APPENDIX A

SEISMIC REVIEW TEAM QUALIFICATIONS

JEFFREY H. BOND

Jeffrey H. Bond has over seventeen years of experience in the design, analysis, testing, and qualification of industrial and nuclear systems, structures, and components. His responsibilities have included finite element modeling and analysis; vibration testing and analysis; and load, shock, vibration, and environmental testing for hardware qualification. His experience includes fourteen years with an engineering consulting organization with primary responsibilities in the area of equipment qualification for both manufacturers and utilities. His three years of experience at CP&L have included design responsibilities, NRC audit preparations, forced-outage plant material condition resolution programs, and responsibility for SQUG/IPEEE implementation at CP&L's Brunswick Plant. He completed the SQUG and IPE Seismic Add-On courses in preparation for participation in USI A-46/IPEEE resolution at all CP&L's nuclear power plants. He holds both BS and MS degrees in mechanical engineering, and is a registered professional engineer in the state of North Carolina.

STEVEN R. BOSTIAN

Steven R. Bostian has over thirteen years of experience in nuclear plant construction and design. This experience includes two years of on-site field engineering during the construction phase of the Comanche Peak Nuclear Plant, three years of on-site field engineering during the construction phase of the Shearon Harris Nuclear Plant, six years of civil/structural design engineering for the three nuclear plants operated by Carolina Power and Light Company, and two years in the USI A-46/Seismic IPEEE project. Primary engineering responsibilities have been in seismic support design and justification of mechanical and electrical components including electrical raceway, small and large bore piping systems, instrumentation, HVAC equipment, cabinets, and panels. He was selected for CP&L's USI A-46/Seismic IPEEE project in late 1992. He completed the SQUG and IPE Seismic Add-On courses in preparation for participation in the USI A-46/Seismic IPEEE resolution at all CP&L's nuclear facilities in early 1993. He is currently the responsible engineer for the A-46/Seismic IPEEE project for the Robinson Nuclear Plant in Hartsville, SC. He has also participated in the efforts for the Harris and Brunswick plants. He is a graduate of North Carolina State University with a Bachelor of Science Degree in Civil Engineering. He is currently registered as a professional engineer in both North and South Carolina.

MARTHA C. COOK

Martha C. Cook graduated from North Carolina State University in December, 1992 with a BS in Civil Engineering. She accepted an associate engineering position with CP&L in March, 1993. She was responsible for maintaining the SSEL databases and coordinating walkdown preparations for all three CP&L nuclear power plants including review of equipment qualification reports (testing and analysis), structures and equipment support drawings, equipment location drawings and anchorage calculations. She attended the SQUG Walkdown Screening and Seismic Evaluation Video Training Course in preparation for the USI A-46 and Seismic IPEEE walkdowns at CP&L's Harris, Brunswick and Robinson nuclear power plants.

RONALD W. CUSHING

At EQE, Mr. Cushing is a principal engineer for EQE Engineering Consultants involved in the application of earthquake experience data for component seismic verification at nuclear power plants. Mr. Cushing has investigated sites which have experienced major seismic activity for the SQUG earthquake experience database. He has extensive experience in performing nuclear power plant walkdowns for seismic adequacy in association with A-46 and IPEEE programs. Mr. Cushing is responsible for maintaining a database of replacement parts and components for equipment in nuclear power facilities. He is an author of the industry guidelines for the seismic technical evaluation for replacement items (STERI).

Mr. Cushing has over 17 years experience in nuclear plant walkdowns and startup testing, including valve testing, pump performance and vibration testing, system functional and preoperational testing on such systems as plant cooling water, condensate, main and auxiliary steam, turbine control and lube oil, main and auxiliary feedwater, chemical injection, service gas, and demineralizer systems.

Mr. Cushing is an instructor for the SQUG walkdown screening and seismic evaluation training course. He has also completed the SQUG equipment selection and relay evaluation training course and the EPRI add-on and seismic IPE training course. He is a registered Mechanical Engineer in the State of California.

GREGORY S. HARDY

Mr. Hardy has over 18 years experience in the design, analysis and testing of chemical, nuclear and aerospace structures and components. His responsibilities have included probabilistic risk assessments, earthquake experience data-based studies, stress analysis, finite element analysis, seismic margin studies, mass property studies, and shock and vibration environmental testing for hardware qualification.

