31	RW	23.00	MG SET	23.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
4	X56	0	46 / Transformer to Y4/Y41	RW	23.00	CSR	23.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
5	P209A	0	30 / RBCCW CRD PMP THRUST BRNG CLR	RB	-17.50	CRD QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P209B	0	30 / RBCCW CRD PMP THRUST BRNG CLR	RB	-17.50	CRD QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	PSV2301-23	0	23 / HPCI TURB SUCT PRESS RELIEF	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-28A	0	10 / RHR A Loop LPCI Injection	RB	23.00	A VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-29A	0	10 / RHR A Loop LPCI Injection	RB	23.00	A VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-43A	0	10 / RHR Pump A SDC Intertie	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-47	0	10 / RHR Shutdown Cooling Suction	RB	23.00	A VLV	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-50	0	10 / RHR Shutdown Cooling Isol	RB	52.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-7A	0	10 / RHR Pump P203A Suction	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
18	PS4008	0	30 / RBCCW LOOP B PMP CNTRL & ALARM	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS4058	0	30 / RBCCW LOOP A PMP CNTRL & ALARM	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	1340-4	1	13 / Pwr Supply for Press. Inst/THIS SEWS REPRESENTS ALL CR ROOM RULE-OF-THE BOX COMPONENTS	RW	37.00	CR	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
JG DYCKMAN	J G Dyckman	5/26/96
CT PITTS	Charles T. Pitts	5/22/96

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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?
4	X74	0	46 / Transformer to Y6	RB	23.00	MCC B17	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
4	X75	0	46 / Transformer to Y7	RB	23.00	MCC B18	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
4	X76	0	46 / Transformer to Y8	RB	23.00	MCC B10	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C153	0	45 / RHR ALT SHUTDOWN PANEL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C155	0	45 / HPCI ALTERNATE SHUTDOWN PANEL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C158	0	45 / HPCI ALTERNATE SHUTDOWN PANEL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C163	0	45 / RHR B Loop Alt Shutdown Panel	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/27/96
JA KALB	Jeffrey A. Kalb	5/28/96

Certification:

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5	P141A	0	61 / DG A Fuel Oil Transfer Pump	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P141B	0	61 / DG B Fuel Oil Transfer Pump	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P205	0	23 / HPCI PUMP	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P220	0	23 / HPCI GL SEAL COND PUMP	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P222	0	13 / RCIC Vacuum Pump	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P223	0	23 / HPCI GL SEAL CONDENSER BLOWER	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
5	P229	0	23 / HPCI AUX OIL PUMP	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P203A	0	10 / RHR Pump A	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P203B	0	10 / RHR Pump B	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P203C	0	10 / RHR Pump C	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P203D	0	10 / RHR Pump D	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P215A	0	14 / Core Spray Pump A	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P215B	0	14 / Core Spray Pump B	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
6	P221	0	13 / RCIC Vacuum Tank Cond. Pump	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
7	AO1301-12	0	13 / RCIC Vacuum Tank Cond. Disch.	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO1301-34	0	13 / RCIC Steam line Drain Isol	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-1A	0	01 / Steamline A Isolation Valve	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-1B	0	01 / Steamline B Isolation Valve	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-1C	0	01 / Steamline C Isolation Valve	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-1D	0	01 / Steamline D Isolation Valve	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-2A	0	01 / Steamline A Isolation Valve	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-2B	0	01 / Steamline B Isolation Valve	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-2C	0	01 / Steamline C Isolation Valve	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO203-2D	0	01 / Steamline D Isolation Valve	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO220-44	0	54 / Reactor Sample Line Isolation	RB	74.00	DW	74.25	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO2301-29	0	23 / HPCI STEAM SUPPLY DRAIN ISOL	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO4521	0	61 / DG A Fuel Pump Discharge Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	AO4522	0	61 / DG B Fuel Pump Discharge Valve	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	WRK	5/21/96

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7	CV2301-32	0	23 / HPCI TURB DRAIN POT ISOL VLV	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-21A	0	03 / RPS EAST SDIV VENT ISOL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-21B	0	03 / RPS WEST SDIV VENT ISOL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-22A	0	03 / RPS EAST SDIV DRAIN ISOL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-22B	0	03 / RPS WEST SDIV DRAIN ISOL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	No	No
7	CV302-23A	0	03 / RPS EAST SDIV VENT ISOL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-23B	0	03 / RPS WEST SDIV VENT ISOL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-24A	0	03 / RPS EAST SDIV DRAIN ISOL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	CV302-24B	0	03 / RPS WEST SDIV DRAIN ISOL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	No	No
7	HO1301-159	0	13 / RCIC Governing Valve	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PCV1301-43	0	13 / RCIC Lube Oil Cooling	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PCV2301-46	0	23 / HPCI Lube Oil Cooler	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV1301-31	0	13 / RCIC Suction line Relief	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV1301-42	0	13 / RCIC L.O. & Condenser Cooling	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV1301-70	0	13 / RCIC Vacuum Tank Relief	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV1401-28A	0	14 / Core Spray A Discharge Relief	RB	-10.00	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV2301-53	0	23 / HPCI PUMP RELIEF VALVE	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4020	0	30 / RBCCW E207A RELIEF	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4031	0	30 / RBCCW E207A RELIEF	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4032	0	30 / RBCCW E207B RELIEF	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4036	0	30 / RBCCW E207B RELIEF	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4563A	0	61 / Relief Valve - Turbo Air Tank	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4563B	0	61 / Relief Valve - Turbo Air Tank	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4563C	0	61 / Relief Valve - Turbo Air Tank	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4563D	0	61 / Relief Valve - Turbo Air Tank	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4565A	0	61 / Relief Valve - Turbo Air Tank	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4565B	0	61 / Relief Valve - Turbo Air Tank	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4582A	0	61 / T146A Pressure Relief Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R. Kline	5/27/96
W DJORDJEVIC	[signature]	5/24/96

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7	PSV4582B	0	61 / T146B Pressure Relief Valve	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4582C	0	61 / T146C Pressure Relief Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV4582D	0	61 / T146D Pressure Relief Valve	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV5010	0	09 / Nitrogen Header Relief Valve	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV5034A	0	09 / Nitrogen Header Relief Valve	RB	23.00	N WALL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV8004	0	10 / RHR Pump P203C Suction Relief	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV8005	0	10 / RHR Pump P203A Suction Relief	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV8006	0	10 / RHR Pump P203B Suction Relief	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	PSV8007	0	10 / RHR Pump P203D Suction Relief	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-3A	0	54 / ADS MAIN STEAM RELIEF VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-3B	0	54 / ADS MAIN STEAM RELIEF VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-3C	0	54 / ADS MAIN STEAM RELIEF VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-3D	0	54 / ADS MAIN STEAM RELIEF VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-4A	0	54 / ADS MAIN STEAM SAFETY VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV203-4B	0	54 / ADS MAIN STEAM SAFETY VALVE	RB	45.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085A	0	01 / Stmline A Accum T220A Relief	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085B	0	01 / Stmline B Accum T220B Relief	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085C	0	01 / Stmline C Accum T220C Relief	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085D	0	01 / Stmline D Accum T220D Relief	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085E	0	01 / Stmline A Accum T220E Relief	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085F	0	01 / Stmline B Accum T220F Relief	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085G	0	01 / Stmline C Accum T220G Relief	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	RV9085H	0	01 / Stmline D Accum T220H Relief	RB	23.00	STM TNL	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-97A	0	54 / RV203-3A Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-97B	0	54 / RV203-3B Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-97C	0	54 / RV203-3C Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-97D	0	54 / RV203-3D Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-98A	0	54 / RV203-3A Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	W Djordjevic	5/21/96

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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?
7	VRV261-98B	0	54 / RV203-3B Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-98C	0	54 / RV203-3C Torus Disch Vac Rel	RB	30.00	DW	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV261-98D	0	54 / RV203-3D Torus Disch Vac Rel	RB	30.00		23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
7	VRV9067	0	13 / RCIC Exhaust Line Vac Relief	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	CV9068A	0	23 / HPCI TORUS DRAIN POT VALVE	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	CV9068B	0	23 / HPCI TORUS DRAIN POT VALVE	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-16A	0	10 / RHR A Loop Ht Exch Bypass	RB	-3.00	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-16B	0	10 / RHR B Loop Ht Exchange Bypass	RB	-3.00	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-18A	0	10 / RHR A Loop Minimum flow	RB	-7.00	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-18B	0	10 / RHR B Loop Minimum Flow	RB	-7.00	NW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-34A	0	10 / RHR Loop A Torus Return	RB	9.00	SE QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-34B	0	10 / RHR Loop B Torus Return	RB	9.00	NW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-36A	0	10 / RHR Loop A Torus Return	RB	-1.00	SE QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1001-36B	0	10 / RHR Loop B Torus Return	RB	9.00	NW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1201-2	0	12 / RWCU Suction Line Isolation	RB	45.00	DW	51.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-17	0	13 / RCIC Steam Line Isolation Vlv	RB	23.00	TIP RM	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-22	0	13 / RCIC Suction from CST	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-25	0	13 / RCIC Suction from Torus	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-26	0	13 / RCIC Suction from Torus	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-49	0	13 / RCIC Discharge Isol. Valve	RB	23.00	TIP RM	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-60	0	13 / RCIC Min Flow Bypass	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-61	0	13 / RCIC Steam Supply Vlv	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1301-62	0	13 / RCIC L.O. & Condenser Cooling	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1400-24A	0	14 / Core Spray A Injection Valve	RB	51.00	RWCU HT	51.00	Yes	BS	GRS	Yes	No	N/A	Yes	No
8	MO1400-24B	0	14 / Core Spray B Injection Valve	RB	51.00	WEST	51.00	Yes	BS	GRS	Yes	No	N/A	Yes	No
8	MO1400-25B	0	14 / Core Spray B Injection Valve	RB	51.00	WEST	51.00	Yes	BS	GRS	Yes	No	N/A	Yes	No
8	MO1400-3A	0	14 / Core Spray A Supp Pool Suction	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1400-3B	0	14 / Core Spray B Supp Pool Suction	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	W Djordjevic	5/21/96

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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?
8	MO1400-4A	0	14 / Core Spray A Test Line Isol	RB	0.00	SE QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO1400-4B	0	14 / Core Spray B Test Line Isol	RB	0.00	NW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	No	No
8	MO2301-10	0	23 / HPCI RCIC TEST LINE/CST	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-14	0	23 / HPCI RHR TEST LINE/MIN	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-15	0	23 / HPCI RCIC/HPCI DISC TEST	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-3	0	23 / HPCI STEAM SUPPLY	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-35	0	23 / HPCI SUPP POOL SUCTION	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-36	0	23 / HPCI SUPP POOL SUCTION	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-6	0	23 / HPCI CST SUCTION	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO2301-8	0	23 / HPCI TURB INJ VALVE	RB	23.00	TIP	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4009A	0	30 / RBCCW LOOP B NE LOAD	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4009B	0	30 / RBCCW LOOP B NE LOAD	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4010A	0	30 / RBCCW Inlet to E209B	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4010B	0	30 / RBCCW Inlet to E209B	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4060A	0	30 / RBCCW Inlet to E209A	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4060B	0	30 / RBCCW Inlet to E209A	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MO4085A	0	30 / RBCCW LOOP A NE LOAD	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8183A	0	24 / MCCHVAC INLET MOV MCC B17	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8183B	0	24 / MCCHVAC OUTLET MOV MCC B17	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8184A	0	24 / MCCHVAC INLET MOV MCC B18	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8184B	0	24 / MCCHVAC OUTLET MOV MCC B18	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8185A	0	24 / MCCHVAC INLET MOV MCC B20	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	MOBB8185B	0	24 / MCCHVAC OUTLET MOV MCC B20	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV1301-12	0	13 / RCIC Vac Tank Cond. Pump Disch	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV1301-34	0	13 / Stm line drain cntrl solenoid	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV2301-29	0	23 / HPCI STM SUPPLY DRN SOL VLV	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-20A	0	03 / RPS CV302-21A & 24A CNTRL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-20B	0	03 / RPS CV302-21A & 24A CNTRL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	W Dj	5/21/96

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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?
8	SV302-20C	0	03 / RPS CV302-22A & 23A CNTRL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-20D	0	03 / RPS CV302-22A & 23A CNTRL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-21A	0	03 / RPS CV302-21B & 24B CNTRL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-21B	0	03 / RPS CV302-21B & 24B CNTRL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-21C	0	03 / RPS CV302-22B & 23B CNTRL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV302-21D	0	03 / RPS CV302-22B & 23B CNTRL	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4521	0	61 / Solenoid for A04521	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4522	0	61 / Solenoid for A04522	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4586A	0	61 / DG A Air Start Solenoid	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4586B	0	61 / DG A Air Start Solenoid	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4587A	0	61 / DG A Air Start Solenoid	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4587B	0	61 / DG A Air Start Solenoid	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4588A	0	61 / DG B Air Start Solenoid	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4588B	0	61 / DG B Air Start Solenoid	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4589A	0	61 / DG B Air Start Solenoid	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SV4589B	0	61 / DG B Air Start Solenoid	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SVL22	0	24 / DG HVAC AVU31 & AVU33 Control	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SVL23	0	24 / DG HVAC AVU32 & AVU34 Control	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
9	VSF-209	0	24 / MCCHVAC B17 FAN	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
9	VSF-210	0	24 / MCCHVAC B18 FAN	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
9	VSF-211	0	24 / MCCHVAC B20 FAN	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC-201A	0	24 / EAC HPCI RM COOLING	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	No	Yes	Yes	No
10	VAC-201B	0	24 / EAC HPCI RM COOLING	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	No	Yes	Yes	No
10	VAC-202A	0	24 / EAC RCIC RM COOLING	RB	2.80	SW QD	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC-202B	0	24 / EAC RCIC RM COOLING	RB	2.80	SW QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC-204A	0	24 / EAC RHR LOOP A AREA COOL	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC-204B	0	24 / EAC RHR LOOP A AREA COOL	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC-204C	0	24 / EAC RHR LOOP B AREA COOL	RB	-17.50	NW QD	23.00	Yes	BS	GRS	Yes	No	No	Yes	No

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/27/96
W DJORDJEVIC	W Djordjevic	5/24/96

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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?
10	VAC-204D	0	24 / EAC RHR LOOP B AREA COOL	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC202A-BDD	0	24 / EAC Backdraft Damper	RB	2.80	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC202B-BDD	0	24 / EAC Backdraft Damper	RB	2.80	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC203A	0	30 / RBCCW CRD EAC	RB	2.75	CRD MEZZ	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC203B	0	30 / RBCCW CRD EAC	RB	2.75	CRD MEZZ	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC204A-BDD	0	24 / EAC Backdraft Damper	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC204B-BDD	0	24 / EAC Backdraft Damper	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC204C-BDD	0	24 / EAC Backdraft Damper	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC204D-BDD	0	24 / EAC Backdraft Damper	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205A-1	0	30 / RBCCW DRYWELL EAC	RB	45.00	DW	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205A-2	0	30 / RBCCW DRYWELL EAC	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205B-1	0	30 / RBCCW DRYWELL EAC	RB	41.00	DW	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC205B-2	0	30 / RBCCW DRYWELL EAC	RB	41.00	DW	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC205C-1	0	30 / RBCCW DRYWELL EAC	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC205C-2	0	30 / RBCCW DRYWELL EAC	RB	23.00	DW	23.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC205D-1	0	30 / RBCCW DRYWELL EAC	RB	41.00	DW	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205D-2	0	30 / RBCCW DRYWELL EAC	RB	41.00	DW	51.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205E-1	0	30 / RBCCW DRYWELL EAC	RB	15.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205E-2	0	30 / RBCCW DRYWELL EAC	RB	15.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205F-1	0	30 / RBCCW DRYWELL EAC	RB	15.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC205F-2	0	30 / RBCCW DRYWELL EAC	RB	15.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC206B-1	0	30 / RBCCW DRYWELL EAC	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
10	VAC206B-2	0	30 / RBCCW DRYWELL EAC	RB	13.00	DW	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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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?
10	VAC207A	0	30 / RBCCW RECIRC MG SET EAC	RB	51.00	MG SET	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC207B	0	30 / RBCCW RECIRC MG SET EAC	RB	51.00	MG SET	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC207C	0	30 / RBCCW RECIRC MG SET EAC	RB	51.00	MG SET	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
10	VAC207D	0	30 / RBCCW RECIRC MG SET EAC	RB	51.00	MG SET	51.00	Yes	BS	GRS	Yes	No	No	Yes	No
11	E202	0	23 / HPCI GLAND SEAL CONDENSER	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
12	K103B	0	61 / DG B Air Start Compressor	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
17	X107A	0	61 / DG A Engine & Generator	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
17	X107B	0	61 / DG B Engine & Generator	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2256A	0	45 / RPS-MSL Hi Flow	RB	2.90	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2256B	0	45 / RPS-MSL Hi Flow	RB	2.90	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2257A	0	45 / HPCI INSTRUMENT RACK	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C2258	0	45 / RCIC Instrument Rack	RB	2.90	SW QD	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	C83	0	45 / Condensate Transfer Instr Rack	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	No	Yes	Yes	No
18	FE1048A	0	10 / RHR Loop A Flow Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE1048B	0	10 / RHR Loop B Flow Element	RB	-17.50	TORUS	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE1463A	0	14 / CS A Discharge Flow Element	RB	-5.00	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FE1463B	0	14 / CS B Discharge Flow Element	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	FT6241	0	29 / SSW FLOW-RBCCW LP B	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LE302-82C	0	03 / RPS EAST SDIV LVL TO LS302-82C	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LE302-82D	0	03 / RPS EAST SDIV LVL TO LS302-82D	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LE302-83A	0	03 / RPS WEST SDIV LVL TO LS302-83A	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LE302-83B	0	03 / RPS WEST SDIV LVL TO LS302-83B	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LIC3508	0	26 / CST Lvl Indicating Controlier	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS2369	0	23 / HPCI EXH DRN POT LVL ALRM & CN	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4531A	0	61 / DG A Fuel Pump stop/start Sw	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4531B	0	61 / DG A Fuel Pump stop/start Sw	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4532A	0	61 / DG A Day Tank Level Alarm	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4532B	0	61 / DG A Day Tank Level Alarm	DG A	23.00	DG A	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	W Djordjevic	5/21/96

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?
18	LS4533A	0	61 / DG B Fuel Pump stop/start Sw	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4533B	0	61 / DG B Fuel Pump stop/start Sw	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4534A	0	61 / DG B Day Tank Level Alarm	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS4534B	0	61 / DG B Day Tank Level Alarm	DG B	23.00	DG B	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	LS9068	0	23 / HPCI TORUS DRPOT LVL VLV CNTRL	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS2390A	0	26 / Low CST Level HPCI Transfer	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PS2390B	0	26 / Low CST Level HPCI Transfer	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-600A	0	45 / Drywell Pressure Transmitter	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-600B	0	45 / Drywell Pressure Transmitter	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-601A	0	45 / Drywell Pressure Transmitter	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT1001-601B	0	45 / Drywell Pressure Transmitter	RB	74.00	EAST	74.25	N/A	ABS	RRS	Yes	Yes	Yes	Yes	Yes
18	PT1360-19	0	13 / RCIC Pump Suction Pressure	RB	-17.50	SW QD	-17.50	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT261-30A	0	45 / RPS-MSL Low Press.	TB	23.00	COND PMP	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT261-30B	0	45 / RPS-MSL Low Press.	TB	23.00	COND PMP	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT261-30C	0	45 / RPS-MSL Low Press.	TB	23.00	COND PMP	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT261-30D	0	45 / RPS-MSL Low Press.	TB	23.00	COND PMP	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT4008	0	30 / RBCCW LOOP B HDR PR IND	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
18	PT4058	0	30 / RBCCW LOOP A HDR PR IND	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
19	TE1046A	0	10 / RHR A Loop Ht Exch Inlet Temp	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE1046B	0	10 / RHR B Loop Ht Exch Inlet Temp	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE1047A	0	10 / RHR A Loop Ht Exch Outlet Temp	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE1047B	0	10 / RHR B Loop Ht Exch Outlet Temp	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3835	0	30 / RBCCW LOOP B TEMP CL	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3836	0	30 / RBCCW LOOP A TEMP CL	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3840	0	29 / SSW LP A RBCCW HX OUTLET TEMP	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3841	0	29 / SSW LP B RBCCW HX OUTLET TEMP	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3890	0	29 / SSW LP A RBCCW HX INLET TEMP	AXBAY	3.00	A COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TE3891	0	29 / SSW LP B RBCCW HX INLET TEMP	AXBAY	3.00	B COMP	3.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/27/96
W DJORDJEVIC	W Djordjevic	5/24/96

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?
19	TS1A	0	24 / CRHEAF TRAIN A TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS1B	0	24 / CRHEAF TRAIN B TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS2A	0	24 / CRHEAF TRAIN A TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS2B	0	24 / CRHEAF TRAIN B TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS3A	0	24 / CRHEAF TRAIN A TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS3B	0	24 / CRHEAF TRAIN B TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS4A	0	24 / CRHEAF TRAIN A TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS4B	0	24 / CRHEAF TRAIN B TEMP SW	RW	76.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	N/A	Yes	No
19	TS8155A	0	24 / MCCHVAC TEMP SW MCC B17	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TS8155C	0	24 / MCCHVAC TEMP SW MCC B17 ALARM	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TS8156A	0	24 / MCCHVAC TEMP SW MCC B18	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TS8156C	0	24 / MCCHVAC TEMP SW MCC B18 ALARM	RB	23.00	WEST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TS8157A	0	24 / MCCHVAC TEMP SW MCC B20	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TS8157C	0	24 / MCCHVAC TEMP SW MCC B20 ALARM	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD41	0	24 / EAC VAC202A Fan Control	RB	2.80	SW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD42	0	24 / EAC VAC202B Fan Control	RB	2.80	SW QD	23.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD43	0	24 / EAC VAC201A Fan Control	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD44	0	24 / EAC VAC201B Fan Control	RB	-17.50	HPCI	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD45	0	24 / EAC VAC204A Fan Control	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	No	No
19	TSD46	0	24 / EAC VAC204B Fan Control	RB	-17.50	SE QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	No	No
19	TSD47	0	24 / EAC VAC204C Fan Control	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
19	TSD48	0	24 / EAC VAC204D Fan Control	RB	-17.50	NW QD	-17.50	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
20	C11	0	45 / TRANSMITTER POWER PANEL	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C152	0	45 / RHR ALT SHUTDOWN PANEL	RB	23.00	EAST	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C248	0	45 / MCC B17 Fan Control Panel	RB	23.00	MCC B17	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C249	0	45 / MCC B18 Fan Control Panel	RB	23.00	MCC B18	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C250	0	45 / MCC B20 Fan Control Panel	RB	23.00	MCC B20	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C64	0	45 / SSW HVAC Control Panel	INTK	25.60	STAIRWL	38.00	Yes	BS	GRS	Yes	Yes	Yes	No	No

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/22/96
W DJORDJEVIC	W Dj	5/24/96

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20	LIS302-82A	0	03 / RPS EAST SDIV LEVEL ATS TRIP	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	LIS302-82B	0	03 / RPS EAST SDIV LEVEL ATS TRIP	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	LIS302-83C	0	03 / RPS WEST SDIV LEVEL ATS TRIP	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	LIS302-83D	0	03 / RPS WEST SDIV LEVEL ATS TRIP	RW	23.00	CSR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
WR KLINE	William R Kline	5/21/96
W DJORDJEVIC	W Djordjevic	5/14/96

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6	P208A	0	29 / SSW PUMP A	INTK	25.50	A COMP	21.50	N/A	ABS	RRS	No	No	Yes	Yes	No
6	P208B	0	29 / SSW PUMP B	INTK	25.50	A COMP	21.50	N/A	ABS	RRS	No	No	Yes	Yes	No
6	P208C	0	29 / SSW PUMP C	INTK	25.50	C COMP	21.50	N/A	ABS	RRS	No	No	Yes	Yes	No
6	P208D	0	29 / SSW PUMP D	INTK	25.50	B COMP	21.50	N/A	ABS	RRS	No	No	Yes	Yes	No
6	P208E	0	29 / SSW PUMP E	INTK	25.50	B COMP	21.50	N/A	ABS	RRS	No	No	Yes	Yes	No

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Print or Type Name	Signature	Date
JG DYCKMAN	[signature]	5/23/96
JA KALB	[signature]	5/22/96

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8	SVL-15	0	24 / CRHEAF TRAIN B DAMPER CONTROL	RW	64.00	#2FRM	66.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
8	SVL-5	0	24 / CRHEAF TRAIN A DAMPER CONTROL	RW	64.00	#2FRM	81.00	Yes	BS	GRS	Yes	Yes	N/A	Yes	Yes
10	VCRF-101A	0	24 / CRHEAF TRAIN A FILTER HEATR	RW	78.00	#2FRM	81.00	N/A	ABS	RRS	No	Yes	Yes	Yes	No
20	C179	0	45 / Torus Wtr Temp Signal Proc Cab	RW	37.00	SAS	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C180	0	45 / Torus Wtr Temp Signal Proc Cab	RW	37.00	SAS	37.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
JA KALB	Jeffrey A. Kalb	5/22/96
W DJORDJEVIC		5/24/96

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15	D1	0	46 / 125VDC Control Battery Rack A	TB	37.00	A BTTRY	37.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
15	D2	0	46 / 125VDC Control Battery Rack B	TB	23.00	B BTTRY	23.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
15	D3	0	46 / 250VDC Power Battery Rack	TB	23.00	B BTTRY	23.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
16	D11	0	46 / Normal 125VDC Changer for D1	TB	37.00	A SWGR	37.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
16	D12	0	46 / Normal 125VDC Changer for D2	TB	23.00	B SWGR	23.00	N/A	DOC	RRS	Yes	Yes	Yes	Yes	Yes
16	D13	0	46 / Normal 250VDC Changer for D3	TB	23.00	B SWGR	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes

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Print or Type Name	Signature	Date
CT PITTS	Charles T. Pitts	5/22/96
SC CHUGH		5/22/96

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18	C208	0	45 / Drywell Cooling Fan Train A Relay Rack	RB	23.00	MCC B17	23.00	Yes	BS	GRS	Yes	Yes	Yes	No	No
18	C209	0	45 / Drywell Cooling Fan Train B Relay Rack	RB	23.00	MCC B18	23.00	Yes	BS	GRS	Yes	Yes	Yes	Yes	Yes
20	C61	0	45 / React Bldg H&V Control Panel	RB	23.00	E WALL	23.00	N/A	ABS	CRS	No	Unk	No	Yes	No
8	MO4038A	0	30 / RBCCW Drywell EAC Control Vlv	RB	45.00	DW	51.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4038B	0	30 / RBCCW Drywell EAC Control Vlv	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4038C	0	30 / RBCCW Drywell EAC Control Vlv	RB	23.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4038D	0	30 / RBCCW Drywell EAC Control Vlv	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4038E	0	30 / RBCCW Drywell EAC Control Vlv	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4038F	0	30 / RBCCW Drywell EAC Control Vlv	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039A	0	30 / RBCCW Drywell EAC Control Vlv	RB	23.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039B	0	30 / RBCCW Drywell EAC Control Vlv	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039C	0	30 / RBCCW Drywell EAC Control Vlv	RB	23.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039D	0	30 / RBCCW Drywell EAC Control Vlv	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039E	0	30 / RBCCW Drywell EAC Control Vlv	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4039F	0	30 / RBCCW Drywell EAC Control Vlv	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4040A	0	30 / RBCCW Drywell EAC Control Vlv	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4040B	0	30 / RBCCW Drywell EAC Control Vlv	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4041A	0	30 / RBCCW Drywell EAC Control Vlv	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
8	MO4041B	0	30 / RBCCW Drywell EAC Control Vlv	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	N/A	Unk	No
10	VAC205B1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205B2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	41.00	DW	51.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205C1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	23.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205C2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	23.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205E1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No

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.)