Mr. Hardy has served as project manager on many projects including multi-million dollar efforts for Comanche Peak Nuclear Power Plant and for the Department of Energy K, L and P reactors at the Savannah River site. He also managed a seismic probabilistic risk assessment for the Chinshan Nuclear Power Plant in Taiwan, a seismic margin study for the Idaho National Engineering Laboratory ICPP facility, seismic research efforts for Mitsubishi Atomic Power in Japan and numerous seismic related projects for the commercial nuclear industry, the Department of Energy and the oil/gas industry. Mr. Hardy participated in the seismic safety margins research project SSMRP (the original margin research effort for LLNL) and was instrumental in the original development of the equipment fragility methods. He has also been a consultant to the Seismic Qualification Utilities Group(SQUG) for

9 years. He has directed and/or participated in the capacity evaluations of mechanical and electrical components on over 25 Probabilistic Risk Assessments (PRAs) for nuclear power plants. He has played a major role in both the development of the methodology and in the completion of the equipment fragility studies.

DARYL W. HUGHES

Daryl W. Hughes has over fourteen years of experience associated with structural design, analysis, testing and construction of nuclear power plant systems, equipment and components. He responsibilities have included seismic qualification of mechanical and electrical equipment and their supporting structures, review and approval of vendor seismic qualification reports, providing seismic requirements for equipment specifications, and evaluating equipment modifications. He has coordinated and directed reverification efforts of HVAC air handling units, plenums and equipment supports including supervision of personnel, design of hardware modifications, evaluation and resolution of design changes. He has four years of on-site design and construction experience of two nuclear plants. He completed the SQUG Walkdown Screening and Seismic Evaluation Training Course and the Add-On Seismic IPE Training Course in preparation for participation in USI A-46 and Seismic IPEEE resolution at CP&L's Harris, Brunswick and Robinson nuclear power plants. He holds a BS in Mechanical Engineering from the University of Illinois. He is a registered professional engineer in the state of North Carolina.

RONALD L. KNOTT

Ronald L. Knott has over eleven years of experience associated with the design and construction of nuclear power plants. For the majority of that time he has been involved with the seismic qualification of equipment. He has reviewed vendor reports and prepared calculations and reports documenting the dynamic analysis and qualification of distribution systems, structures, tanks, valves, and mechanical and electrical equipment for seismic loads. He served as equipment seismic qualification supervisor for the nuclear engineering department at CP&L. He was assigned to the probabilistic risk assessment section and later assigned to the Brunswick Plant for restart following a dual unit shutdown associated with structural deficiencies. In this capacity, he was responsible for the reanalysis of 250 masonry walls under the IEB 80-11 criteria, plant walkdowns and evaluations for material condition deficiencies, electrical equipment anchorage assessments, HVAC ducting upgrade and instrument rack replacements. He has completed the SQUG and the IPEEE Seismic Add-on courses. He has participated development of a resolution approach for CP&L, performed walkdowns and documentation reviews. He holds a BS in Civil Engineering. He is a registered Professional Engineer in North Carolina.

TIMOTHY MASON

At EQE International Dr. Mason has been involved in structural assessment, ranging from the use of hand calculations to complex numerical modeling. He has gained experience in seismic analysis using the finite element program ANSYS. He has experience in nuclear plant walkdowns and seismic qualification, including structural and pipework assessments, equipment inspection for seismic adequacy and the investigation of thermal and seismic interactions. He has also carried out a comprehensive study on nuclear plant equipment identifying similarities between equipment at UK power stations and that found in the US SQUG seismic experience database. This project involved site walkdowns and data collection in the UK, equipment assessment and comparison with equipment documented in the database.

Dr. Mason's experience of analytical techniques for the seismic qualification of nuclear plant has been extensive. This work has included soil structure interaction to generate building responses from pre-defined ground motion and the use of this secondary response to assess the integrity of both the buildings and other major structures. These analyses have been performed using time histories and, in the frequency domain, using response spectra.

Dr. Mason has completed the SQUG walkdown screening and seismic evaluation training course. He has a B.Sc. and a Ph.D. in Mechanical Engineering.