Print or Type Name	Signature	Date
JG DYCKMAN	JG Dyckman	8/12/96
CT PITTS	Charles T. Pitts	8/12/96

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?
10	VAC205E2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205F1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC205F2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	15.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC206A1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC206A2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC206B1-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No
10	VAC206B2-BDD	0	30 / RBCCW Drywell EAC Bkdrft Dmp	RB	13.00	DW	23.00	Yes	BS	GRS	No	Unk	Unk	Unk	No

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.)

Print or Type Name	Signature	Date
JG DYCKMAN		8/12/96
CT PITTS	Charles T. Pitts	8/12/96

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

15. Appendix E: Peer Review Assessment

15.1 Description of Peer Review

A peer review of the resolution of USI-A46 at Pilgrim Nuclear Power Station in accordance with the Generic Implementation Procedure was conducted by Dr. John D. Stevenson of Stevenson and Associates to the requirements of GIP Part 1, Section 2.2.7 on August 17th and 18th, 1994. The review provided an assessment of GIP walkdowns by a review of a sample of completed Seismic Evaluation Work Sheets (SEWS) and the associated Outlier Seismic Verification Sheets (OSVS). Following the review of the SEWS and OSVS forms, an in-plant walk by of the reviewed components was conducted to determine if the SEWS captured the " as is " condition of the components in the plant as they relate to the seismic verification of these components.

15.2 Results of Peer Review

A total of 17 component SEWS were reviewed which included 6 OSVS. The components reviewed along with the outcome of the review are summarized below. For additional information refer to the peer review letter [Reference 18] included as subsection 15.4 of this report.

Table 15-1
Peer Review Results

ITEM #	COMPONENT ID & NAME	REVIEW RESULTS & ACTION ITEMS
1	C2251A, Jet Pump Instrument Rack	Justify basis for 3/8" gap acceptance
2	C2251B, Jet Pump Instrument Rack	Agree with SEWS
3	C150, SSW / RBCCW Alternate Shutdown Panel	Agree with SEWS
4	X22, 4KV/480V Transformer	Agree with SEWS
5	C174, PASS Isolation Valve Control Panel	Validate deflection calculation. Consider anchor tension
6	AA504, 4KV Undervoltage Relay Cabinet	Agree with SEWS
7	C175, PASS Isolation Valve Control Panel	Agree with SEWS
8	P206, RCIC Pump	Agree with SEWS
9	VAC203A, RBCCW CRD EAC	Shock isolator question.
10	X107B, Diesel Generator B	Agree with SEWS
11	VAC203B, RBCCW CRD EAC	Shock isolator question.
12	MO2301-6, HPCI CST Suction Valve	Agree with SEWS
13	P202A, RBCCW Pump	Editorial comment
14	AO1301-12, RCIC Vacuum Tk Cond Discharge Valve	Agree with SEWS
15	B17 480V MCC	OSVS for component missing
16	125 volt Station Battery	Agree with SEWS
17	Low Voltage Switchgear B6	Agree with SEWS

15.3 Resolution of Peer Review Findings Requiring Follow-up Action

The peer review generated comments which require resolution on a total of 6 component SEWS. In addition, 2 localized observed items and 3 generic items were identified during the field walk-by as requiring resolution. The items along with their resolution are summarized in Table 15-2 which follows.

Table 15-2
Resolution of Peer Review Findings

ITEM #	COMPONENT ID & NAME	REVIEW RESULTS & RESOLUTION
1	C2251A, Jet Pump Instrument Rack	Justify basis for 3/8" gap acceptance. **Resolved - Seismic interaction issue resolved in C2251A , Rev. 1.**
5	C174, PASS Isolation Valve Control Panel	Validate deflection calculation. Consider anchor tension. **Resolved - Seismic interaction issue resolved in 174, Rev. 1.**
9	VAC203A, RBCCW CRD EAC	Shock isolator question. **Closed - This item will be resolved as part of Outlier O22.**
11	VAC203B, RBCCW CRD EAC	Shock isolator question. **Closed - This item will be resolved as part of Outlier O22.**
13	P202A, RBCCW Pump	Editorial comment. **Closed. This is a comment and no action is required.**
15	B17 480V MCC	OSVS for component missing. **Closed. OSVS has been generated and added to Rev 0 of the SEWS.**
"As observed" Condition 1	D1, D2 and D3, 125volt and 250 volt Station Batteries	Station battery racks had gaps between the batteries and the side bars. They should be closed by adjustment or by shimming. **Resolved - Station Batteries D1, D2 and D3 have been replaced for other reasons. The replacements consists of new cells and racks which meet design basis seismic requirements, ie. IEEE344-75. The new batteries were inspected and found to be free of the gaps observed in the old racks.**
"As observed" Condition 2	Emergency Diesel Generator B	A small trolley hoist is located above Diesel Generator B. The hoist operating chain hangs down and could be dragged over the diesel in a seismic event causing damage. The chain should be stowed so it cannot drag along the diesel or the trolley should be positively restrained. **Resolved - FRN 96-01-45 has been issued to install two chain loops that the hoist chain can be secured to.**
General Issue 1	Lights over SSEL equipment	In a few instances very light chains were observed supporting lights. **Closed - This item will be tracked and resolved as General Interaction Issue G1.**
General Issue 2	High pressure gas bottle	A gas bottle was observed to be secured by a horizontal chain at a single location. **Closed - This item will be tracked and resolved as General Interaction Issue G2.**
General Issue 3	Fire extinguishers	Supporting knobs were observed to be less than ½" high in some instances. **Closed - This item will be tracked and resolved as General Interaction Issue G3.**

15.4 Peer Review Letter

S&A STEVENSON & ASSOCIATES
a structural-mechanical consulting engineering firm

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LTR8.22

February 19, 1996

Mr. Charles Pitts
Boston Edison
Pilgrim Nuclear Power Station
600 Rockyhill Road
Plymouth, MA 02360-5599

Dear Mr. Pitts:

This letter is meant to document my independent peer review audit of the resolution of USI-A46 on the Pilgrim NPP in accordance with the requirements of the Generic Implementation Procedure, GIP Section 2.2.7. This review was conducted Wednesday 17 and Thursday 18 August 1994. In this review I am providing an assessment of an USI-A46 GIP walkdown by a review of a sample of the completed Seismic Evaluation Work Sheets, SEWS, and associated Outlier Seismic Verification Sheets, OSVS. Following a review of the completed SEWS and OSVS forms a walkby in the plant of the components reviewed was conducted to determine if the SEWS captured the "as is" condition of the components in the plant as they relate to the seismic verification of these components.

A total 17 component SEWS were reviewed which included 6 OSVS. The conclusion reached on the individual SEWS and OSVS reviewed are as follows:

1) Item C2251 Instrument Rack - Class 18

   a) What is the basis for 3/8" gap O.K.? Otherwise agree with SEWS.

2) Item C2251B Instrument Rack - Class 18

   Agree with SEWS.

3) Item C150 Shutdown Panel - Class 20

   Agree with SEWS.

4) Item X22 Transformer - Class 4

   Agree with SEWS.

5) Item C174 I&C Panels and Cabinet - Class 20

   a) Inertia deflections only valid if no tension in anchorage. Deflection calculations give results which are not rational when considering anchorage flexibility. Otherwise agree with SEWS.

6) Item AA504 I&C Panel and Cabinets - Class 20

   Agree with SEWS.

7) Item C175 I&C Panel and Cabinets - Class 5

   Agree with SEWS.

8) Item P 206 Horizontal Pump - Class 5

   Agree with SEWS.

9) Item VAC 203A Air Handler - Class 10

   (a) Shock isolators are only a problem if they permit unrestrained lateral displacement. Is this the case in this instance? Otherwise agree with SEWS.

10) Item DG B Emergency Diesel - Class 17

    Agree with SEWS.

11) Item VAC 203B Air Handlers - Class 10

    See Item 9(a). Otherwise agree with SEWS.

12) Item MO 2301-6 Motor Op Valve - Class 8

    Agree with SEWS.

13) Item P202A Pump A Loop A - Class 5

    a) If attached piping is well supported why do you need a comment? - CAV4

14) Item A01301-12 Fluid Op Valve - Class 7

    Agree with SEWS.

S&A

15) Item B17 MCC - Class 17

(a) Why no OSVS for this component given on interaction concern?

16) Item D 1 Battery Rack A - Class 15

Agree with SEWS.

17) Item B6 Low Voltage Switchgear - Class 2

Agree with SEWS.

In addition to the SEWS review OSVS were reviewed for the following items 1), 2), 7), 9), 11) and 13) and I agree with OSVS findings. It was also noted that for item 15) apparently an unresolved interaction concern was listed but without an accompanying OSVS.

On Thursday 18 August 1994, I walked through the plant to review the content of the SEWS against the "as observed" condition of the component. The only conditions observed not otherwise considered by the SEWS are as follows:

a) Item 16) battery racks had gaps between the batteries and the side bars which in a few instanced were up to about a 3/8" gap. In my opinion that gap should be classed by either adjusting the side bars or placing a shin panel between the side bar and the battery.

b) On the diesel generation item 10 it was noted that a small trolley section of a hoist was located over one end of the D.G. with a chain hanging down. In my opinion the chain should be secured so if the trolley slides along the beam on which it is mounted the chain would not be dragged over the diesel potentially failing tubing in its path. Alternatively, the trolley should be positively restrained.

There were some additional generic issues noted during the walkby as follows:

a) There are some very light chains support lights which in my opinion should be vertically load tested to 3 x deadweight to demonstrate there seismic adequacy.

b) Pressurized gas bottles were secured in some cases by a single horizontal chain. In my opinion a double chain or a lateral restraint shoe on the bottom of the bottle should be added to assure lateral restraint adequacy.

c) Fire extinguisher should be checked to assure the knob supporting the extinguisher should be at least 1/2" high.

S&A

In conclusion I believe USI-A46 walkdown and seismic adequacy judgment and analysis are being done in a thorough and competent manner in accordance with the requirements of GIP.

Sincerely,

John D. Stevenson
President

JDS:ss

cc: Tom Tracy

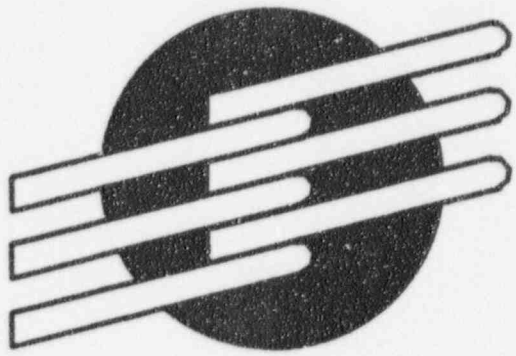
S&A

16. Appendix F: Results of Cable Tray and Conduit Review

SUDDS/RF 95-05

S&A

Stevenson & Associates



Boston Edison Company

USI A-46 Electrical Raceway Report

July 29, 1994

for

Pilgrim Nuclear Power Station

S&A Project 93C2787

Pilgrim USI A-46 Electrical Raceway Report

Table of Contents

There were only a few inaccessible rooms that were not visited by the walkdown team. Those rooms were of small size (such as tank rooms) and extremely high radiation zones where the raceways were not expected to be different than the raceways that were observed outside of these rooms. Furthermore, for those inaccessible rooms, drawings were reviewed to confirm that additional raceways did not originate in the rooms and that the raceways that entered and exited the rooms did not significantly change their configuration such as number of tiers, or conduits, or their fill ratios.

All areas that were walked down were evaluated against the Inclusions Rules,and the caveats (also known as "Other Seismic Concerns" and "Seismic Interaction"). Section 4 discusses the evaluation criteria at greater length.

The surveys are documented on Plant Area Summary Sheets (PASS).

Table A.1 in Appendix A provides an index of the areas reviewed and for which PASS forms were completed. Appendix A also contains copies of all of the PASS forms listed in Table A.1.

2.2 General Description of Pilgrim Raceways

Pilgrim's raceway systems are primarily light steel strut frame construction with some (very few) trapeze rod hanger construction. The strut hangers vary from the very simple single cantilever strut supporting one or a few conduits to multi-tier, three-dimensional strut frames supporting cable trays and conduits.

The trays varied in size from 6" width to 36" width, primarily of 12" to 24" ladder and trough type construction. Conduits vary in size from 1/2" to 4" nominal diameter and are of rigid steel material (standard schedule pipe). Trays were often sprayed with fire retardant, covered or constructed with fire board barriers between tray tiers.

The trays and conduits were secured to hangers using standard tray clamps (clips) and pipe clamps. Missing or damaged hardware was not identified in the scope of the walkdown.

The hangers are generally constructed of double channel members interconnected with 4-bolt gusseted ninety degree fittings. The hangers are anchored to overhead channels which are connected to concrete slabs by expansion anchors, or clamped and/or welded to structural steel. Anchorage designs such as welding fittings directly to steel and clamping to structural steel using clamps are quite common throughout the plant. The use of beam clamps for the rod hanger systems are also found, but to a much lesser extent.

Lateral (transverse) bracing is used in various systems. Also, strut members longitudinally connecting raceway hangers provide ductile longitudinal frame action which increases longitudinal seismic capability.

A considerable percentage of the raceway systems are rigidly mounted on walls using strut frames, brackets or single strut members mounted directly on the wall. This is the predominant mode of raceway support inside the drywell.

Photographs of the various types of Pilgrim raceways may be found in the PASS forms in Appendix A.

2.3 Specific Raceway Systems Evaluated

The goal of the evaluation process is to determine overall plant raceway systems acceptability based on a detailed examination of a focused review scope. The GIP [6.1] evaluation procedure requires that each plant evaluates 10 - 20 raceway supports selected for Limited Analytical Reviews (LAR) to envelop the most heavily loaded of the major different support configurations in use at that plant. Following GIP, all of the raceway systems and their supports were first checked against the Inclusion Rules and Caveats. Then the Seismic Review team (SRT) selected representative, worst-case (bounding) samples of the raceway supports on which LAR was performed. This process allows for the establishment of the adequacy of the plant's raceway systems. The actual supports used for LAR were selected following GIP recommendations and at the discretion of the SRT relying on experience and technical judgment.

A limited number of large junction boxes were observed. The conduit/tray feeding into the junction boxes are well supported in all instances. In addition, the junction boxes are also well supported. No unusual conditions were observed.

Raceways spanning seismically separate buildings were also observed. The raceway trays and supports, including cable and conduit, possess adequate flexibility to absorb relative movement between the buildings. It is also noted that relative seismic movement between seismically separate buildings at Pilgrim Station are low.

In all, 25 raceway systems (supports) were chosen for LAR. It shall be noted that 18 of them were previously (in 1982) selected by Bechtel Corporation for rigorous analysis [6.4]. Eight (8) out of the 25 supports chosen for LAR did not meet the LAR requirements - specifically the requirement that anchorage capacity be sufficient to meet the vertical dead load capacity (1.0 x DL) and vertical capacity checks (3.0 x DL) and were, therefore, considered as outliers. However, they were ultimately found to be just "Analytical Outliers" as they passed lateral load evaluations and did not require any hardware modification. Following the GIP recommendations for outliers these supports were further evaluated using more detailed analytical models to demonstrate that they were as rugged as required [6.3]. The completed Outlier Seismic Verification Sheets (OSVS) for the 8 analytical outliers are contained in Appendix B.

As a result all 25 supports chosen for LAR were shown to meet acceptance criteria with no hardware modifications required.

Drawings or sketches of the LAR supports may be found in the respective PASS Forms.

3. Previous Seismic Raceway Evaluation Procedure & Results

Boston Edison Company (BECo) conducted rigorous evaluations of the Pilgrim Station electrical raceway systems in 1982 through its contractor, Bechtel Corporation. The purpose in evaluating electrical raceway systems at that time was a desire to apply any lessons learned based on an extensive raceway testing program undertaken by Bechtel Corporation in the late 1970s. BECo decided to evaluate their raceways and incorporate any design modifications that might be forthcoming and of a generic nature [6.4].

In a fashion quite similar to the GIP procedural evaluations, the basis for evaluation was the selection of 20 representative worst case examples of the Pilgrim raceway construction. In this sense it was identical in approach to the GIP evaluation procedure. Where it differed, however, is that the evaluations were conducted rigorously as opposed to the more simplified checks required by the GIP procedure. Each raceway was sketched (as-built condition) in great detail. Rigorous frequency and stress analyses were conducted with the aid of computer models. Test data specifically germane to Pilgrim's raceway hardware details were applied , as appropriate. Detailed longitudinal analyses were also conducted for each system analyzed. By then and present day standards, the analytical approaches and criteria would meet new plant analysis and design procedures.

Ref. 6.4 contains the Pilgrim Station Raceway Evaluation Criteria developed for the assessment.

Hangers were evaluated for the following load conditions:

(1) Dead Load (DL) + Live Load (LL) $<$ f (working stress allowable),

(2) DL + LL + Operating Basis Earthquake (OBE) $<$ f,

(3) DL + LL + Safe Shutdown Earthquake (SSE) $<$ 1.5 x f $\leq f_y$

All concrete expansion anchors are evaluated against manufacturer's recommended working loads - generally a factor of safety of 4 or 5 (dependent on manufacturer) against ultimate failure loads. See Tables 1 through 3 in Appendix 1 of Ref. 6.4 for anchorage allowables used. For all analyses, the stresses were combined absolutely for vertical load and one horizontal component of the earthquake. The hangers were evaluated in the transverse and longitudinal directions in every case.

Each hanger system was evaluated for natural frequency including the flexibility of the raceway components (trays and conduits). The frequency was varied plus or minus 20% for the purpose of selecting spectral acceleration. Spectral accelerations are based on the floor response spectra for the floor from which the hanger is supported.

Five levels of analysis were defined ranging from the most conservative attempt (Level 1) to the most detailed (Level 5). The five levels of analysis are discussed, following:

Level 1. This initial level of analysis is the most conservative of the five levels. All trays are considered fully loaded based on 50#/ft weight for a 24" wide tray. The OBE damping is set to 2% and the SSE damping to 5%.

Level 2. This analysis level is similar to level 1 except that actual tray weights are used and 7% damping is assumed for the SSE analysis. The OBE analysis case is eliminated.

Level 3. This level involves comparing the hanger to the lower bound test table response spectra used during the Bechtel/ANCO test program [6.5]. This clearly requires reasonable similarity to tested configurations and was not used in the evaluation of the 20 Pilgrim supports.

Level 4. This level of analysis utilizes inelastic analysis techniques commonly referred to as "energy balance". The criteria was based on a maximum ductility ratio of 4 on displacement and a minimum cyclic demand of 60 full cycles. The technique is described in detail in Appendix C [6.4]. Level 4 evaluations were not used for any of the 20 Pilgrim supports.

Level 5. Level 5 analysis involves modeling the entire raceway system, essentially from anchor to anchor of the system. Detailed computer models were developed using finite element techniques. Eigenvalue extraction analyses were performed and response spectrum stress analyses were conducted. Stresses and loads in every raceway element were checked. Both transverse and longitudinal analyses were conducted.

This evaluation resulted in no major hardware modifications or seismic upgrades.

4. Current Raceway Seismic Evaluations and Results

The following three sections discuss the results of the raceway seismic evaluations for the Pilgrim station.

4.1 GIP Inclusion Rules Results

As previously stated, the vast majority of raceway systems in the power block buildings were included in the walkdown. Where it is clear that not every hanger fitting or every square foot of supporting concrete can be inspected, it is still important to note that a very thorough review of most raceways was accomplished.

Without exception, no anomalies in design or construction were found. All inspected raceways meet the requirements of Section 8.2.2 of the GIP [6.1] as follows:

- Cable tray spans did not exceed the 10' limit between adjacent supports and the 5' limit for cantilevers;
- Conduit spans were within the limits required by Rule 2 of Section 8.2.2 [6.1];
- On all cantilever bracket-supported systems cable trays and conduit were found secured to their supports so no tray or conduit sliding can occur;
- Channel nuts used with light metal framing systems were nuts with teeth (ridges) stamped into the nuts (Fig.8-1, Ref. 6.1);
- No "rigid boot" type connection or similar (Fig.8-2, Ref. 6.1) was observed during the walkdown inspection;
- None of the beam clamps inspected had friction resistance in the direction of gravity;
- Cast-iron anchor embedment rule implementation was resolved as follows. To check for cast iron anchorage embedments in a walkdown is not clearly feasible; however, BECo undertook an exhaustive effort to identify and document its concrete anchorages for the IE 79-02 Bulletin Issue in 1981 and reported the results in *Summary Report, Generic Response to USNRC I&E Bulletin Number 79-02 Baseplate/Concrete Expansion Anchor Bolts* [6.6]. The report shows the use of various commonly used and well documented ductile steel anchor types, but no usage of cast iron embedments was found. Therefore, this issue has no impact on Pilgrim Station.

Masonry block walls were found throughout the station and in the vicinity of electrical raceways. Moreover, some raceway systems were transversely and longitudinally braced to block walls. Since block walls are ubiquitous at Pilgrim, it was necessary to verify that all block walls near safety-related equipment, including electrical raceways, had been reviewed in a systematic fashion for seismic integrity. BECo undertook a program of detailed review of masonry block walls in response to IE Bulletin 80-11 [6.7] in which all masonry walls (nearly 400 in total) were reviewed and dispositioned. The inclusion of Class 1E electrical raceways with other safety related systems and components, and satisfactory response to NRC Bulletins [6.6, 6.7] satisfies this GIP requirement.

Pilgrim Station meets the Inclusion Rules in their entirety.

4.2 GIP Other Seismic Performance Concerns & Seismic Interaction Review

In addition to the Inclusion Rules the SRT inspected the raceway systems for the caveats known as "Other Seismic Performance Concerns" and "Seismic Interaction Review". The assessment results are as follows:

Other Seismic Performance Concerns

- All raceway anchorages were reviewed for adequacy in accordance with Section 8.2.3 [6.1]. No concerns were found;
- No concerns were found regarding visible cracks, significantly spalled concrete, serious honeycombs or other gross defects in the concrete to which the raceway supports are attached;
- No significant corrosion of cable trays, conduit supports or anchorage was noted by the SRT;
- No noticeable sag of any conduit or cable tray as defined in Concern 4 of Section 8.2.3 [6.1] was observed;
- No broken or missing cable tray and conduit components were found by the SRT;
- All cables inspected were restrained so they will be kept in the tray during an earthquake. No concern of that type was observed by the SRT;
- Plastic ties were pull-tested where found and no brittle ties of plastic materials were found by the SRT;
- The SRT evaluated the raceways for stiff/short supports and found no instances of this design flaw. Pilgrim's hangers are of uniform height in long flexible runs of cable trays or conduit.

No findings were noted with respect to "Other Seismic Performance Concerns".

Seismic Interaction

- The raceway systems were reviewed for seismic proximity interaction in accordance with Section D.2. [6.1]. No concerns were found by the SRT;
- The raceway systems were reviewed for falling hazards in accordance with Section D.3 [6.1]. One concern was noted, an unanchored hot water tank located on a platform above a safety-related wall mounted conduit located in the machine shop in the Radwaste Building. This concern has been documented on an OSVS which is included in Appendix B;
- Conduit and cables were reviewed for sufficient flexibility to accomodate differential displacement between safe shutdown equipment and adjacent equipment and structure. No concerns were found by the SRT;
- No Isolated Outliers (other findings) were found by the SRT.

One finding was noted during the performance of the Seismic Interaction Review. The finding is noted above under the "falling hazards" category and documented on an OSVS which is included in Appendix B.

4.3 Bolt Tightness Testing For Expansion Anchors

Floor mounted supports with expansion anchors were observed in the following locations:

- Cable Spreading Room — Radwaste Building Elevation 23'
- Fan Room #6 — Reactor Building Elevation 91'
- Feed Pump Area — Turbine Building Elevation 51'

The expansion anchors for these floor mounted supports were tightness checked and found to meet GIP tightness guidelines of Appendix C [6.1].

4.4 Limited Analytical Review (LAR) Results

This Limited Analytical Review (LAR), performed within the scope of Unresolved Safety Issue (USI) A-46, evaluates the structural integrity of cable tray and conduit supports which have been chosen as representative, worst case examples of the raceway support configurations within the Pilgrim Plant. Twenty-five bounding examples of electrical raceway supports have been chosen from the plant raceway support systems for evaluation by the Seismic Review Team.

The hangers (members, connections and fittings) were first evaluated for static, dead load stresses. They were then evaluated for lateral load ductility to ensure no brittle failure loads. Finally, the vertical capacity was checked by comparing support anchorage capacity to 3 times the support deadweight. If any of these evaluations are failed, the support is declared an Outlier and additional evaluations of lateral load capacity are performed as shown in Section 4.4.2.

4.4.1 Summary of Results

Critical interaction values and related comments for each of the raceway support evaluations in this LAR are summarized in Table 4.4.1.1 below. Refer to [6.3] for details of each of the evaluations.

Table 4.4.1.1

Critical Interaction Values

LAR No.**	Interaction Value			
	DL Members	DL Fittings/ Connections	Vertical Capacity Anchorage*	Maximum
001	1.00	0.41	0.49 (DL Capacity)	1.00
002	0.26	Low	0.33 (DL Capacity)	0.33
003	Resolved, refer to OSVS, Appendix B			
004	0.34	Low	0.56	0.56
005	0.81	0.20	0.61	0.81
006	0.86	Low	0.91	0.91
007	0.88	Low	1.00	1.00
008	0.24	Low	0.44	0.44
009	0.40	0.65	0.95	0.95

[ ] Outlier

(Continued on next page)

Table 4.4.1.1 (Continued)

Critical Interaction Values

LAR No.**	Interaction Value			
	Members	Fittings/ Connections	Vertical Capacity Anchorage*	Maximum
010	1.00	1.00	0.50 (DL Capacity)	1.00
011	Resolved, refer to OSVS, Appendix B			
012	Resolved, refer to OSVS, Appendix B			
013	Resolved, refer to OSVS, Appendix B			
014	Resolved, refer to OSVS, Appendix B			
015	Resolved, refer to OSVS, Appendix B			
016	0.95	0.23	0.69	0.95
017	0.89	Low	0.50	0.89
018	Low	Low	0.60	0.60
019	0.19	Low	0.99	0.99
020	Low	0.33	Low	0.33
021	Resolved, refer to OSVS, Appendix B			
022	Resolved, refer to OSVS, Appendix B			
023	0.55	Low	0.41	0.55
024	1.00	Low	0.80	1.00
025	Low	Low	Low	Low

[ ] Outlier

*) Support connection to building structure. LAR 001, 002 and 010 are wall mounted-therefore, vertical capacity check not required.

**) All LARs referenced in this table are from [6.3]. For analytical review tracking summary see Table 4.4.1.2.

Table 4.4.1.2

Analytical Review Tracking Summary

Bldg/Elev	Plant Location	Selection Number	Final Resolution	Initials/ Date
RB EL 51'	General	LAR 1	OK	[illegible] - VE
TB EL 51'	Feed Pump Area	LAR 2	OK	[illegible] - VE
TB EL 1'	South Corridor	LAR 3	Analytical Outlier/Resolved	[illegible] - VE
TB EL 23'	Condenser Bay	LAR 4	OK	[illegible] - VE
TB EL 37'	Battery Room A	LAR 5	OK	[illegible] - VE
TB EL 37'	Upper Swgr Rm	LAR 6	OK	[illegible] - VE
TB EL 37'	Upper Swgr Rm	LAR 7	OK	[illegible] - VE
RW EL 23'	MG Set Room	LAR 8	OK	[illegible] - VE
RW EL 23'	MG Set Room	LAR 9	OK	[illegible] - VE
RW EL 23'	Cable Sprdg Rm	LAR 10	OK	[illegible] - VE
RW EL 23'	Cable Sprdg Rm	LAR 11	Analytical Outlier/Resolved	[illegible] - VE
RW EL 23'	RW & TB Corridor	LAR 12	Analytical Outlier/Resolved	[illegible] - VE
RW EL 23'	RW & TB Corridor	LAR 13	Analytical Outlier/Resolved	[illegible] - VE
RB EL 23'	General Area	LAR 14	Analytical Outlier/Resolved	[illegible] - VE
RAB EL 23'	Ground Level	LAR 15	Analytical Outlier/Resolved	[illegible] - VE
RB EL 23'	General Area	LAR 16	OK	[illegible] - VE
RB EL 23'	General Area	LAR 17	OK	[illegible] - VE
RB EL 23'	General Area	LAR 18	OK	[illegible] - VE
RB EL 23'	General Area	LAR 19	OK	[illegible] - VE
RB EL 23'	General Area	LAR 20	OK	[illegible] - VE
RB EL 23'	General Area	LAR 21	Analytical Outlier/Resolved	[illegible] - VE
RB EL 23'	General Area	LAR 22	Analytical Outlier/Resolved	[illegible] - VE
RAB EL 23'	Ground Level	LAR 23	OK	[illegible] - VE
RAB EL 3'	AuxBay SSW Comp	LAR 24	OK	[illegible] - VE
RB EL 23'	General Area	LAR 25	OK	[illegible] - VE

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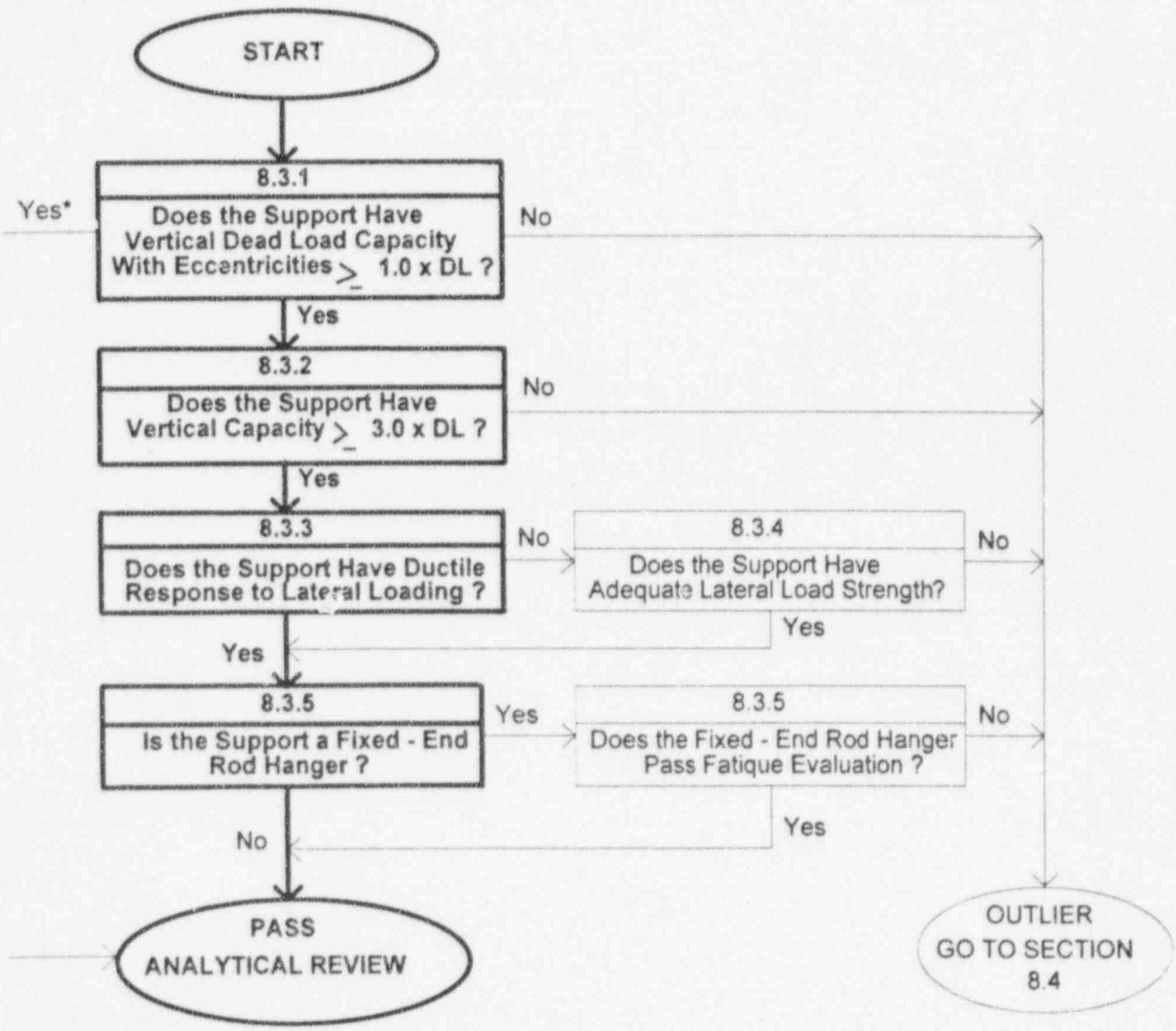
4.4.2 Logic Diagrams for Cable Tray and Conduit Support Evaluations

Logic diagrams indicating the evaluation path taken to demonstrate the acceptance of each of the raceway supports are shown below. Note that the particular evaluation path taken for the support in question is defined in heavy outline. The steps (8.3.1, 8.3.2, etc.) are Section numbers from [6.1].

LAR Nos. 004, 005, 006, 008, 009, 017, 018, 019, 023, 025

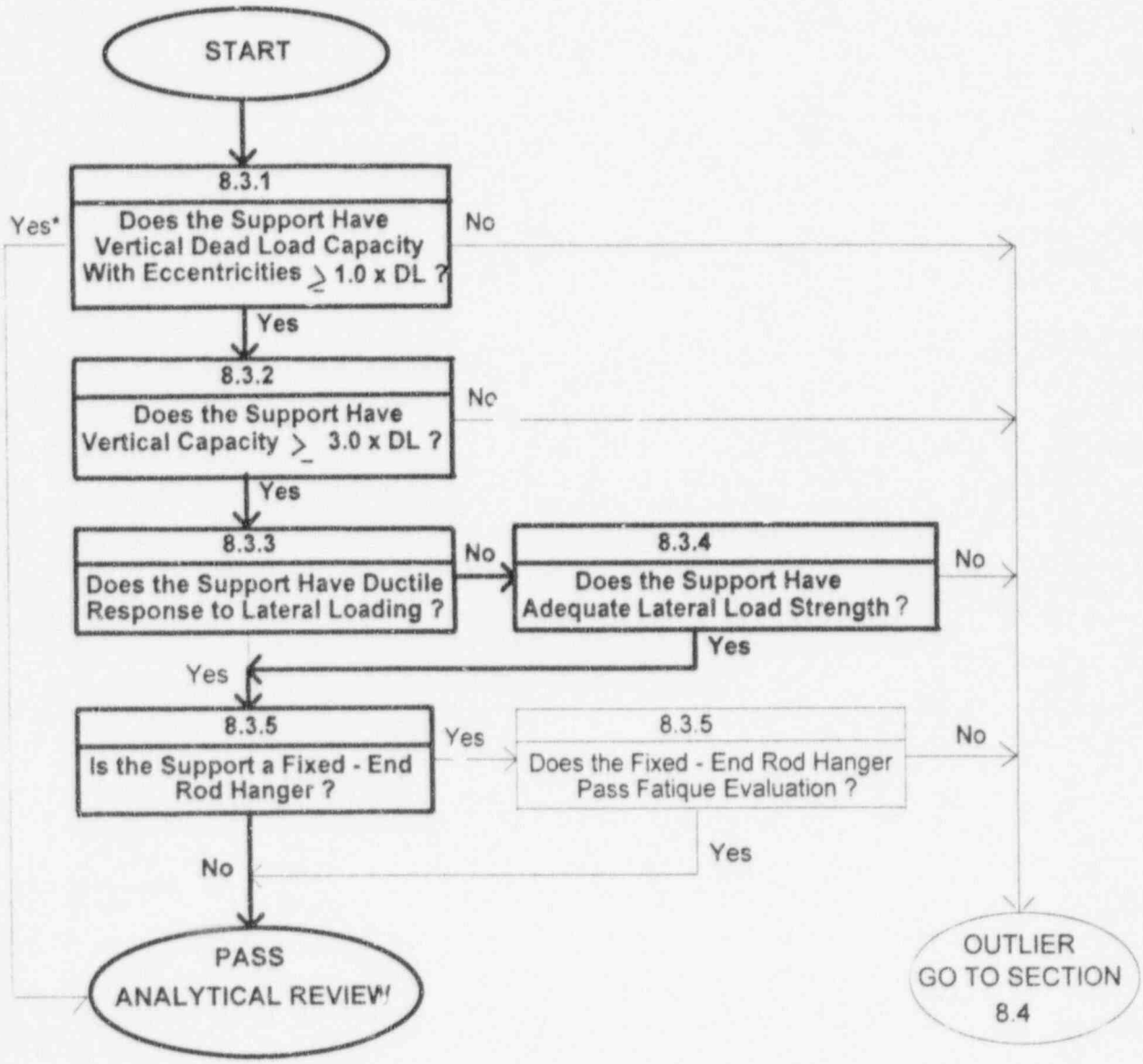


*) Directly mounted or rigidly cantilevered from structural wall

4.4.2 Logic Diagrams for Cable Tray and Conduit Support Evaluations (Cont.)

LAR Nos. 010, 016, 024

Note: Evaluation path is defined in heavy outline.

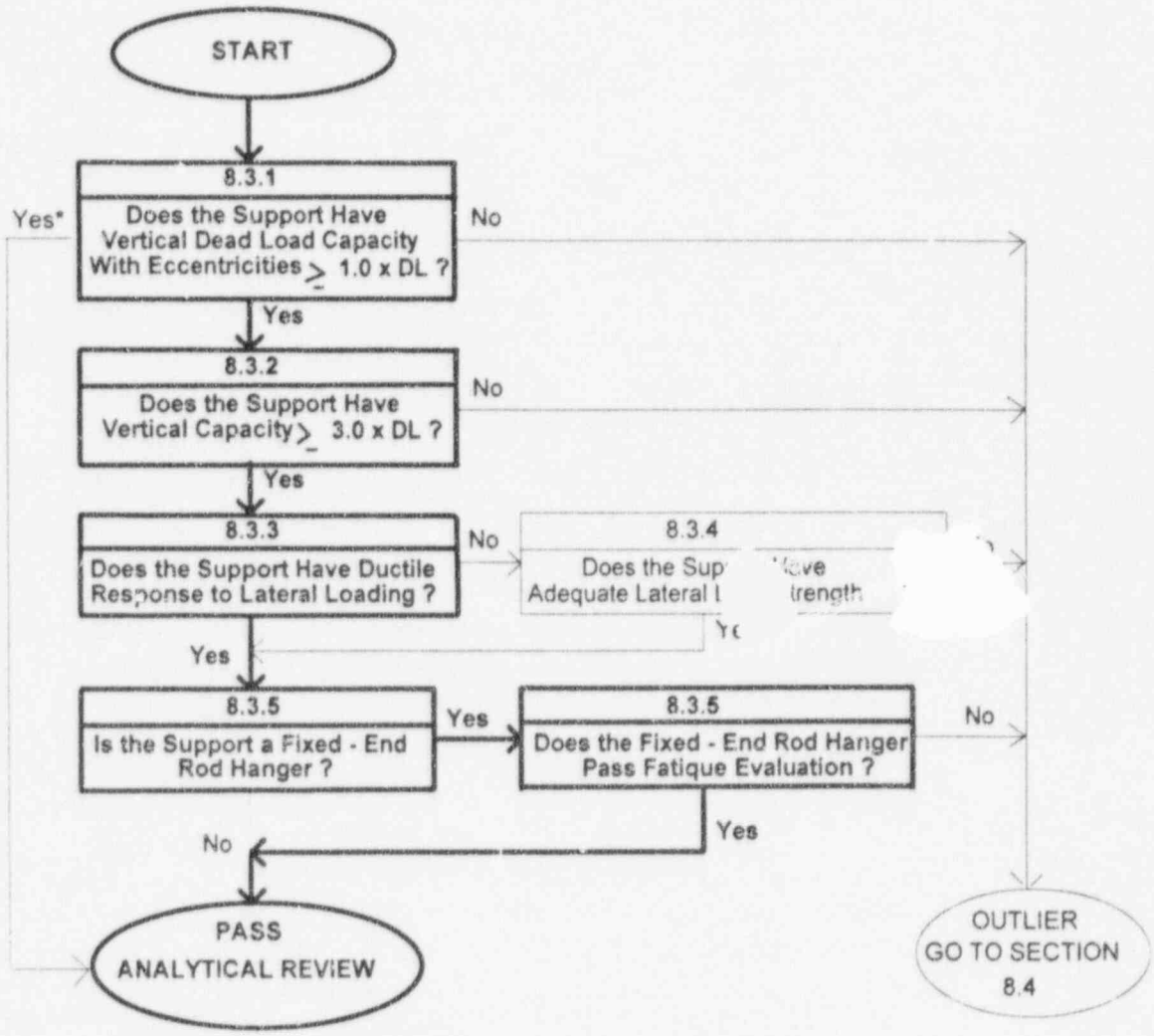


*) Directly mounted or rigidly cantilevered from structural wall

4.4.2 Logic Diagrams for Cable Tray and Conduit Support Evaluations (Cont.)

LAR No. 007

Note: Evaluation path is defined in heavy outline.

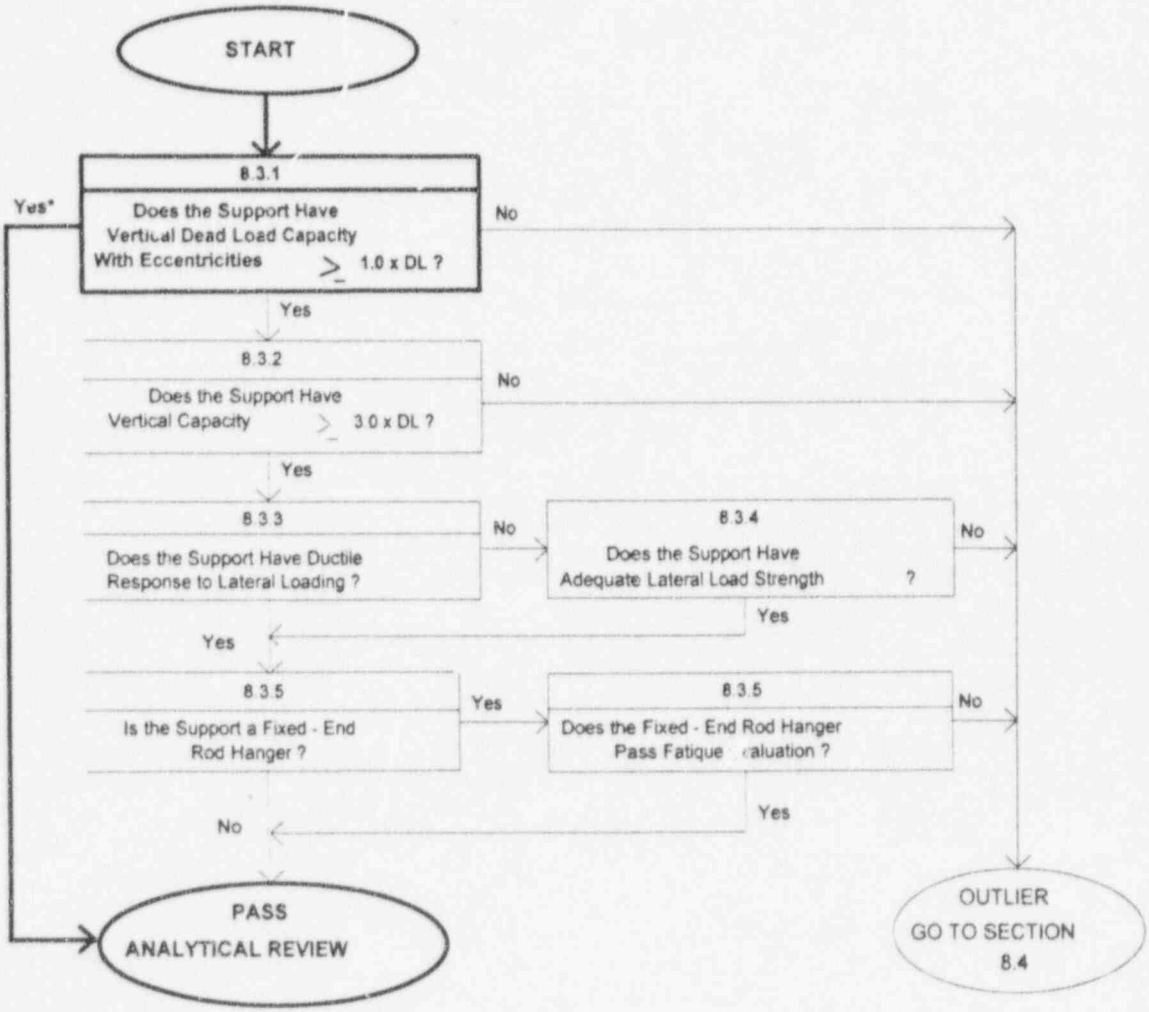


*) Directly mounted or rigidly cantilevered from structural wall

4.4.2 Logic Diagrams for Cable Tray and Conduit Supports (Cont.)

LAR Nos. 001, 002, 020

Note: Evaluation path is defined in heavy outline.

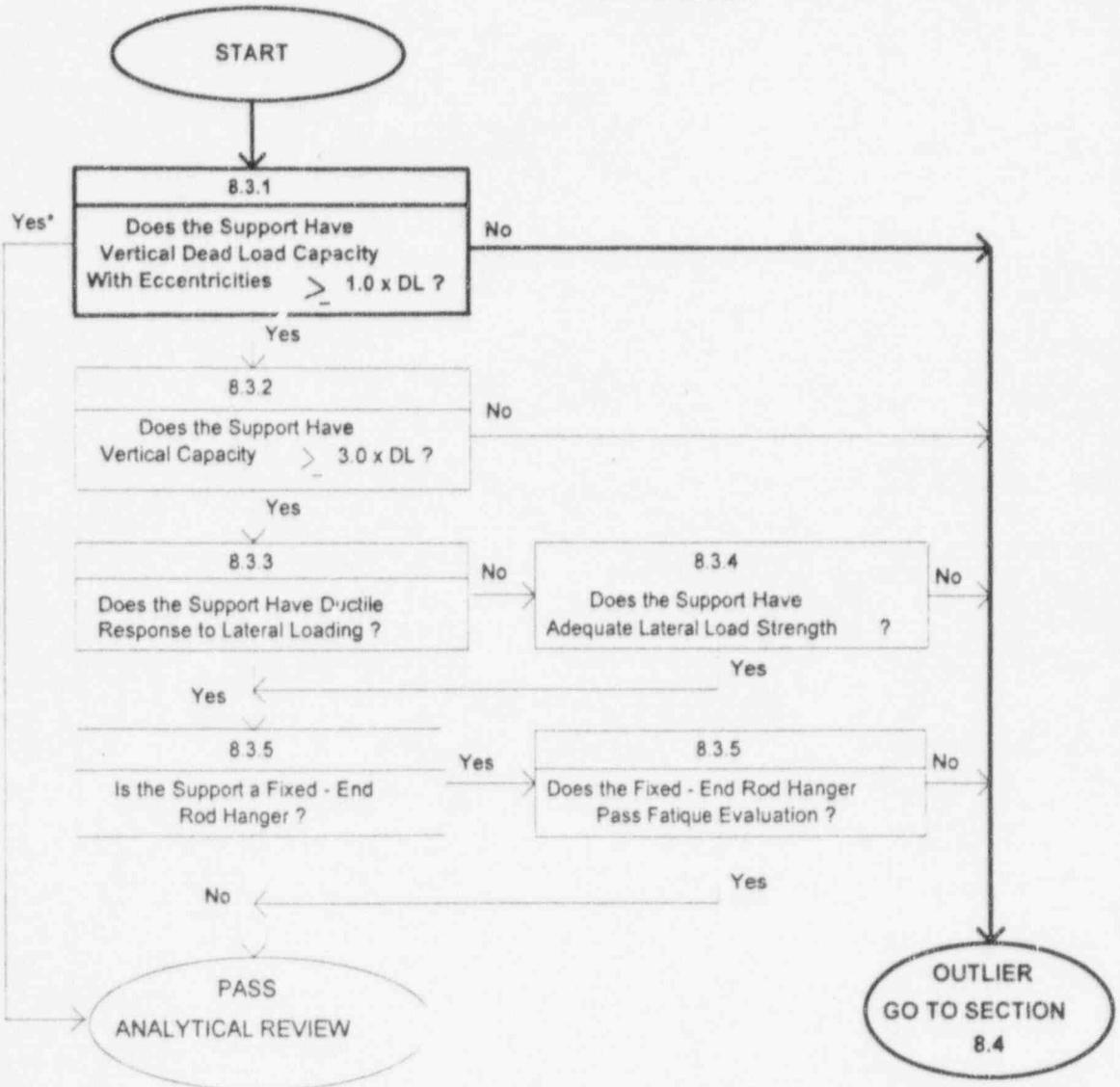


*) Directly mounted or rigidly cantilevered from structural wall

4.4.2 Logic Diagrams for Cable Tray and Conduit Support Evaluations (Cont.)

LAR Nos. 011, 021

Note: 1) Evaluation path is defined in heavy outline.
2) See Appendix B for OSVS's for LAR Nos. 011 and 021.

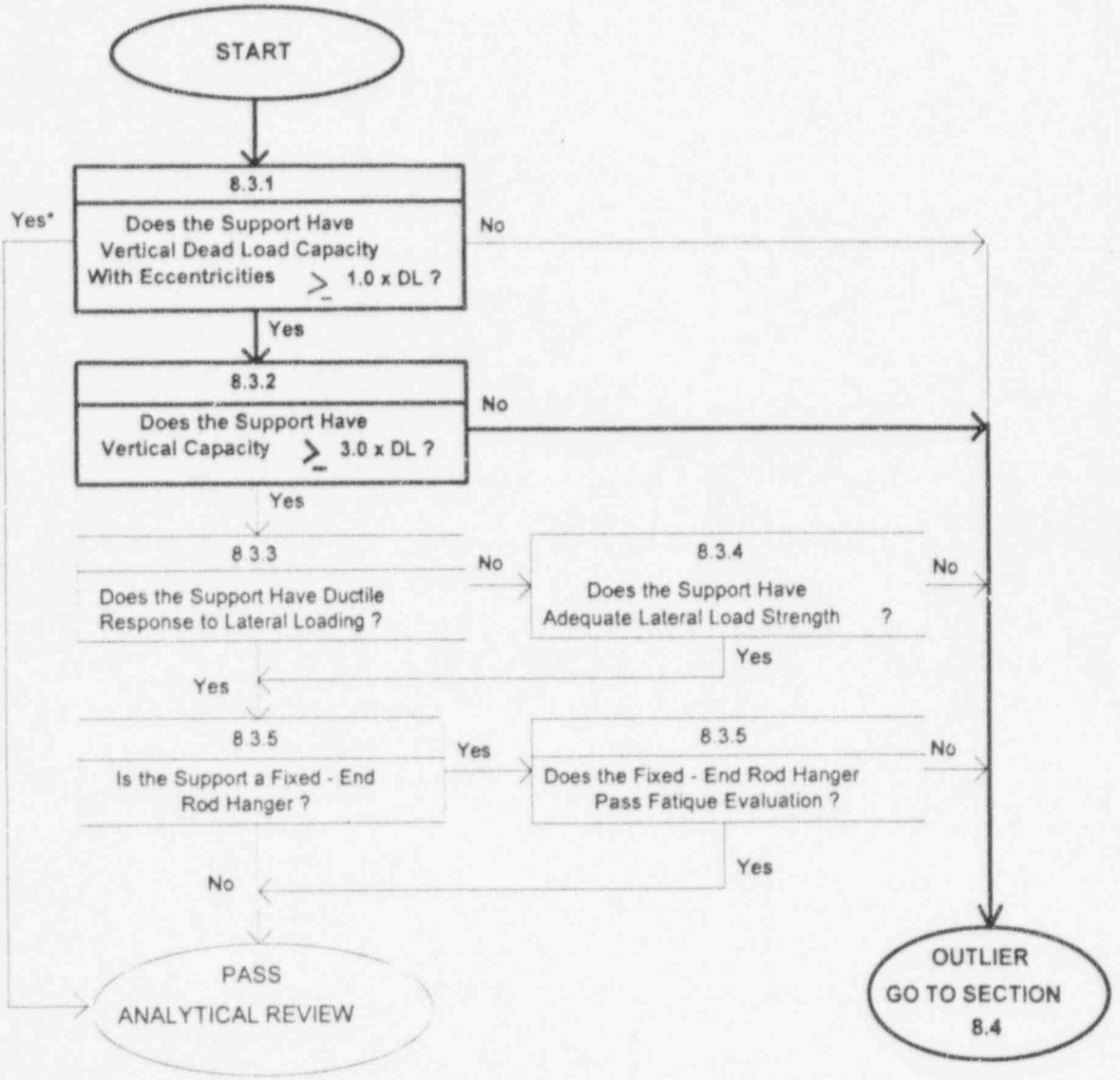


*) Directly mounted or rigidly cantilevered from structural wall

4.4.2 Logic Diagrams for Cable Tray and Conduit Support Evaluations (Cont.)

LAR Nos. 003, 012, 013, 014, 015, 022

Note: 1) Evaluation path is defined in heavy outline.
2) See Appendix B for OSVS's for LAR Nos. 003, 012, 013, 014, 015 and 022.



*) Directly mounted or rigidly cantilevered from structural wall

4.4.3 Method of Solution

Hand calculations employing the methodology outlined in Section 8 of [6.1] are used to conduct the evaluation of the raceway support configurations chosen for the LAR [6.3].

There are three basic analytical checks consistent with the LAR evaluation procedure as follows:

Check 1: Dead Load
Check 2: Ductility Review
Check 3: Vertical Capacity (3 x Dead Load)

These analytical checks are discussed below:

Check 1: Dead Load

All support members, connections and anchorages are to be checked for adequate design margin with respect to normal, working stress allowable loads. This will be the only check required for conduits and cable trays mounted directly to walls or rigidly cantilevered from walls. Clip angle bending stresses are considered only for floor supported (at base) designs.

Check 2: Ductility Review

Suspended supports will be reviewed for ductility. Supports suspended from above may be characterized as ductile if connection and member yielding can be accomplished without degradation of primary vertical support connections and anchorage. (See Section 8 of Ref. 6.1 for a more detailed discussion of ductility.)

Check 3: Vertical Capacity

This check concentrates on the support anchorage - specifically, the fittings, overhead members and expansion anchor and/or welding anchorages. It has been established that high vertical capacity (three times dead load) is a design attribute for good seismic performance. High vertical capacity provides significant margin for horizontal earthquake loading.

The vertical capacity check is applicable to raceway supports suspended from above and deemed ductile (Check #2). The check is limited to the primary framing connections at the anchorage (including overhead members but excluding building structural steel) and the anchorage capacities. Bending stresses in clips are once again excluded. Allowable stresses shall be in accordance with Part 2 of the AISC Steel Construction Manual [3]. Expansion anchor allowables shall not be less than ultimate strength pullout and shear allowable loads divided by 3.0 following the guidelines of the GIP seismic anchorage guidelines in Appendix C [6.1].

If the hangers meet the Checks 1-3, the analytical review is complete. Failing to meet the Checks results in the hanger being declared an outlier. Failing to meet Checks 2 or 3 for suspended supports generally requires a lateral load or limit state evaluation.

4.4.4 Input Data and Assumptions

The input data used in the performance of the LAR of the cable tray and conduit support systems within the Pilgrim Plant are as defined below:

- Plant Area Summary Sheets (PASS forms, see Appendix A to this Report)
- Plant Design Calculations
- Plant Seismic Response Spectra [6.11]
- GIP Bounding Spectrum - Fig. 4-2 [6.1].

Specific input data used in the evaluation of raceway supports are defined within their individual evaluations (Section 4.3.6) and referenced to Section 6.0 of this Report. Assumptions made in the process of performing the individual evaluations are also defined in Section 4.4.6.

4.4.5 Allowable Stress and Load Criteria

The following is a compilation of allowable stress and load criteria used throughout the raceway support evaluations. These criteria are referenced to Section 6.0 of [6.3].

Allowable Stress

A-36 Structural Steel [6.8]:	F_y = 36,000 psi
	F_u = 58,000 psi
Unistrut Channels [6.9]:	$F_{a,b}$ = 25,000 psi
E60XX Filler Metal, Table 4.1.1, [6.10]:	F_u = 62,000 psi
E70XX Filler Metal, Table 4.1.1, [6.10]:	F_u = 72,000 psi

4.4.6 Lateral Load Check Calculations

The following provides a reference for the lateral load accelerations employed in the performance of the Lateral Load Check evaluations.

Transverse Load Condition(s) Employed in Lateral Load Checks

Section 8.3.4 [6.1] describes three different transverse load conditions that must be considered when conducting a Lateral Load Check on a raceway support. Those conditions are repeated below for reference convenience.

- "Dead load plus a 2.0G horizontal acceleration in the transverse direction. The horizontal acceleration may be scaled down linearly by the minimum ratio of the design basis earthquake ground motion spectral acceleration for the plant site divided by the corresponding spectral acceleration of the Bounding Spectrum given in Figure 4-2."

- "Dead load plus a transverse acceleration of 2.5 times the Zero Period Acceleration (ZPA) of the floor response spectrum for the anchor point in the plant where the raceway system is attached."

- "For elevations lower than about 40 feet above grade, dead load plus a transverse acceleration of 2.5 times the floor ZPA where the floor ZPA is equal to the free-field ZPA times 1.5 (to account for building amplification), times 1.25 (to adjust for median-centered response)".

The scale factor determined for this loading condition is 0.45; however, it did not govern as discussed below.

The following describes the transverse loading condition chosen for raceway support Lateral Load Checks in the Auxiliary, Radwaste, and Reactor Buildings. Raceway supports chosen for evaluation and located elsewhere in the plant did not require Lateral Load Checks.

Auxiliary, Radwaste and Reactor Building Transverse Loading Acceleration

All raceway supports in these buildings, that require a Lateral Load Check, are located at elevations below 40 feet above grade. Supports requiring a Lateral Load Check use a transverse acceleration based on the third transverse loading condition, above, = 2.5x0.15Gx1.5x1.25 = 0.70G.

Finally, all outlier supports requiring a lateral load (or limit state evaluation) passed that evaluation without the need for further analysis or design modification. See Analytical Review Tracking Summary, Table 4.4.1.2.

5.0 Conclusions

As a result of SRT walkdowns (April - July 1993) all raceway support systems located in all power block buildings and on all elevations of the Pilgrim Nuclear Power Station were thoroughly inspected and evaluated following the GIP Inclusion Rules, Other Seismic Performance Concerns and Seismic Interaction requirements. The SRT included W. Djordjevic (Stevenson & Associates), and C.T.Pitts and V. Zukauskas (BECo).

All electrical raceway systems inspected by the SRT, with the exception of the Machineshop area in the Radwaste Building, Elevation 23", were in full conformance with the above mentioned GIP requirements (see PASS forms in Appendix A to this Report). The concern in the Machineshop relates to an unanchored tank that may or may not pose a seismic interaction hazard to safety related cables in that area. It is concluded that the Pilgrim Station raceways, with the exception of the Machineshop area, meet the "Inclusion Rules", "Other Seismic Performance Concerns" and "Seismic Interaction" caveats in their entirety.

Based upon SRT expertise and previous (1989, 1982) walkdown inspections performed by S&A and Bechtel, 25 worst case samples were chosen as representative for Limited Analytical Review [6.3]. Out of these twenty-five samples, 17 passed the LAR requirements and 8 did not satisfy the vertical capacity LAR Guidelines and were identified as outliers. They were further evaluated by GIP accepted methods including lateral load analyses and found to be Analytical Outliers only, not requiring any hardware modification. OSVS's are contained in Appendix B.

Based on the walkdown reviews and results of the evaluations, Stevenson & Associates concludes that the electrical raceway systems at the Pilgrim Nuclear Power Station will maintain structural integrity with respect to the design earthquake loads. An OSVS has been written to document and track the seismic interaction concern identified in the Machineshop area.

6.0 References

6.1 "Generic Implementation Plan Procedure (GIP), for Seismic Verification of Nuclear Plant Equipment", Revision 2, Corrected, 2/14/92, Seismic Qualification Utility Group.

6.2 USNRC Generic Letter 87-02 that transmits Supplemental Safety Evaluation Report No. 2 (SSER No. 2) on SQUG GIP, Revision 2, as corrected on February 14, 1992; Washington DC, May 22, 1992, USNRC.

6.3 "Cable Tray and Conduit Supports Limited Analytical Review", Job. No. 93C2787, PNPS USI A-46/IPEEE Seismic Evaluation Project, BECo Calc. No. C15.0.3216, Rev. 0, Jan. 11,1994, Stevenson & Associates

6.4 "Evaluation Report of Cable Tray and Conduit Support Systems for Unit No. 1, Pilgrim Station No. 600, Boston Edison Company." Vols. 1-8. Job. No. 10394-088, Revision 0, April 26, 1982, Bechtel Power Corporation

6.5 "Cable Tray and Conduit Raceway Seismic Test Program." 1053-21.1-4. Vols. 1 & 2. Prepared by ANCO Engineers, Inc. for and in collaboration with Bechtel Power Corporation, December 15, 1978.

6.6 Utility/TES Owners Group. "Summary Report, Generic Response to USNRC I&E Bulletin Number 79-02 Baseplate/Concrete Expansion Anchor Bolts", Report No.3501-2. Teledyne Engineering Services. August, 1979.

6.7 USNRC. Report No. 50-293/86-31. Docket No. 50-293. Resolution of Masonry Wall Design (IE Bulletin 80-11).

6.8 ASTM Specifications A-36/A 36M, "Standard Specification for Structural Steel" Annual Book of Standards, American Society for Testing and Materials, Philadelphia, PA.

6.9 "General Engineering Catalog", No. 10, Unistrut Building Systems, GTE Products Corp., 1983.

6.10 "Structural Welding Code - Steel", ANSI/AWS D1.1-88, American Welding Society.

6.11 Pilgrim Unit 1 Seismic Response Spectra Specification No. C-114-ER-Q-EO, Rev.0.

6.12 "Cable Tray and Conduit System Seismic Evaluation Guidelines", EPRI NP-7151-D, 1991.

Appendix A

Cable and Conduit Review Forms

Table A.1 - Listing of PASS Form Areas by ID Name

PASS Form ID Name	Raceway Description	Bldg	Elev
TipRmCT	Cable tray and Conduit Raceway	RB	23.00
StmTunCT	Raceways in Steam Tunnels	RB	23.00
DWCT	Raceways in Drywell - All Elev	RB	23.00
CDBAYCT	Condenser Bay Cable Trays-El 6	TB	6.00
RCICQUADCT	RCIC Quad Area Raceways All El	RB	3.00
TORUSRMCT	Torus Compartment	RB	-17.00
RWCURMCT	Reactor Water Cleanup Room	RB	0.00
REFEULCT	Refeuling Floor	RB	117.00
CONDBAY2ND	Condenser Bay- El. 23'	TB	23.00
TRUCKLOCKCT	Truck Lock - Turbine Building	TB	23.00
UPBATTRMCT	Upper Battery Room Cable Trays	TB	37.00
UPSWGRCT	Upper Switchgear Room Cable Trays	TB	37.00
LOWSWGRCT	Lower Switchgear Room - El. 23	TB	23.00
MGSETCTCON	MG Set Room	RW	23.00
CABSPRCT	Raceways in Cable Spreading Ro	RW	23.00
SOUTHCORRDR	Turbine Building - South Corri	RW	-1.00
RWTBCORR	RW/TB Building - Corridor	RW	23.00
ARHRQUAD	Reactor Building - A RHR Quad	RB	23.00
BRHRQUAD	Reactor Building - B RHR Quad	RB	23.00
CRDQUAD-17	Reactor Bldg - CRD Quad.	RB	-17.50
CRDQUAD-2.75	Rx Bldg - CRD Quad, El -2'-9"	RB	-2.75
ARHRVALVE	Rx Building - A RHR Valve Rm &	RB	23.00
BRHRVALVE	Rx Building - B RHR Valve Rm	RB	23.00
RBTRKLOCK	Rx Building Truck Lock	RB	23.00
RB51GENERAL	Rx Building - El 51 Gen Area	RB	51.00
RB51CUBKTANK	Rx Bldg - El 51 CU Bkwsh Tank	RB	51.00
RB51I&CLAB	Rx Building - El 51 I&C Pr Lab	RB	51.00
RB51CAVENCL	Rx Building - El 51 Cavs Encl	RB	51.00
RB51RCMGSET	Rx Bdg- El 51 Recirc MG Set Rm	RB	51.00
RB74GENERAL	Rx Building - El 74 Gen Area	RB	74.00
RB74FAN3RM	Rx Building - El 74 Fan Rm 3	RB	74.00
RB74FAN4RM	Rx Building - El 74 Fan Rm 4	RB	74.00
RB74FAN5RM	Rx Building - El 74 Fan Rm 5	RB	74.00
RB74PUMPAREA	Rx Building - El 74 Pump Area	RB	74.00
RB74HXAREA	Rx Building - El 74 HX Area	RB	74.00
RB74FIL/POWD	Rx Bldg - El 74 Filter/Powdex	RB	74.00
RB74HOLDPUMP	Rx Bldg - El 74 Hold Pump Area	RB	74.00
RB91GENERAL	Rx Building - El 91 Genrl Area	RB	91.00
RB91FANRM6	Rx Building - El 91 Fan Rm 6	RB	91.00
RB91CATWALK	Rx Building - El 91 Catwalk	RB	91.00
RB91SLICK	Rx Building - El 91 SLIC Area	RB	91.00
AUXBAYHPCI	Aux Bay - HPCI Compartment	AB	-17.50
AUXBAYHEATIN	Aux Bay - Heating Pump Area	AB	3.00
AUXBAYREGEN	Aux Bay - Condemin Regen Area	AB	3.00
AUXBAYASSW	Aux Bay - A SSW Compartment	AB	3.00
AUXBAYBSSW	Aux Bay - B SSW Compartment	AB	3.00
AUXBAYGROUND	Aux Bay - Ground Level	AB	23.00
HOTMACHSHOP	Hot Machine Shop	RW	23.00
MACHINESHOP	Machine Shop	RW	23.00

Table A.1 (Cont.)

Listing of PASS Form Areas by ID Name

PASS Form ID Name	Raceway Description	Bldg	Elev
FANRM2	Rad Waste - Fan Room 2	RW	23.00
VALVEGALLERY	Turb Bg - Valve Gallery	TB	3.50
CONDPUMPAREA	Turb Bg - Condensate Pump Area	TB	6.00
MECHVACPUMP	Tb Bg - Mech Vacuum Pump Area	TB	6.00
LUBEOILAREA	Turb Bg - Lube Oil Area	TB	0.00
RECOMBINERRM	Turb Bg - Recombiner Rooms A&B	TB	37.00
TURBINEHALL	Turb Bg - Turbine Hall	TB	51.00
FEEDPUMPAREA	Turb Bg - Feed Pump Area	TB	51.00
LOWFAN&GEN51	Turb Bg - Fan Rm 1/Genral Area	TB	51.00
UPFAN&GEN51	Turb Bg - Upper Fan Rm 1	TB	51.00
RADGEN-13	Rad Wst - General Area -13'	RW	-13.00
RADGEN-1	Rad Wst - General Area -1'	RW	-1.00
RADTANKRM	Rad Wst - Tank Rooms	RW	-1.00
REDLINE	Rad Wst - Redline & Change Rm	RW	23.00
RDWSTTRUCKLK	Rad Wst - Truck Lock	RW	23.00
RB23GENERAL	Reactor Bldg - General 23'	RB	23.00
ABCUPUMPRM	Rctor Bldg - A&B CU Pump Rooms	RB	51.00
ADIESELRM	DG BLDG - A Diesel Room	DG	23.00
AIRRECVDG	DG BLDG - Air Recv Area	DG	23.00
BDIESELRM	DG BLDG - B Diesel Room	DG	23.00
CHEMLAB	Rad Wst - Chem Lab	RW	37.00
COMPRSSRM	Turb Bldg - Compressor Room	TB	-1.00
CONDEMIN	Turb Bldg - Condemin Tank Area	TB	3.50
CONTROOM	Rad Wst - Control Room & SAS	RW	37.00
CONTROOMANNX	Rad Wst - Control Rm Annex	RW	37.00
LOWBATTRMCT	Lower Battery Room Cable Trays	TB	23.00
MICRWAVE	Rad Wst - Microwave Eq. Rm	RW	37.00
MONTRTANK	Turb Bldg - Monitor Tank Room	TB	-1.00
PASSMEZZ	Rad Wst - Pass Mezzanine	RW	37.00
TREATTANKRM	Turb Bldg - Treated Tank Room	TB	-1.00
INTKCT	Intake Structure	INTK	21.50

Appendix B

Outlier Seismic Verification Sheets (OSVS)

PASS Form Area ID	Outlier Issue Definition
AUXBAYGROUND	Limited Analytical Review (No. 015)
CABSPRCT	Limited Analytical Review (No. 011)
RWTBCORR	Limited Analytical Review (Nos. 012, 013)
SOUTHCORR	Limited Analytical Review (No. 003)
RB23GENERAL	Limited Analytical Review (Nos. 014, 021, 022)
MACHINESHOP	Other (Falling Hazard)

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : AUXBAYGROUND (Rev. 0)	Class : 22. Cable Tray and Conduit Raceways	
Description : Aux Bay - Ground Level		
Building : AB	Floor El. : 23.00	Room, Row/Col :

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	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).

The support, LAR 015, did not pass the vertical capacity check.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

The support was qualified by a successful lateral load check.

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

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: _____ Date: 7/22/94

Charles F. Pitt 3/13/95

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : CABSPRCT (Rev. 0)	Class : 22. Cable Tray and Conduit Raceways	
Description : Raceways in Cable Spreading Ro		
Building : RW	Floor El. : 23.00	Room, Row/Col : CSR

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	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).

The support, LAR 011, did not pass the dead load check.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

The support was qualified by a successful redundancy and consequence evaluation.

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

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: _____ Date: 7/22/94

Charles T. Plotts 3/13/95

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : RWTBCORR (Rev. 0)	Class : 22. Cable Tray and Conduit Raceways	
Description : RW/TB Building - Corridor		
Building : RW	Floor El. : 23.00	Room, Row/Col :

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	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).

Both LAR 012 and LAR 013 did not pass the vertical capacity check.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

Both supports were qualified by a successful lateral load check.

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

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: W [illegible] — Date: 7/22/94

Charles T. Pitts — 3/13/95

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : SOUTHCORRDR (Rev. 1)	Class : 22. Cable Tray and Conduit Raceways	
Description : Turbine Building - South Corri		
Building : RW	Floor El. : -1.00	Room, Row/Col : CSR

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	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).

The support, LAR 003, did not pass the vertical capacity check.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

The support was qualified by determining a higher capacity by elastic analysis.

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

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 on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: _____ Date: 3/21/95

Charles T. Pitts 3/21/95

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : RB23GENERAL (Rev. 0)	Class : 22. Cable Tray and Conduit Raceways	
Description : Reactor Bldg - General 23'		
Building : RB	Floor El. : 23.00	Room, Row/Col :

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	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).

1. Support LAR 014 did not pass the vertical capacity check. ✓
2. Support LAR 021 did not pass the dead load check. ✓
3. Support LAR 022 did not pass the dead load check. ✓

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

1. Support LAR 014 was qualified by a successful lateral load check. ✓
2. Support LAR 021 was qualified by a successful redundancy and consequence check. ✓
3. Support LAR 022 was qualified by a successful limit state evaluation. ✓

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

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: WAF — Date: 7/22/94

Charles F. Pitts — Date: 3/13/95

Boston Edison Company - Pilgrim Nuclear Power Station OUTLIER SEISMIC VERIFICATION SHEET (OSVS)		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : MACHINESHOP (Rev. 0)	Class : 22. Cable Tray and Conduit Raceways	
Description : Machine Shop		
Building : RW	Floor El. : 23.00	Room, Row/Col :

1. OUTLIER ISSUE DEFINITION - Cable and Conduit Raceways

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

Inclusion Rules	
Other Seismic Performance Concerns	
Limited Analytical Review	
Other	X

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).

An unanchored hot water tank is located on a platform above safety-related, wall-mounted conduit.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

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

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

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: _____ Date: 7/22/94

Charles T. Pitts 3/13/95

Appendix C

Resumes of Seismic Capability Engineers

Walkdown Team Qualifications
and Resumes

The walkdown(s) was conducted by Mr. W. Djordjevic of Stevenson & Associates and Messrs. C. Pitts and V. Zukauskas of Boston Edison Company. All of the engineers meet the experience requirements of the GIP [7] as described for Seismic Capability Member Engineers.

Mr. Djordjevic is a registered Professional Engineer in the Commonwealth of Massachusetts and a registered Civil/Seismic Engineer in the State of California. Regarding experience specific to electrical raceway design, Mr. Djordjevic served as Principal-In-Charge for the Systematic Evaluation Program (SEP) Raceway Program conducted for the SEP plants from 1980 to 1983. During this effort, over 200 raceway seismic shake table tests were conducted for rod and strut hung raceway systems as well as over 100 cyclic fatigue tests of raceway components. In addition, Mr. Djordjevic has seismically evaluated and designed raceway systems for the Grand Gulf, DC Cook, Millstone and Connecticut Yankee nuclear power stations in his career.

Mr. Pitts is a registered Professional Engineer in the Commonwealth of Massachusetts. Mr. Pitts has extensive experience in the seismic analysis and design of structures, equipment and components.

Mr. Zukauskas is a registered Professional Engineer in the Commonwealth of Massachusetts. Mr Zukauskas has extensive experience in the seismic analysis and design of structures, equipment and components.

WALTER DJORDJEVIC

EDUCATION:

B.S. - Civil Engineering, University of Wisconsin at Madison, 1974
M.S. - Structural Engineering, Massachusetts Institute of Technology, 1976

REGISTRATION:

State of California, State of Wisconsin, Commonwealth of Massachusetts, State of Michigan

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., Vice President and General Manager of the Boston area office, 1983 - present
URS/John A. Blume & Associates, Engineers, Boston, Massachusetts, General Manager, 1980 - 1983; San Francisco, California, Supervisory Engineer, 1979 - 1980
Impell Corporation, San Francisco, California, Senior Engineer, 1976 - 1979
Stone & Webster Engineering Corporation, Boston, Massachusetts, Engineer, 1974 - 1976

PROFESSIONAL EXPERIENCE:

Mr. Djordjevic founded the Stevenson & Associates Boston area office in 1983 and serves as Vice President and General Manager. He is currently preforming numerous seismic walkdowns for resolution of the USI A-46 and seismic IPEEE issues, and serving as the Project Manager for the Kewaunee, Point Beach and Palisades projects, all joint A-46 and Seismic PRA projects.

Mr. Djordjevic is expert in the area of seismic fragility analysis and dynamic qualification of electrical and mechanical equipment. He has participated in and managed over twenty major projects involving the evaluation and qualification of vibration sensitive equipment and seismic hardening of equipment. As demonstrated by his committee work and publications, Mr. Djordjevic has participated in and contributed steadily to the development of equipment qualification and vibration hardening methodology.

Mr. Djordjevic's previous walkdown experience included all of the SEP plants (8 plants), Nine Mile - Unit 1, D.C. Cook - Units 1 & 2, the Hanford Reservation Purex facility and the Savannah River Plant Reservation L-Reactor. He has personally participated in seismic walkdowns at 26 U.S. nuclear units.

Representative projects include overseeing the SEP shake-table testing of electrical raceways, in-situ testing of control panels and instrumentation racks at various nuclear facilities, equipment anchorage walkdowns and evaluations at various nuclear facilities, principal author of the *CERTIVALVE* software package to evaluate nuclear service valves, and contributing author in the development of the *ANCHOR* and *EDASP* software packages commercially distributed by Stevenson & Associates.

S&A

Mr. Djordjevic has been involved extensively in the reassessment of safety-related equipment for commercial nuclear facilities and government U.S. Department of Energy facilities, for which he maintains an active Q-clearance status. He has served on advisory groups and review teams touring older existing nuclear facilities to assess safety and has performed earthquake reconnaissance at such installations following seismic events.

PROFESSIONAL GROUPS:

Member, Institute of Electrical and Electronics Engineers, Nuclear Power Engineering Committee Working Group SC 2.5 (IEEE-344)

Chairman, American Society of Civil Engineers Nuclear Structures and Materials Committee, Working Group for the Analysis and Design of Electrical Cable Support Systems

Member, American Society of Mechanical Engineers Operation, Application, and Components Committee on Valves, Working Group SC-5

S&A

RESUME

Name: Charles T. Pitts
Position: Senior Engineer
Department: Civil/Structural/Mechanical
Group: Nuclear Engineering

EDUCATION

M.S., Civil Engineering, Northeastern University, Boston, MA
B.S., Civil Engineering, Northeastern University, Boston, MA

PROFESSIONAL REGISTRATION

Registered Professional Engineer #28351 - Massachusetts

PROFESSIONAL MEMBERSHIPS

American Society Of Civil Engineers, Member

SPECIALTIES/EXPERTISE

Structural Engineering
Safety System Modifications
Field Engineering and Design
SQUG - Generic Implementation Plan (GIP) Evaluations and Reviews

EXPERIENCE PROFILE

Total Years Engineering Experience:	25
Years Nuclear Experience:	20
Construction/Site Experience:	15

RESUME

Name: Viktor J. Zukauskas

Position: Principal Structural Engineer

Division: Civil/Structural

Section: Design

Department: Nuclear Engineering

Education

MBA Suffolk University 1982
MSCE Northeastern University 1978
BSCE Northeastern University 1972

Professional Registration

Registered Profession Engineer #29658 Massachusetts
Licensed Construction Supervisor #000399 Massachusetts

Professional Memberships/Societies

American Institute of Steel Construction, Member
American Concrete Institute, Member
American Society of Civil Engineers, Member

Specialties/Expertise

Structural Engineering
Project Management
Engineering Management

Experience Profile

Total Years Engineering Experience: 22

Years with Boston Edison: 15

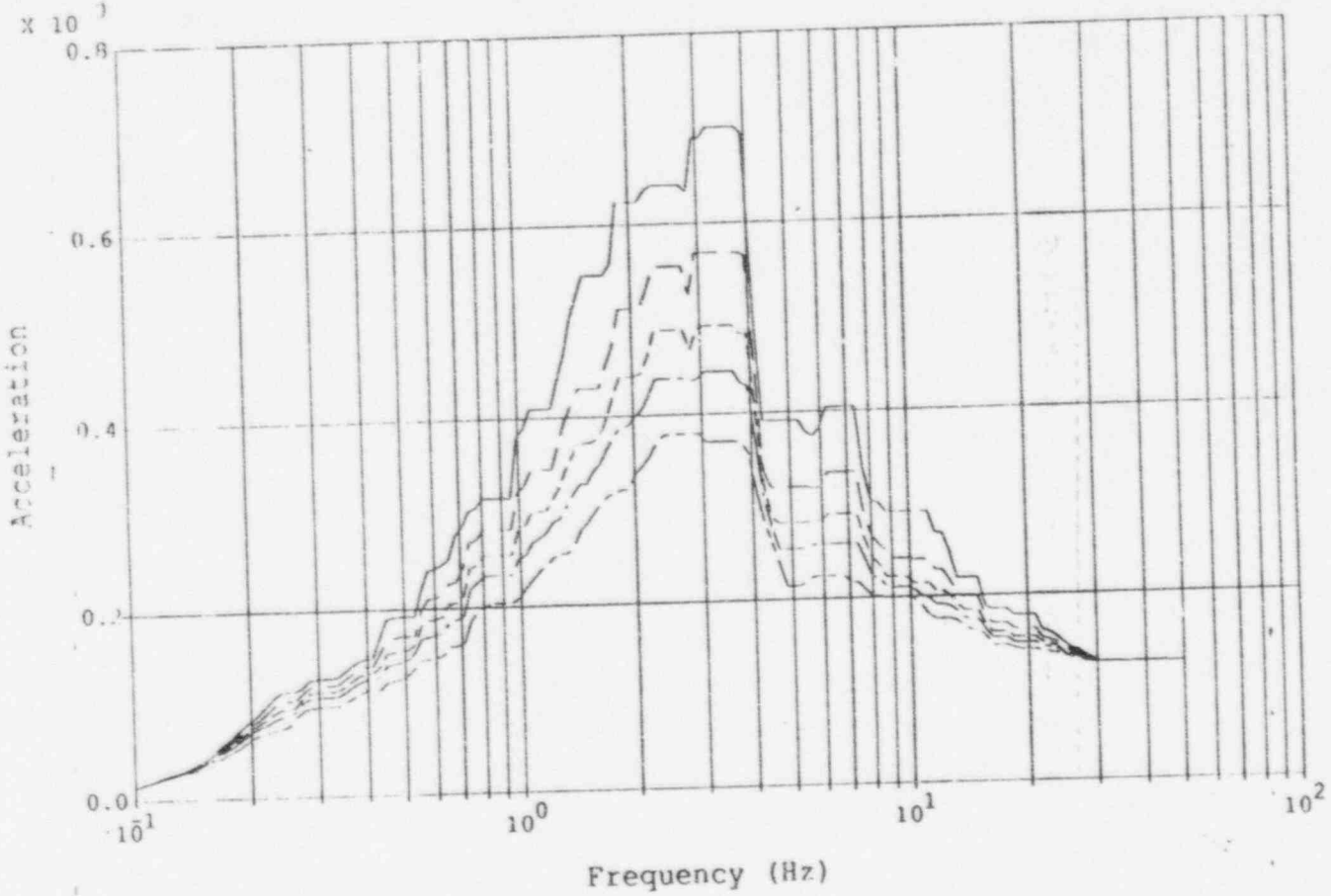
Years Nuclear Experience: 18

Construction/Site Experience: 5

Date: 05/23/94

17. Appendix G: Soil-Structure Interaction Spectra

The enclosed are selected in-structure response spectra plots for the Safe Shutdown Earthquake (SSE) case extracted from Attachment Item #7 to Reference 17. These plots show the alternate Reactor Building spectra discussed in Section 9.3. Plots are furnished for north-south, east-west and vertical response at 2%, 3%, 4%, 5% and 7% damping for Elevations (-) 17.5 feet, 23.0 feet, 51.0 feet, 74.25 feet, 91.25 feet, 117.0 feet, 145.0 feet and 164.5 feet.



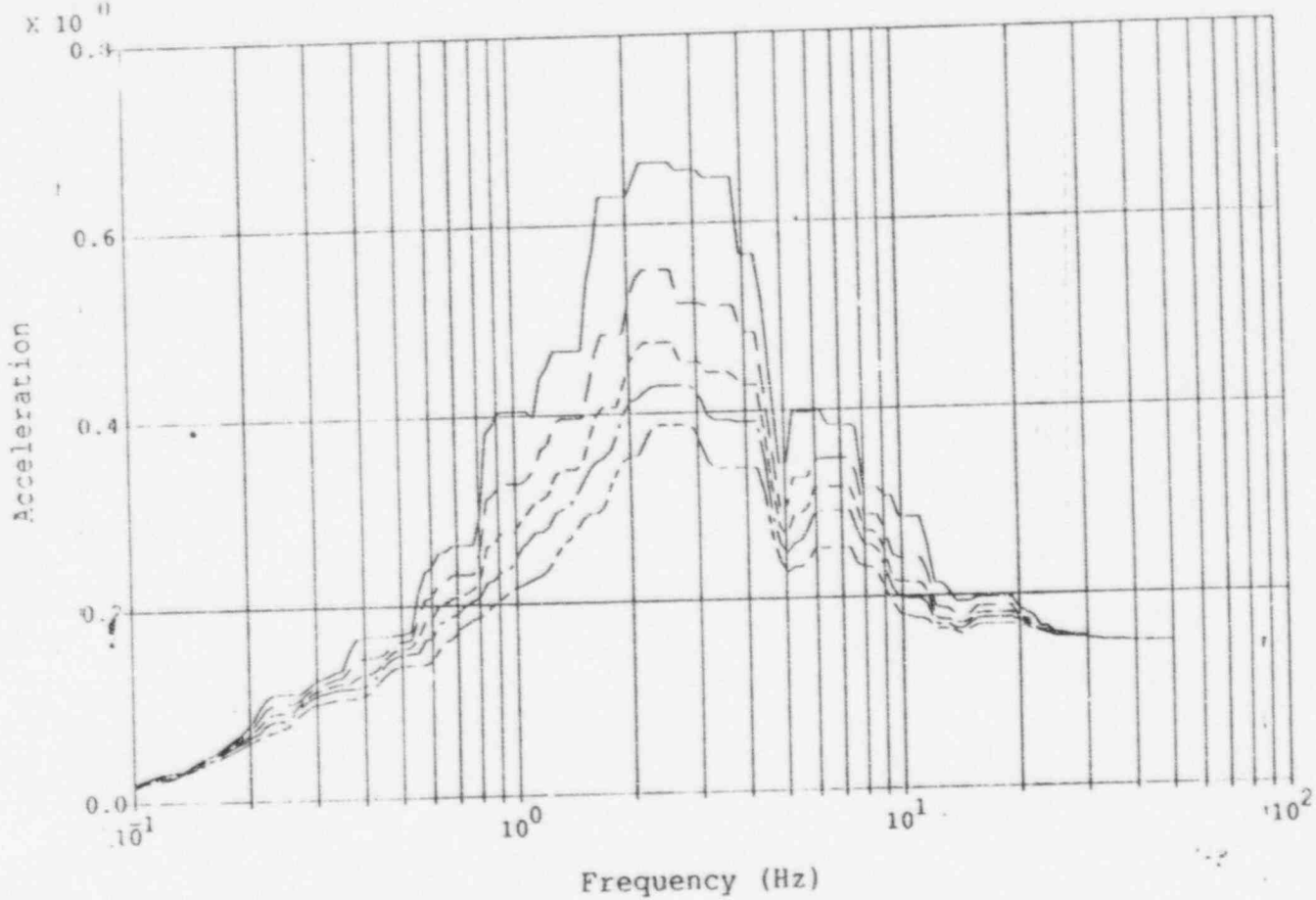
Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building Basemat, El.-17.5', Translation in the NS Direction



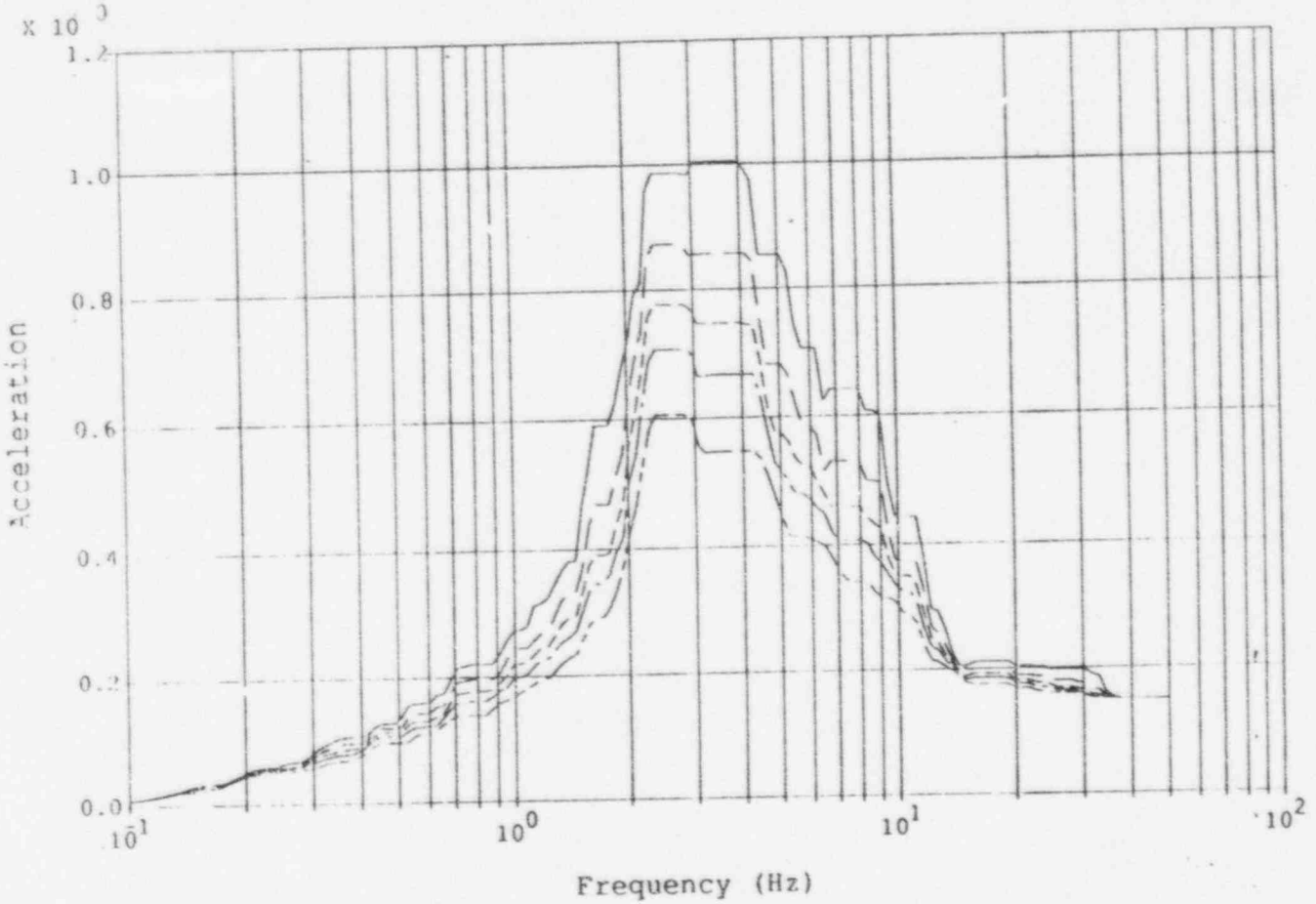
Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building Basemat, El.-17.5', Translation in the EW Direction



Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

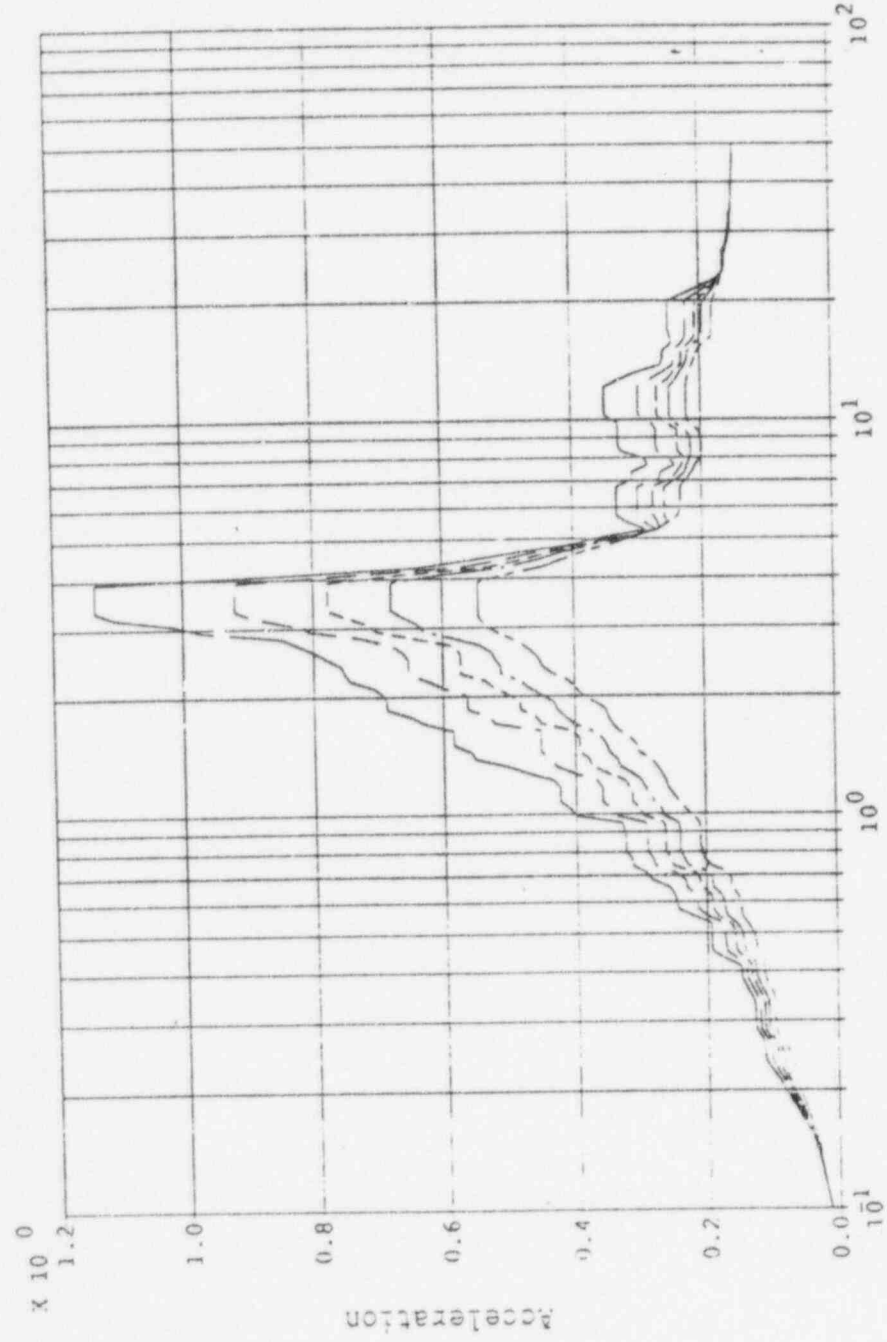
Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building Basemat, El.-17.5', Translation in the Vert.Direction

RSPLT SUN V1.2 rb1z.plt 12:21:37 05/21/93

RSPLT SUN V1.2 rb2x.plt 17:21:40 05/21/93



Legend:

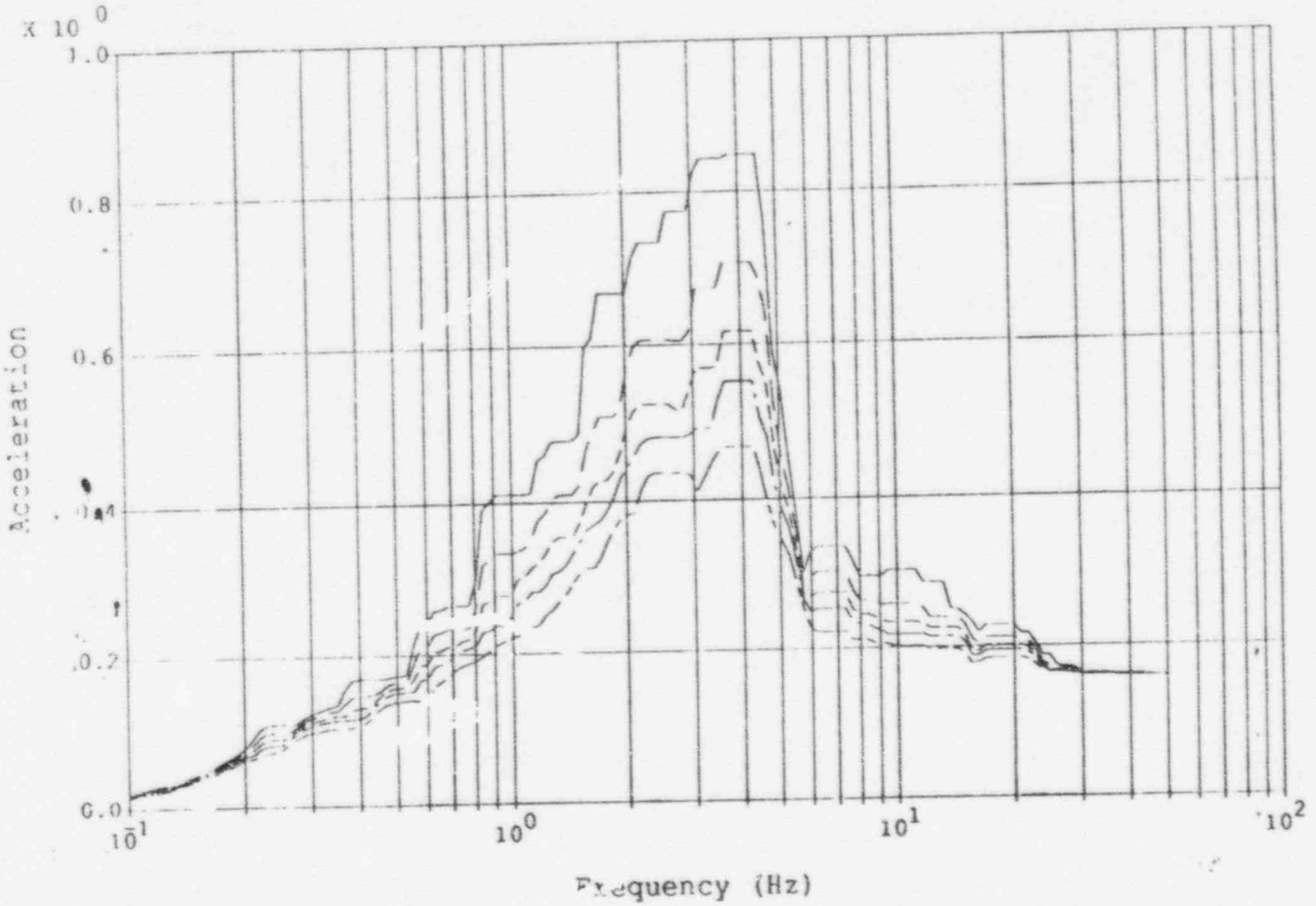
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 23.0', Translation in the NS Direction

RSPLT SUN V1.2 rb2y.plt 12:21:43 05/21/93



Legend:

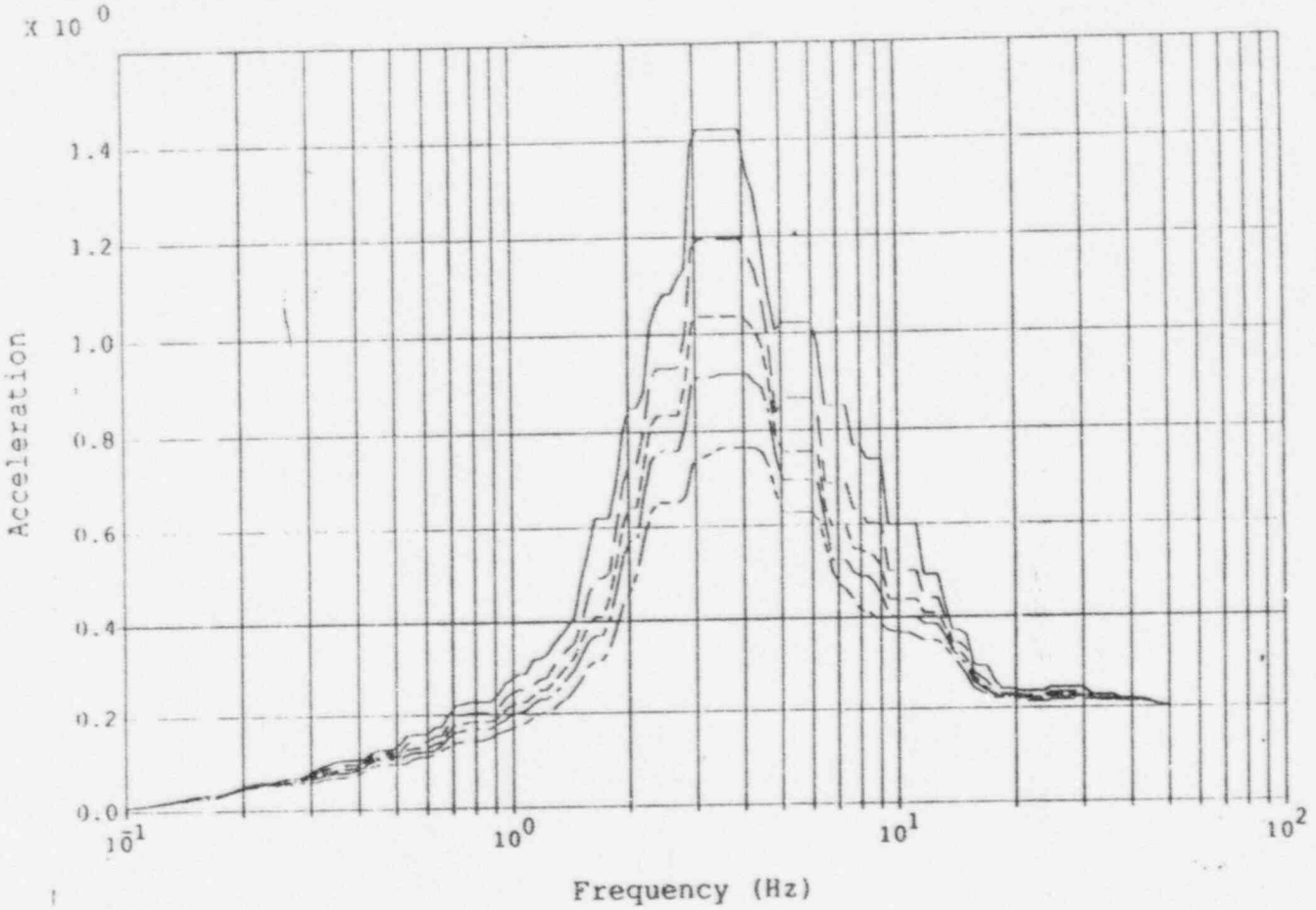
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, 'El. 23.0', Translation in the EW Direction

RSPLT SUN V1.2 rb2z.plt 12:21:45 05/21/93



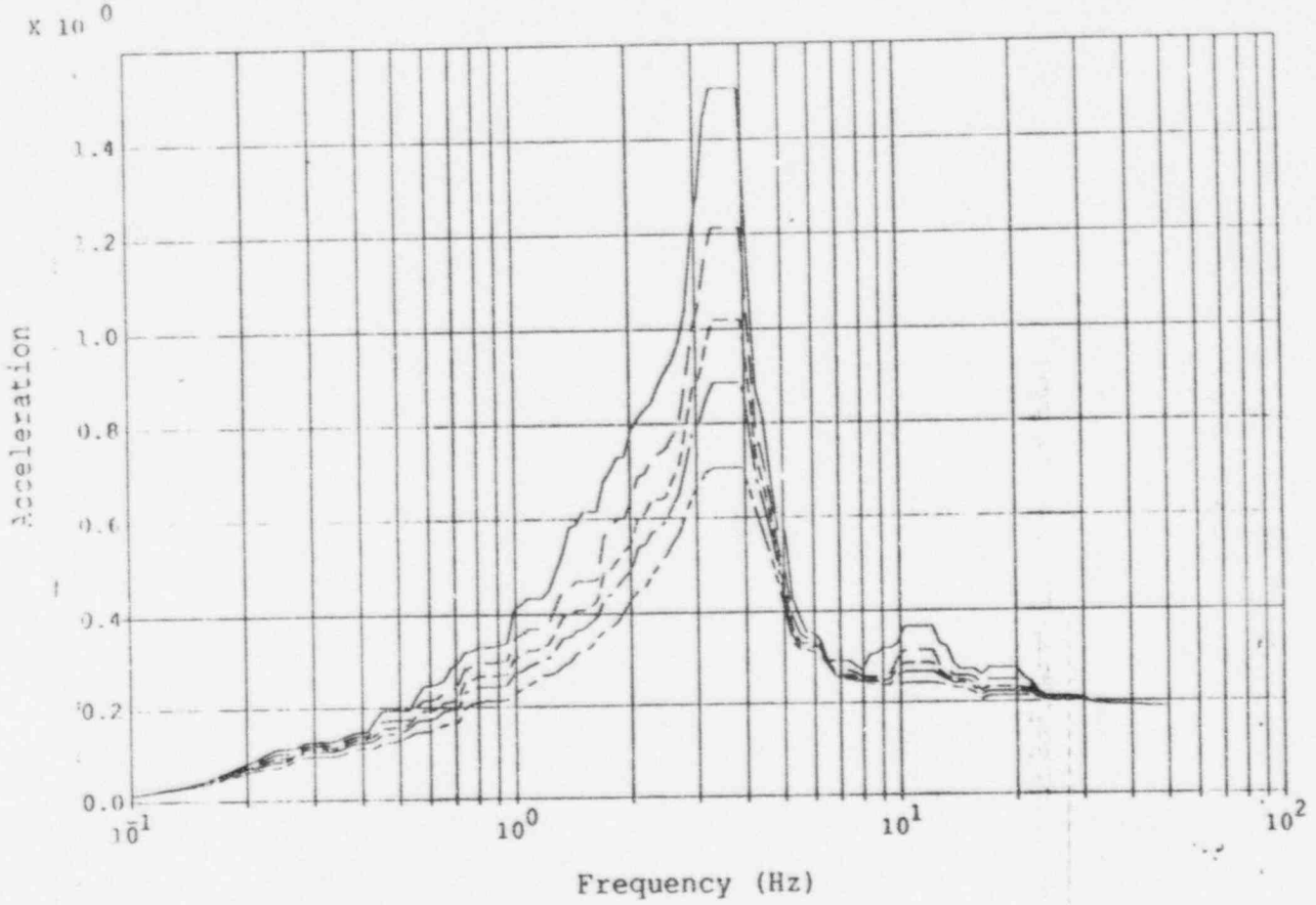
Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 23.0', Translation in the Vertical Direction



Legend:

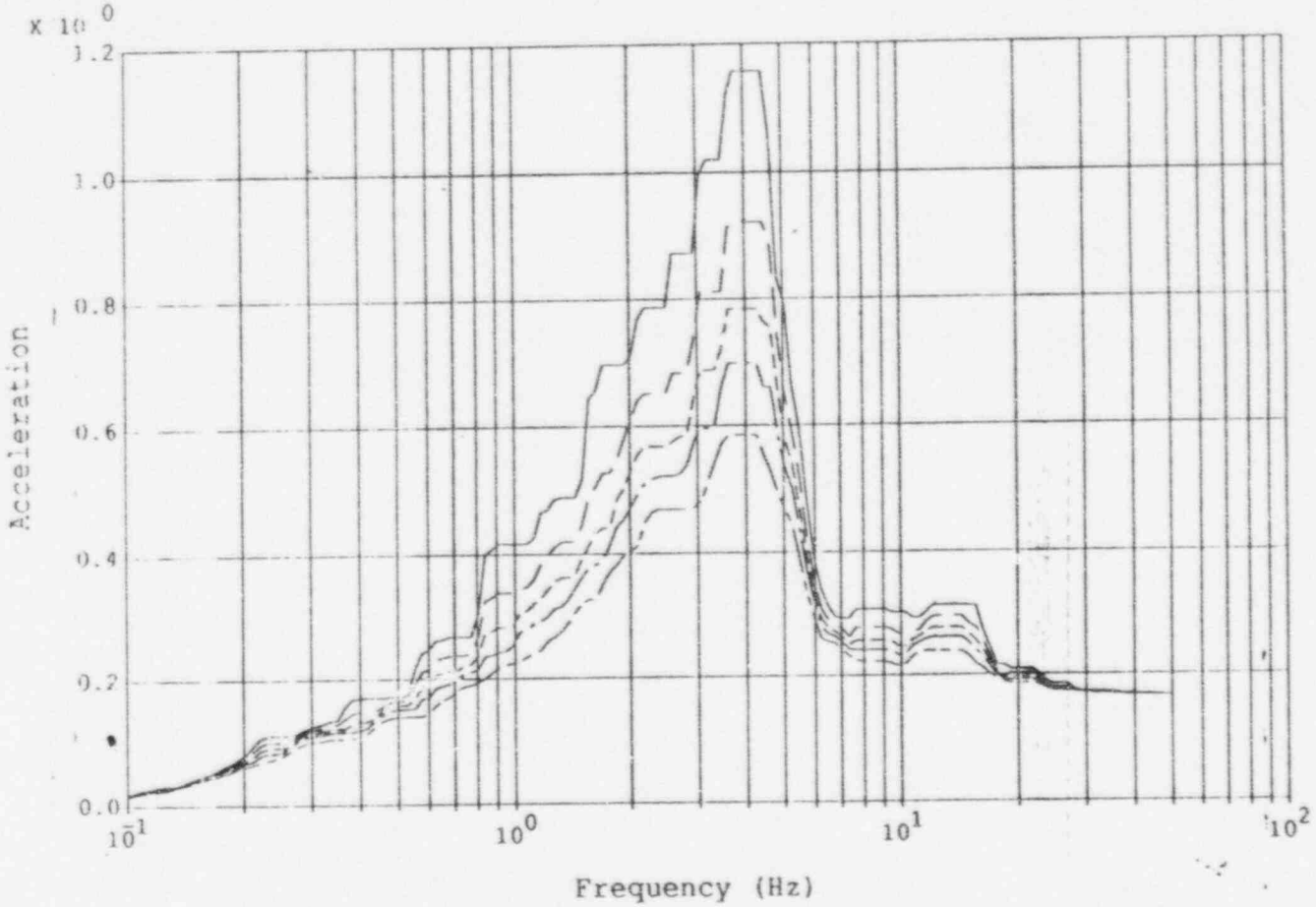
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 51.0', Translation in the NS Direction

RSPLT SUN V1.2 rb3x.plt 12:21:48 05/21/93



Legend:

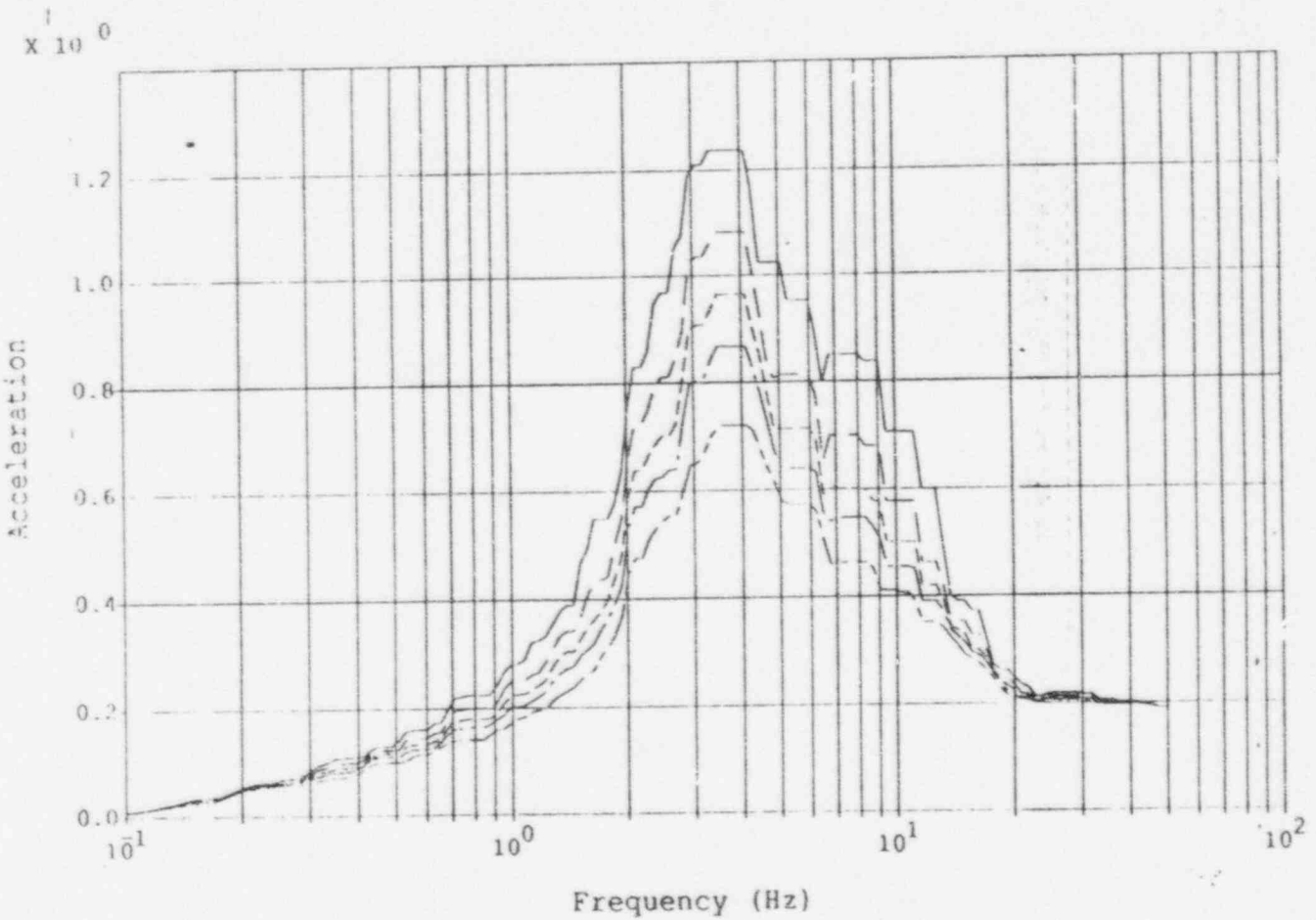
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, 'El. 51.0', Translation in the EW Direction

RSPLT SUN V1.2 rb3y.plt 12:21:50 05/21/93



Legend:

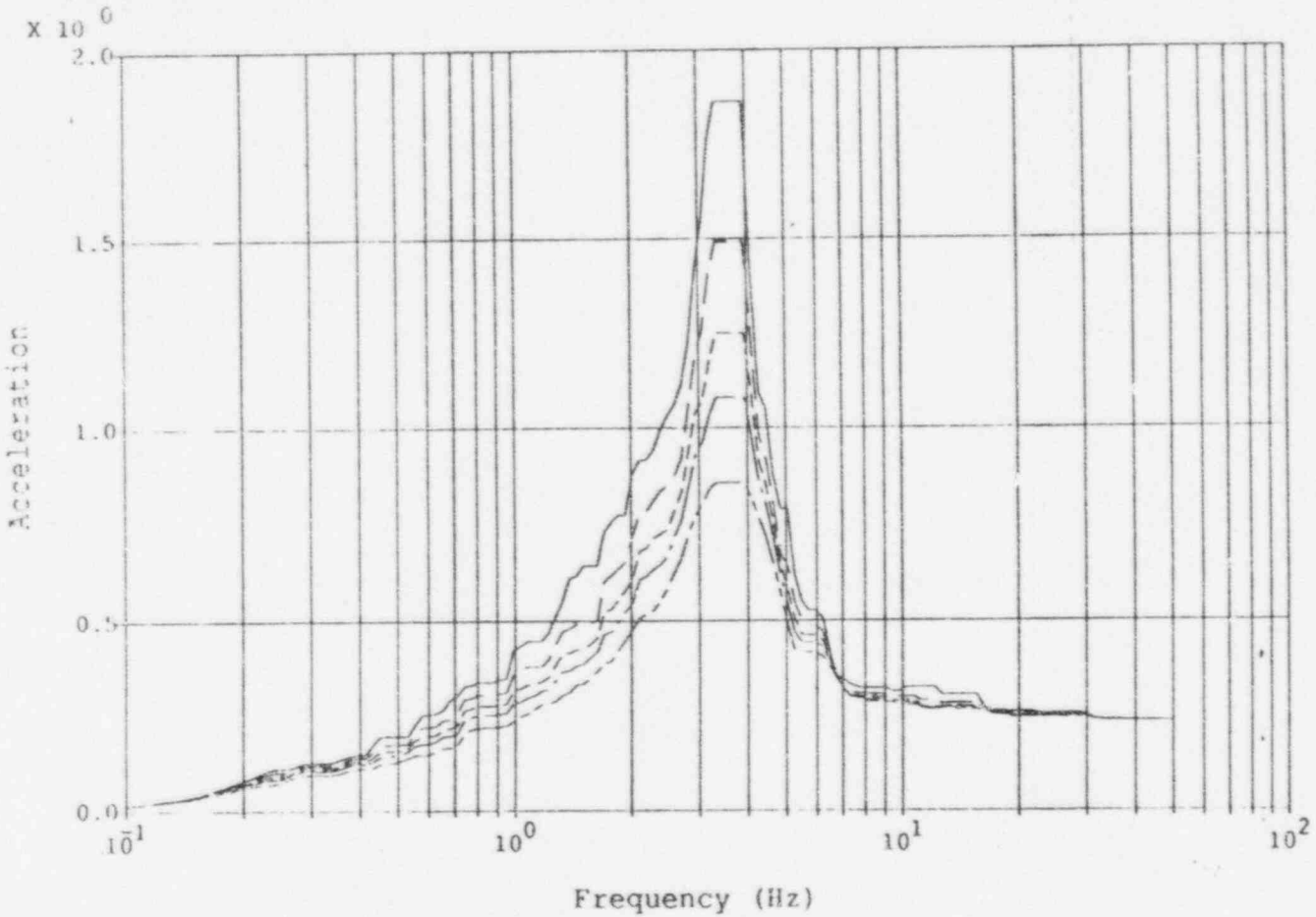
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. '51.0', Translation in the Vertical Direction

RSPLT SUN V1.2 rb3z.plt 12:21:53 05/21/93



Legend:

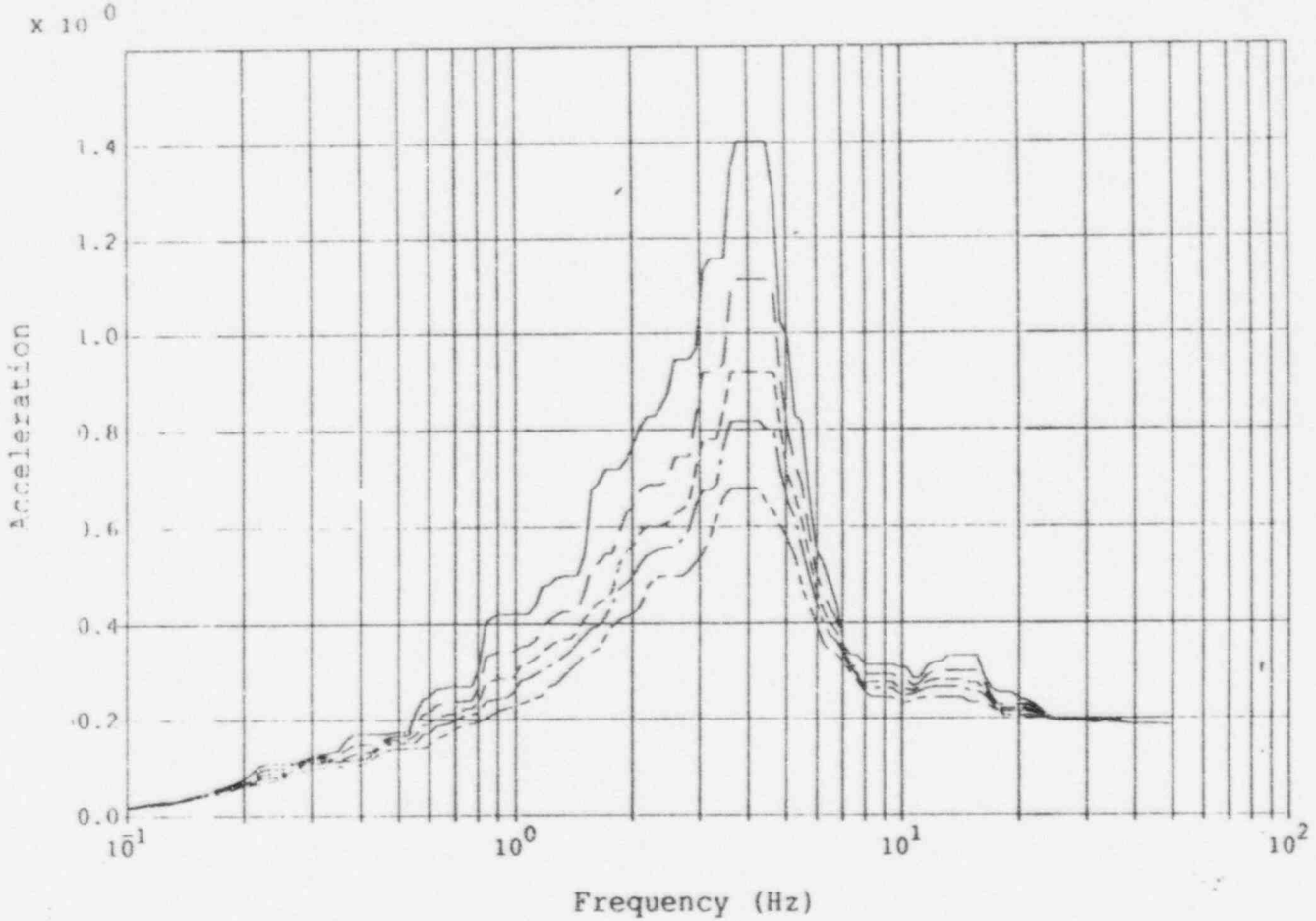
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 74.25', Translation in the NS Direction

RSPLT SUN V1.2 rb4x.plt 12:21:56 05/21/93



Legend:

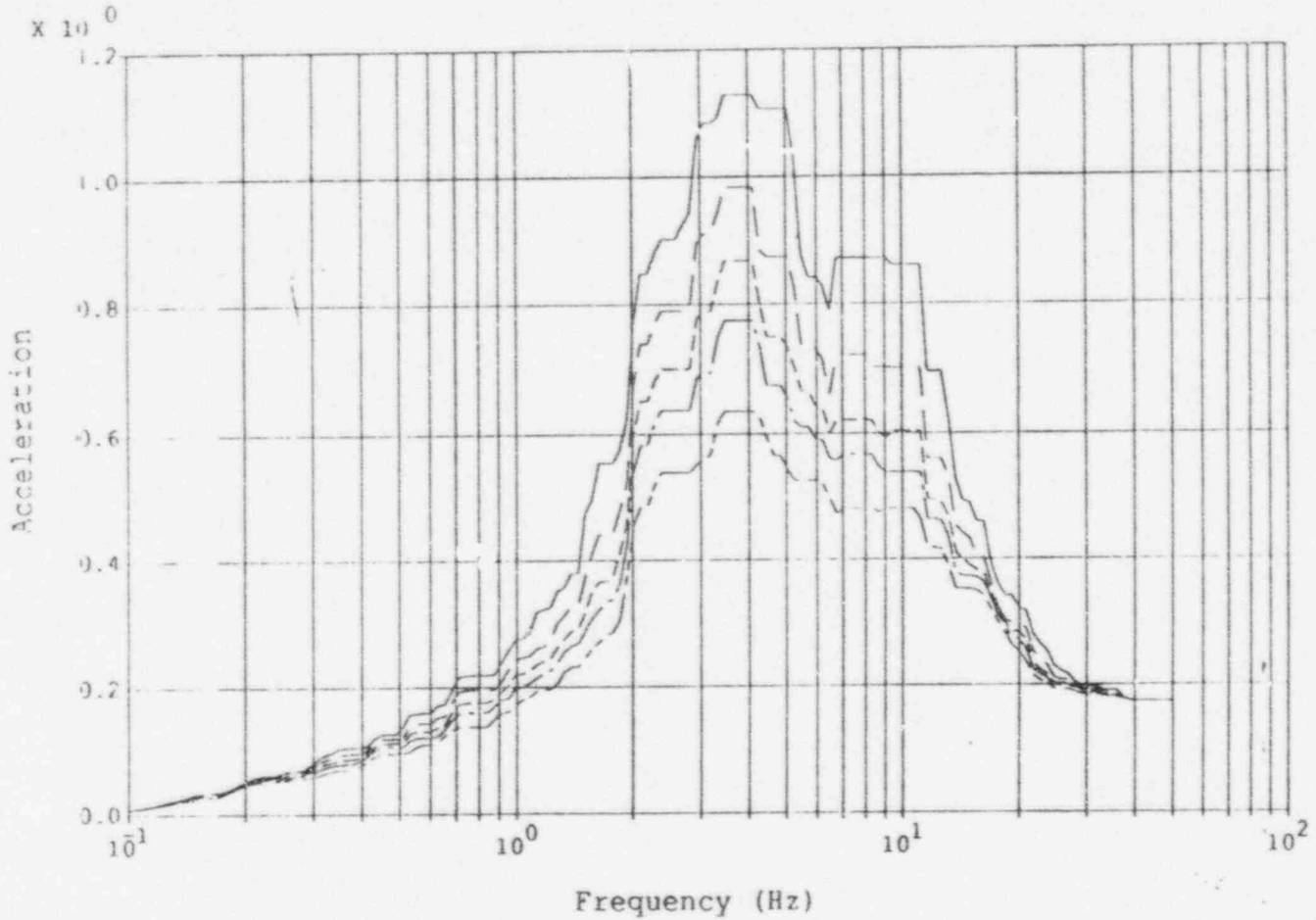
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 74.25', Translation in the EW Direction

RSPLT SUN V1.2 rb4y.plt 12:21:58 05/21/93



Legend:

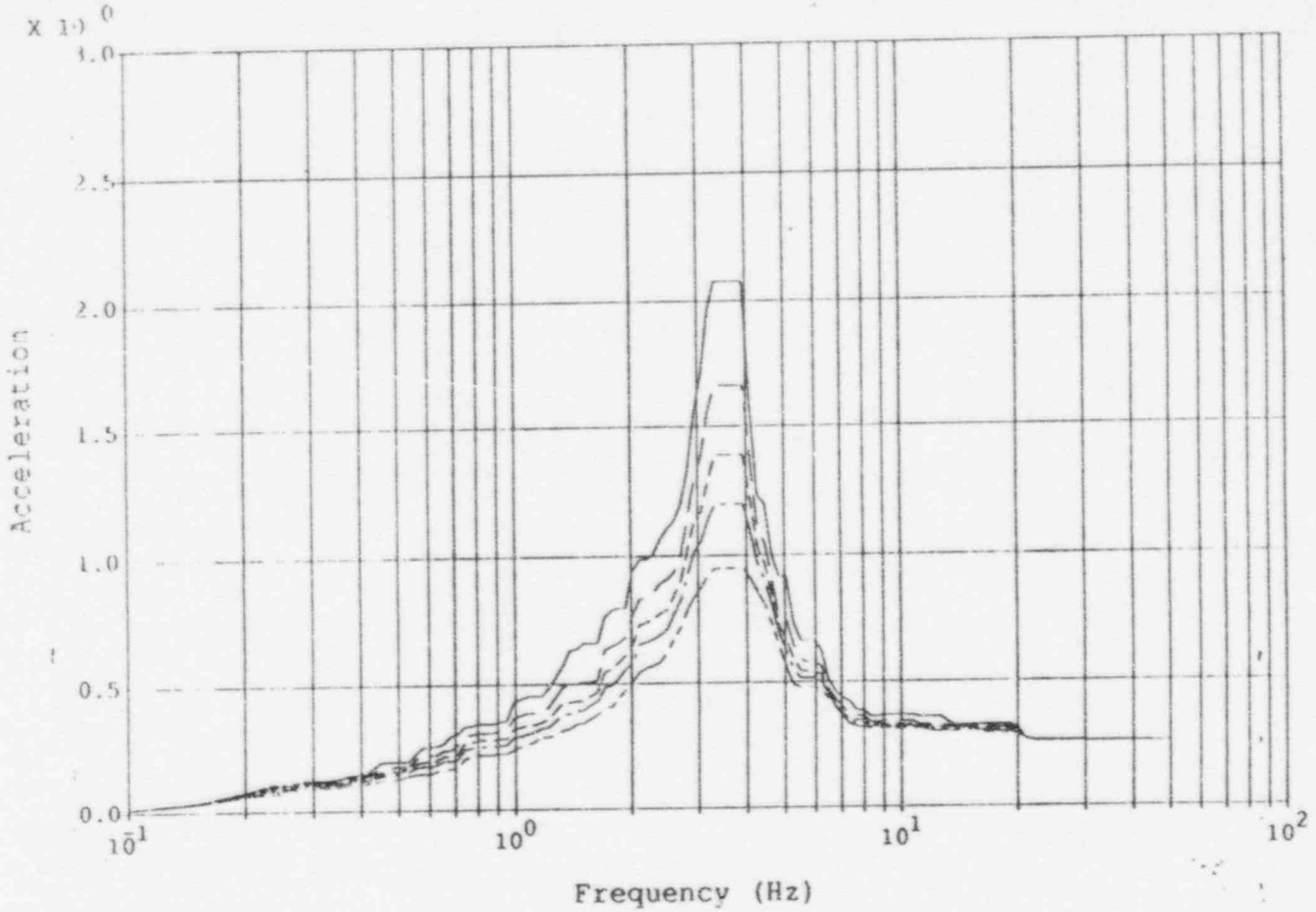
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 74.25', Translation in the Vertical Direction

RSP1T SUN V1.2 rb4z.plt 12:22:02 05/21/93



Legend:

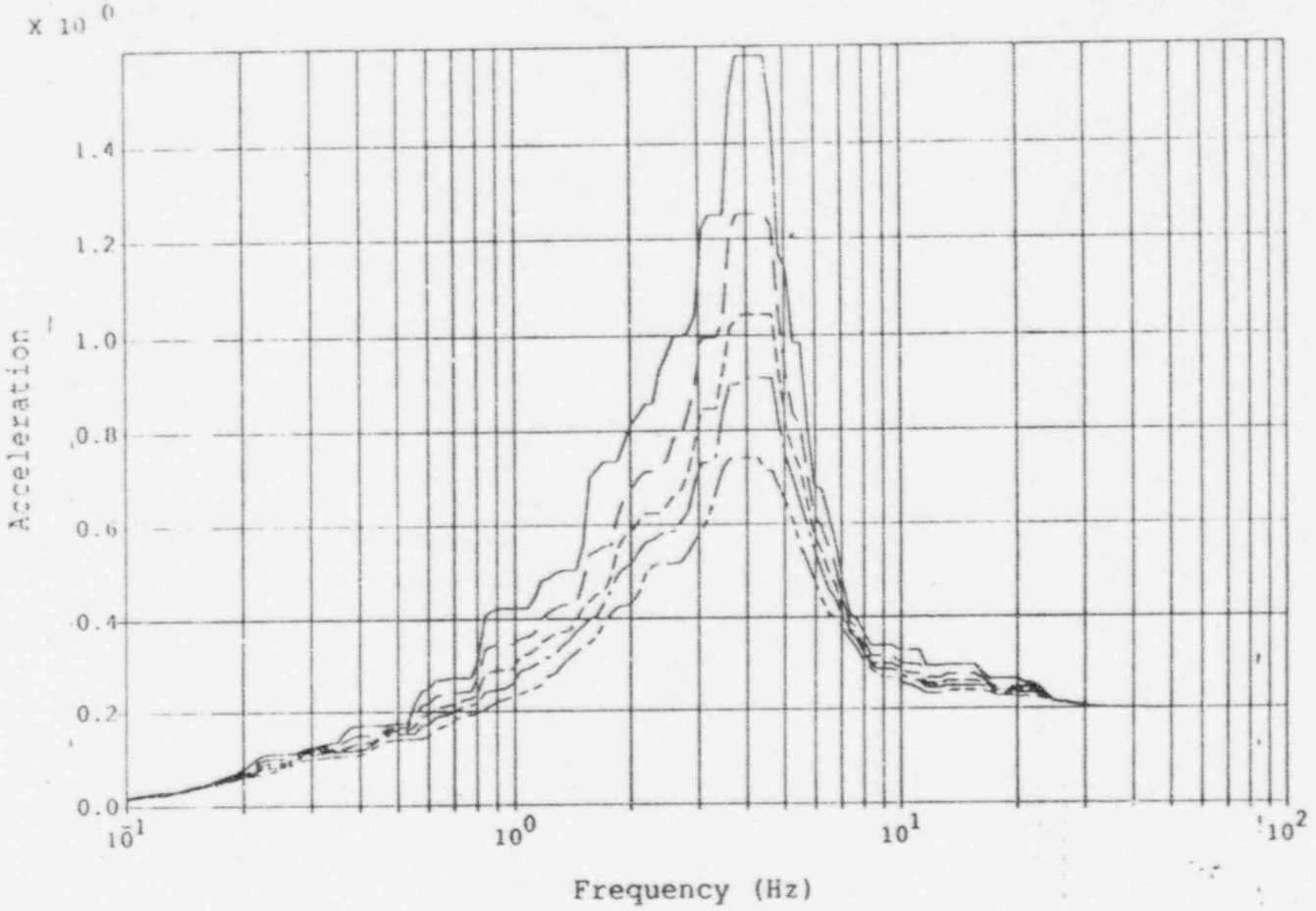
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 91.25', Translation in the NS Direction

RSPLT SUN V1.2 rb6x.plt 12:22:05 05/21/93



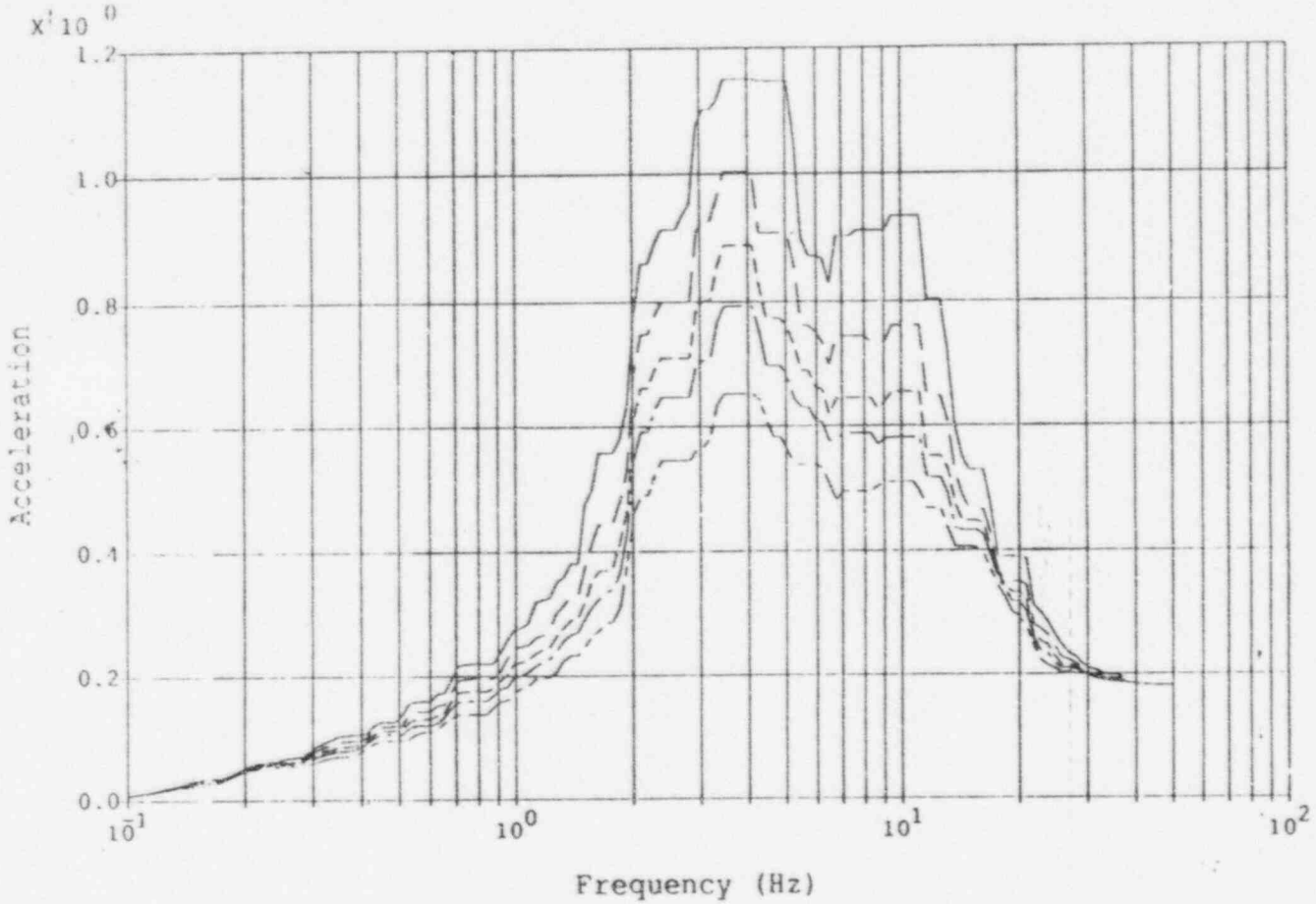
Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 91.25', Translation in the EW Direction



Legend:

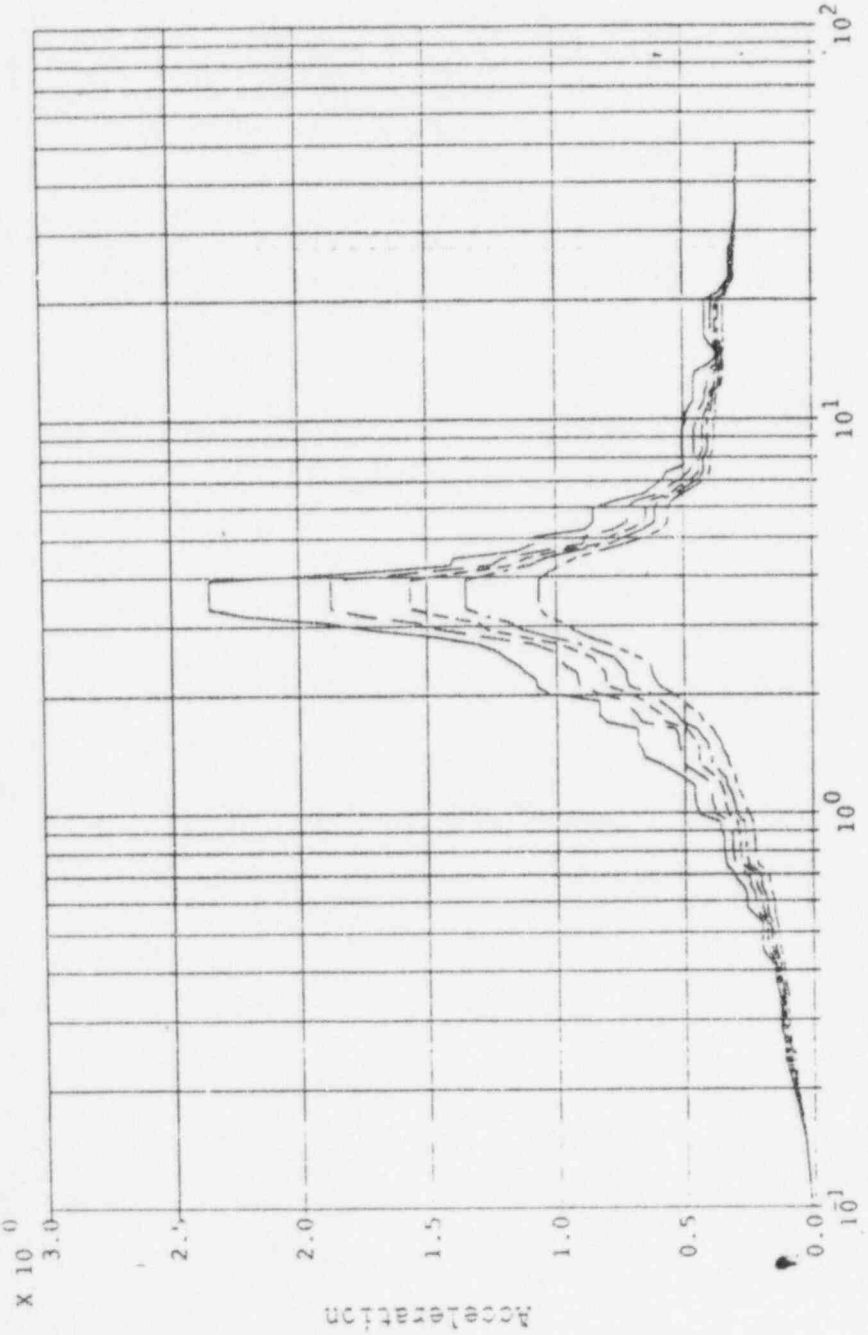
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 91.25', Translation in the Vertical Direction

RSPLT SUN V1.2 rb7x.plt 12:22:13 05/21/93



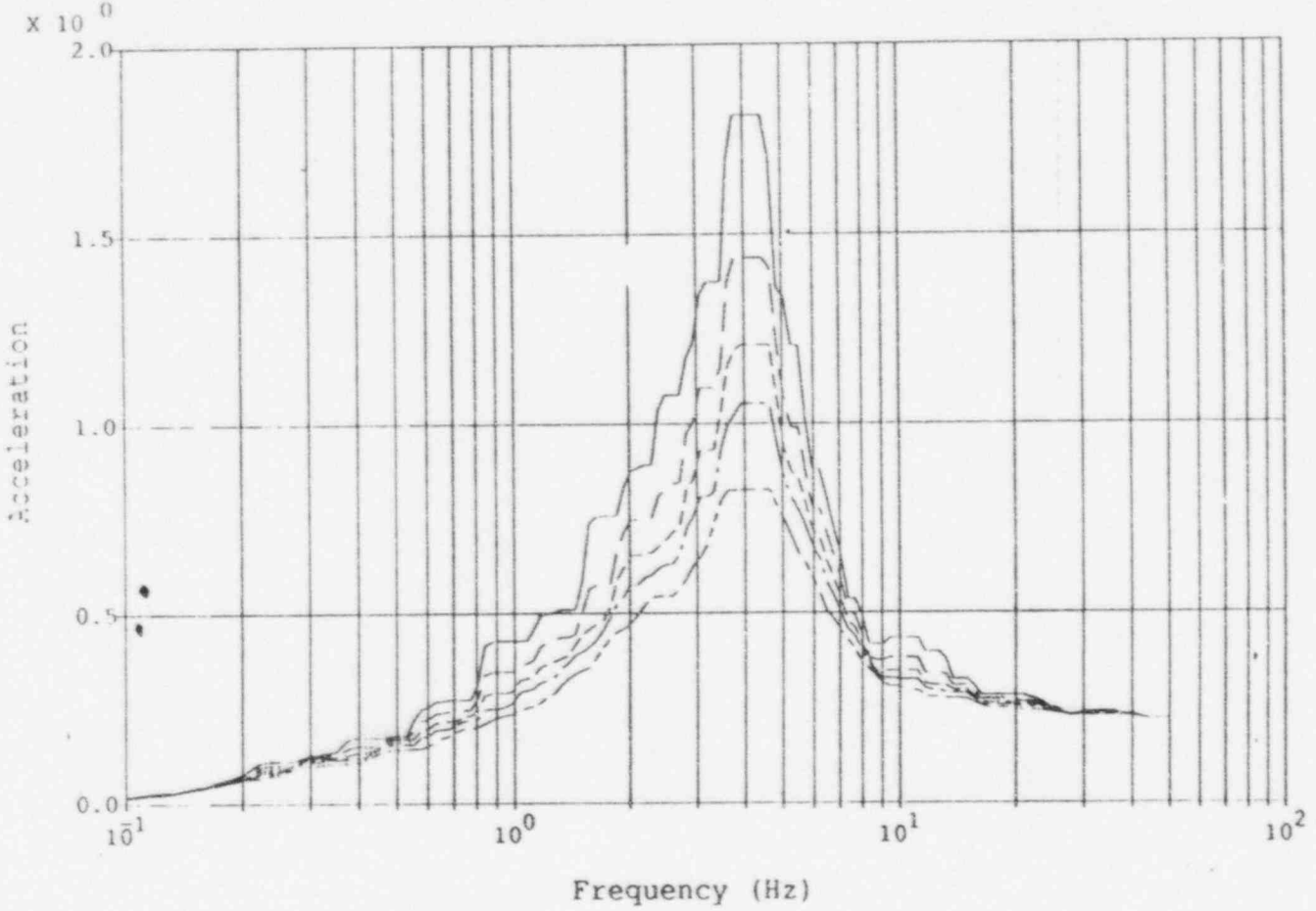
Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 117.0', Translation in the NS Direction



Legend:

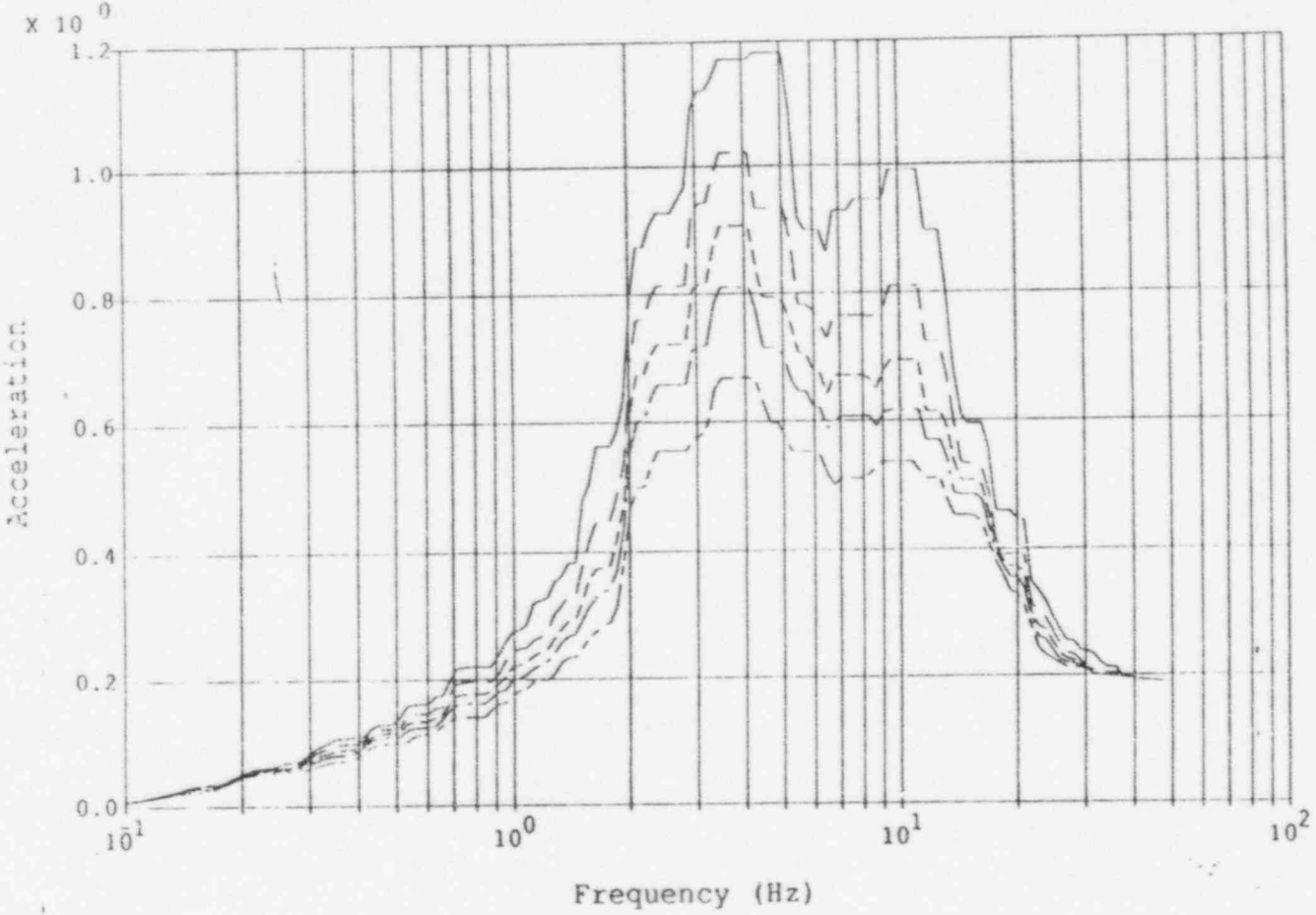
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 117.0', Translation in the EW Direction

RSPLT SUN V1.2 rb7y.plt 12:22:16 05/21/93



Legend:

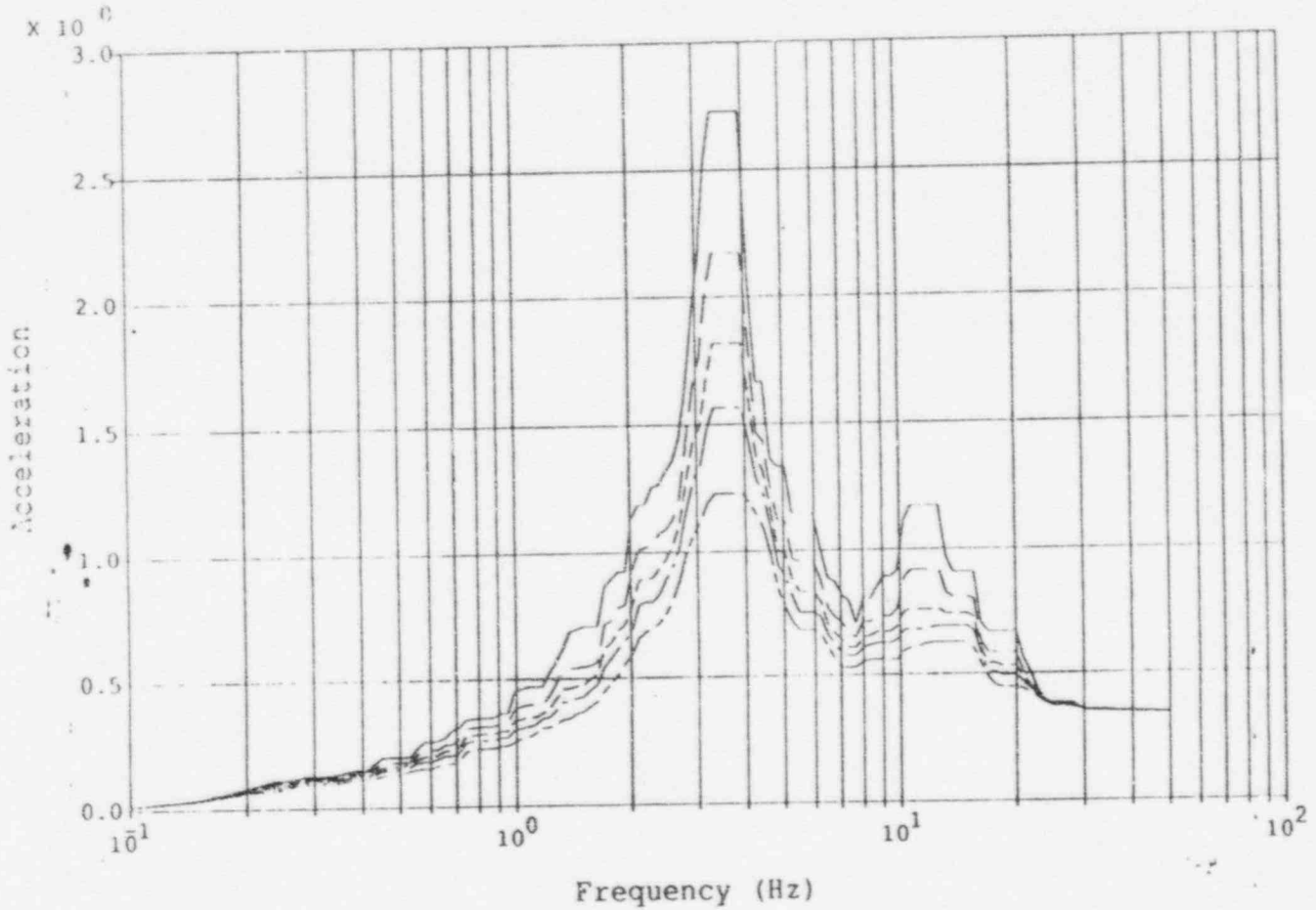
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 117.0', Translation in the Vertical Direction

RSPLT SUN V1.2 rb7z.plt 12:22:19 05/2:/93



Legend:

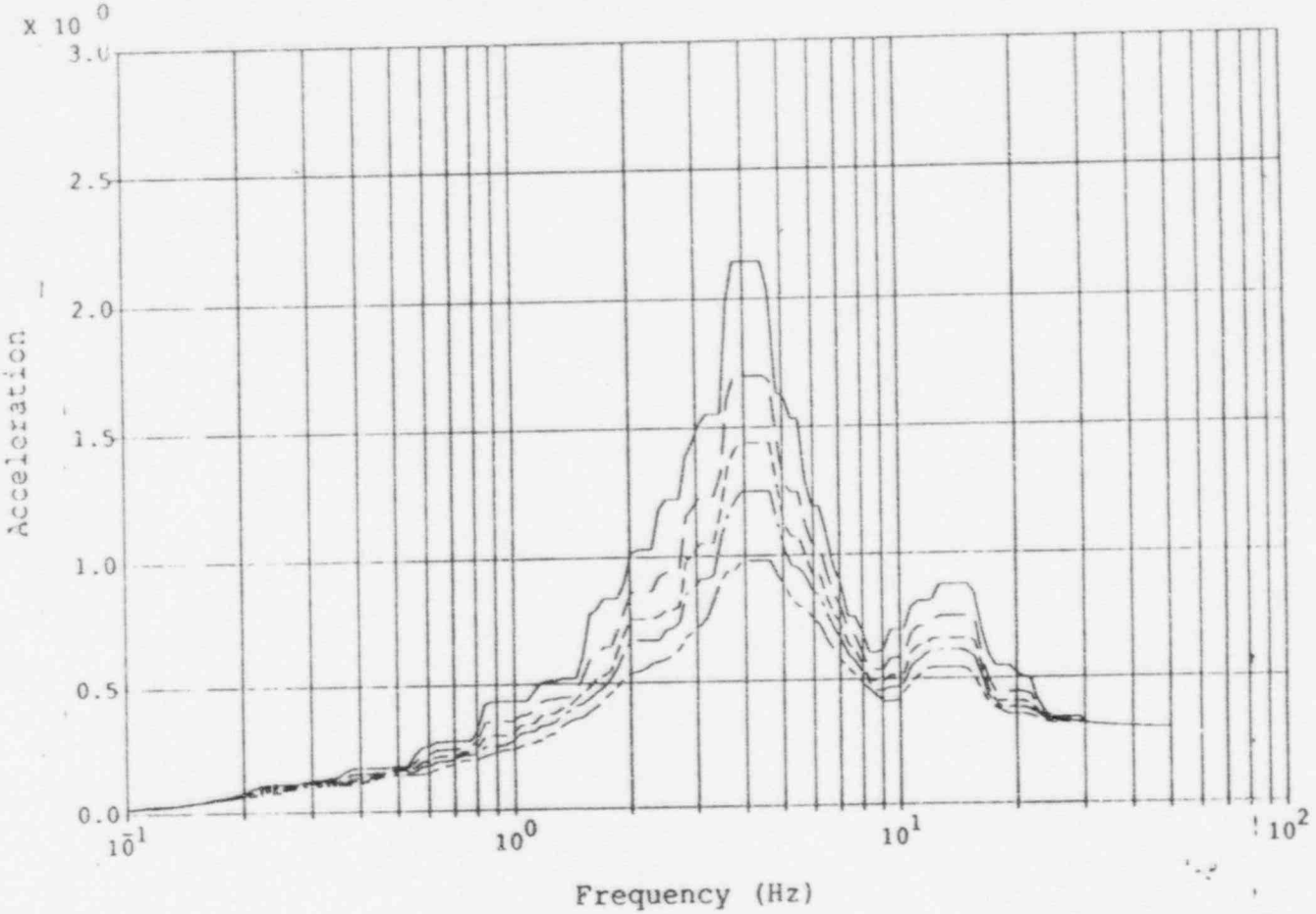
2% Damped Spectrum	————
3% Damped Spectrum	— — — — —
4% Damped Spectrum	- - - - - - - - -
5% Damped Spectrum	——·——
7% Damped Spectrum	——--—--

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 145.0', Translation in the NS Direction

RSPLT SUN V1.2 rb8x.plt 12:22:21 05/21/93



Legend:

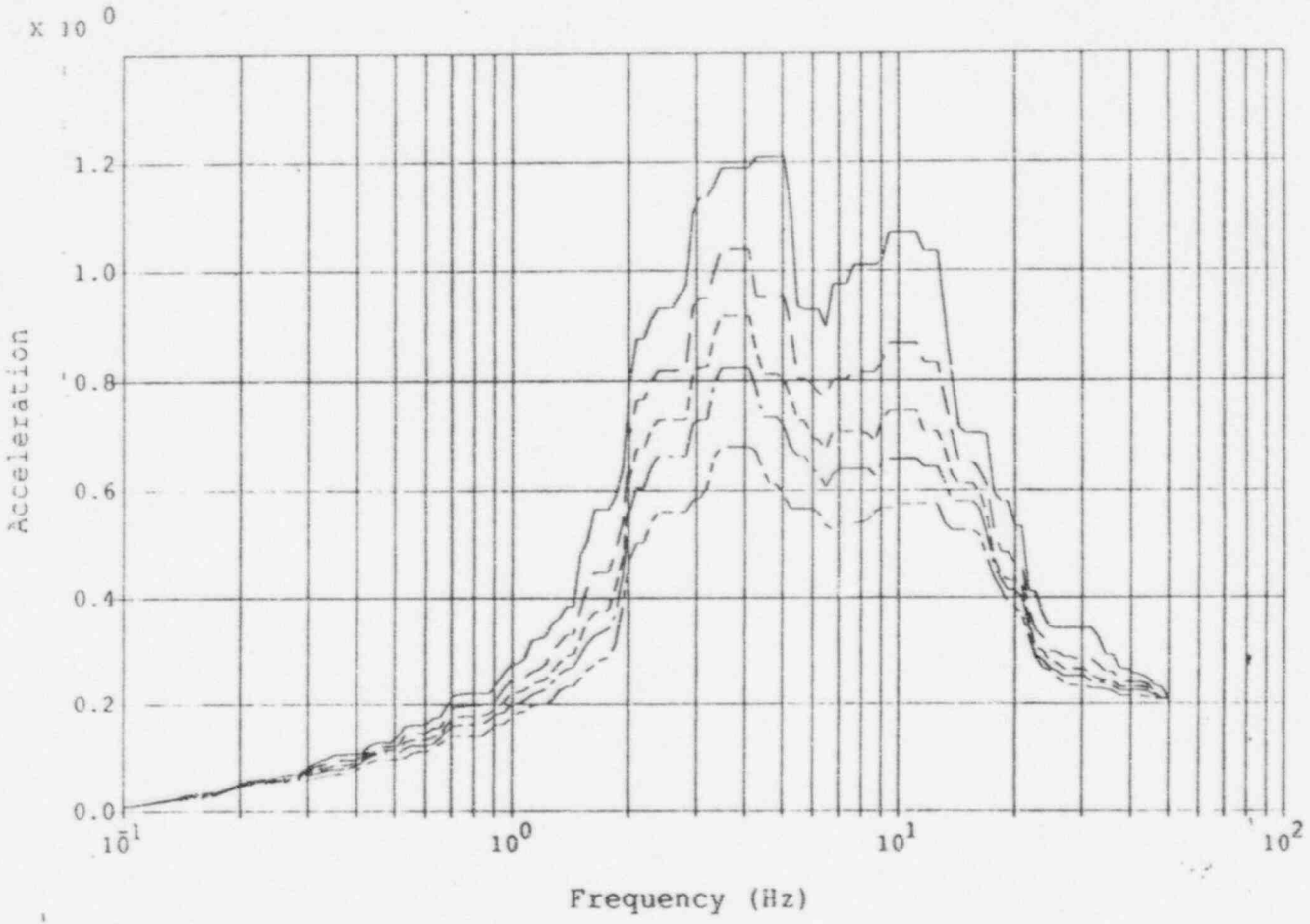
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 145.0', Translation in the EW Direction

RSPLT SUN V1.2 rb8y.plt 12:22:24 05/21/93



Legend:

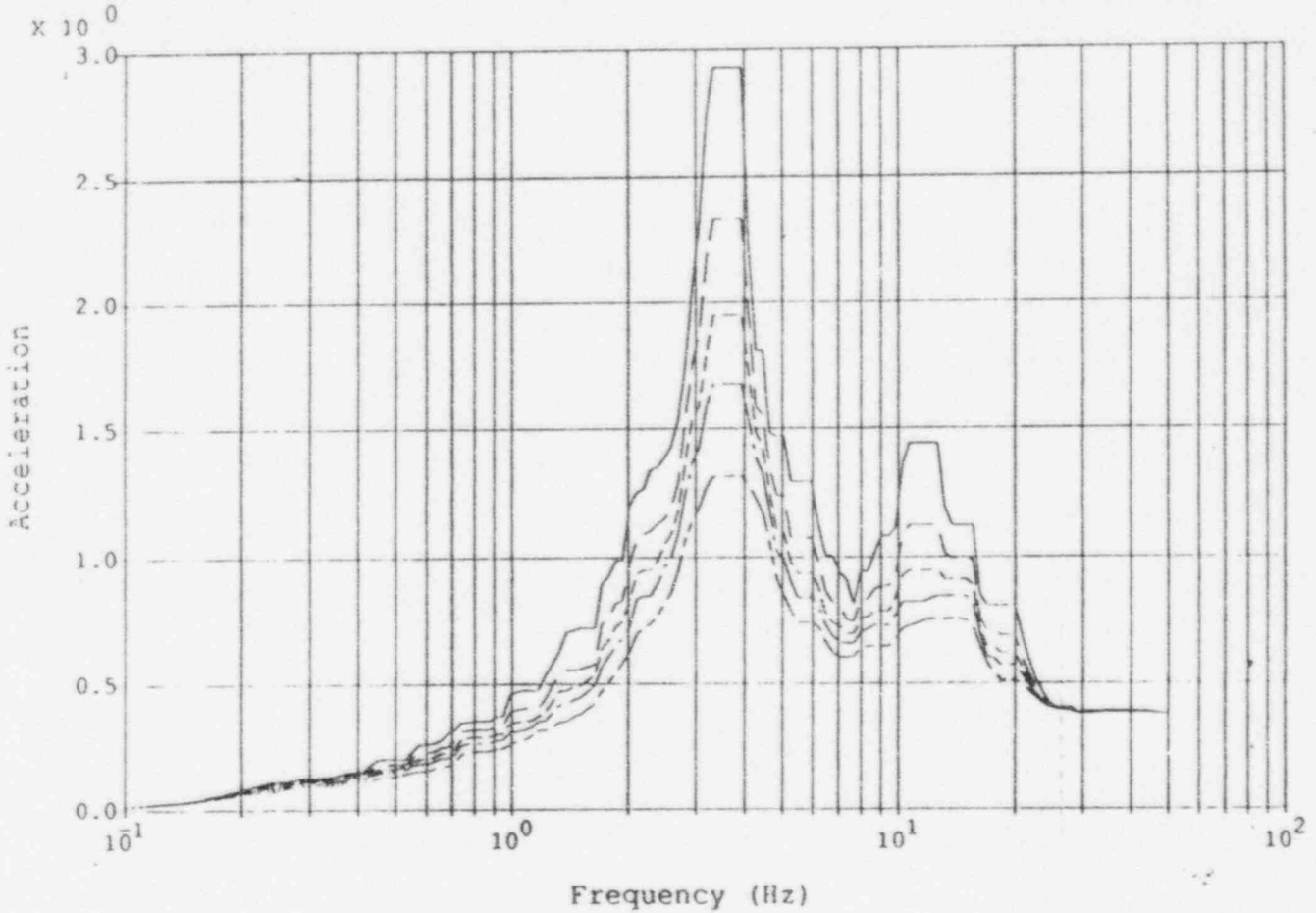
2% Damped Spectrum	————
3% Damped Spectrum	— — — — —
4% Damped Spectrum	- - - - - - - - - -
5% Damped Spectrum	—— . —— ..
7% Damped Spectrum	—— - - —— - - -

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 145.0', Translation in the Vertical Direction

RSPLT SUN V1.2 rb8z.plt 12:22:27 05/21/93



Legend:

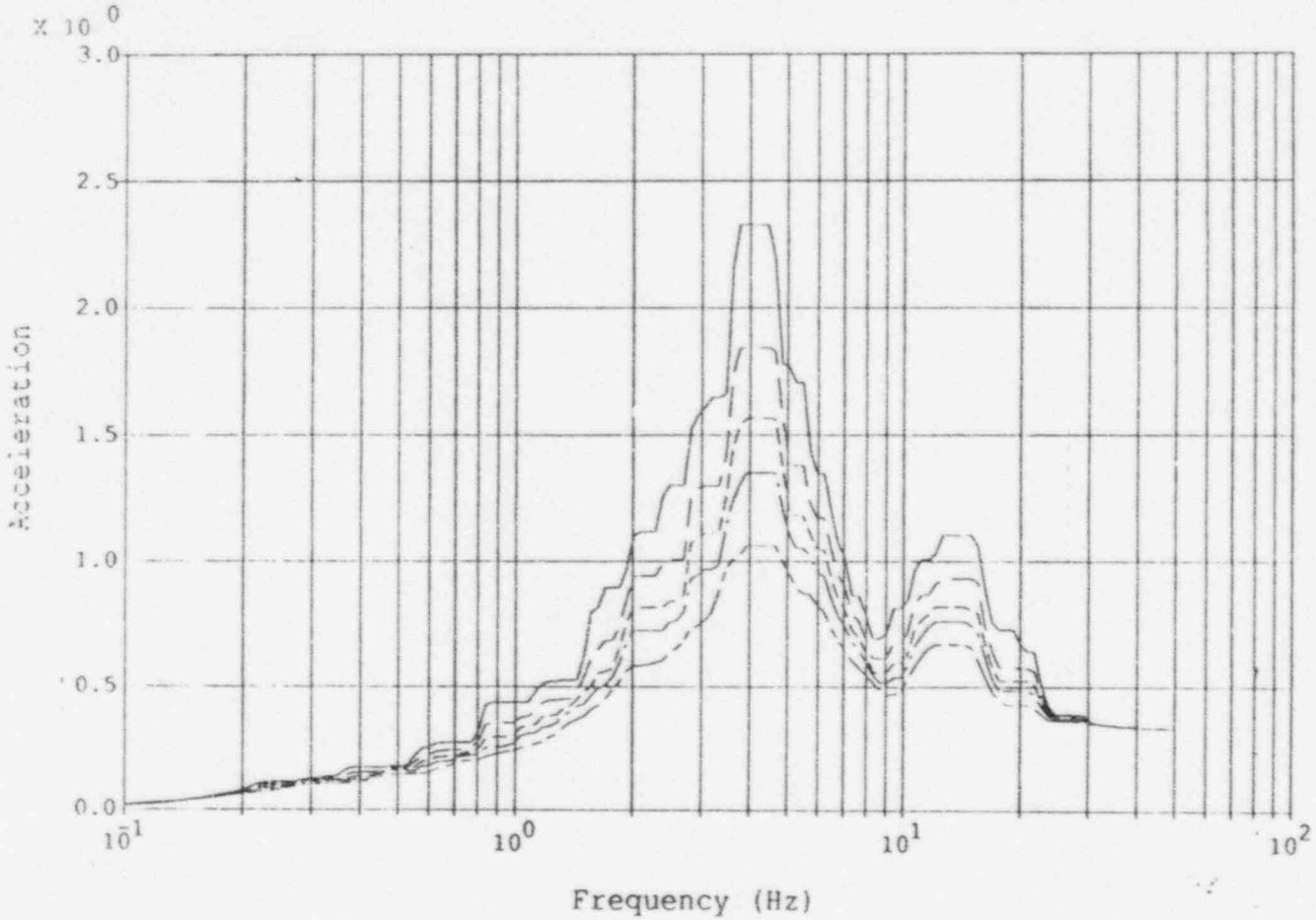
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 164.5', Translation in the NS Direction

RSPLT SUN V1.2 rb9x.plt 12:22:29 05/21/93



Legend:

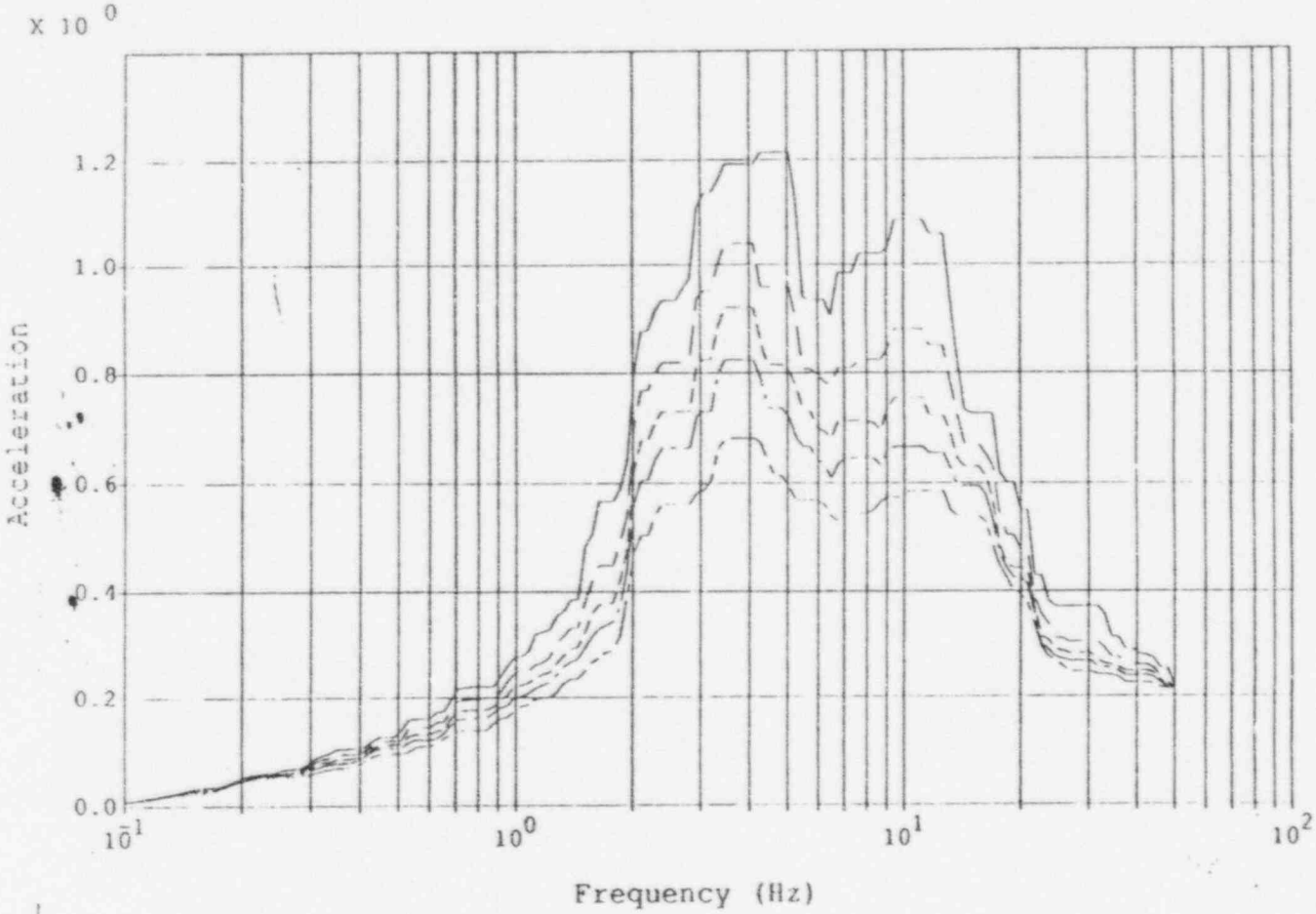
2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.15g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 164.5', Translation in the EW Direction

RSPLT SUN V1.2 rb9y.plt 12:22:33 05/21/93



Legend:

2% Damped Spectrum
3% Damped Spectrum
4% Damped Spectrum
5% Damped Spectrum
7% Damped Spectrum

Notes:

Accelerations in g's
1 SSE Level = 0.10g
Five Locations Enveloped

BECO: Pilgrim Reactor Building, RG 1.60 SSE
Reactor Building, El. 164.5', Translation in the Vertical Direction

RSPLT SUN V1.2 rb9z.plt 12:22:36 05/21/93