ROBERT N. PANELLA

Robert N. Panella has over twelve years of experience associated with design and construction of nuclear power plants. He has experience in seismic response spectra development, masonry wall analysis, pipe stress analysis, pipe and conduit support design, and seismic qualification of equipment. He has served as department expert in computer-assisted design of steel frames and re-analysis of existing structures. He has also provided training to engineering personnel on structural design issues to ensure consistency of approach among designers. He completed the SQUG Walkdown Screening and Seismic Evaluation Training Course and the Add-On Seismic IPE Training Course in preparation for participation in USI A-46 and Seismic IPEEE resolution at CP&L's Harris, Brunswick and Robinson nuclear power plants. He was the project manager for the USI A-46 and Seismic IPEEE programs of all three plants from 1992 through 1993. He holds a BS in Civil Engineering.

KEVIN N. POYTHRESS

Kevin N. Poythress has over four years of experience in structural design and analysis. He has been working for CP&L in the HESS civil stress subunit for 1 1/2 years performing pipe stress analyses, and has completed Harris Basic Systems Training. He was the lead pipe stress analyst for the replacement of the Brunswick Emergency Diesel Generator Service Water Piping. This MOD replaced a significant amount of piping and therefore required careful attention to schedule, budget and technical issues. He has also performed pipe stress operability and long term evaluation for the RESS Piping Improvement Program. He completed the SQUG

Walkdown Screening and Seismic Evaluation Training Course and the Add-On Seismic IPE Training Course in preparation for participation in USI A-46 and Seismic IPEEE resolution at CP&L's Harris, Brunswick and Robinson nuclear power plants. He has a BS and MS in civil engineering, and is a licensed engineer in the State of Tennessee.

THOMAS R. ROCHE

Mr. Roche has over eleven years of experience in the design, engineering, startup and analysis of systems and equipment at power, industrial and nuclear facilities. His responsibilities have included evaluation and analysis of systems and equipment for seismic events, preoperational testing of nuclear power plant systems, system engineer for nuclear and non-nuclear power plant systems, equipment qualification and post earthquake investigations. Mr. Roche is a Technical Manager with EQE International. He is responsible for various seismic evaluation efforts for nuclear facility systems and equipment. Mr. Roche is the Electric Power Research Institute (EPRI) Principal Investigator for investigating the 1989 Loma Prieta, 1994 Northridge and 1995 Great Hanchin earthquakes. He completed the SQUG walkdown and relay evaluation courses as well as the EPRI seismic individual plant evaluation of external events add-on course. He is a registered Mechanical Engineer in the State of California.

Mr. Roche has contributed to the development of the earthquake experience data base generated for the Seismic Qualification Utilities Group (SQUG). He concentrates on the response of systems to earthquakes at power and industrial facilities. Systems are investigated for the effects of power interruption, relay actuations due to vibration, relay actuations due to system transients, spurious electrical and pneumatic signals, and control room alarms. This seismic experience data is being utilized by the nuclear industry to resolve the seismic issues associated with the NRC's Unresolved Safety Issue A-46.

PEER REVIEWER RESUMES

CHARBEL M. ABOU-JAOUDE, P.E.

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

STEPHEN P. REICHLE

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

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

APPENDIX B

SHEARON HARRIS NUCLEAR POWER PLANT
SUCCESS PATH LOGIC DIAGRAM AND
SUPPORTING INFORMATION DEVELOPMENT
RSC 94-01
REVISION 1 AND ADDENDUM 1

RSC 94-01

Shearon Harris Nuclear Power Plant Success Path Logic Diagram and Supporting Information Development

Revision 1

August 1994

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1.0 Success Path Logic Diagram

As a part of the individual plant examination of external events (IPEEE)[1], an evaluation of plant response to a seismic event that exceeds the design basis earthquake is required. A successful response is defined by the ability to maintain plant frontline systems that provide critical plant functions. The functions involved are: reactivity control, reactor coolant system inventory control, reactor coolant system pressure control, and decay heat removal. In addition the systems that support frontline system operation, for example, ac power, service water, etc., must be available. The Electric Power Research Institute (EPRI) has developed a process for seismic margins assessment (SMA) and it is documented in EPRI report NP-6041[2]. This document outlines the steps required to perform the assessment and identifies the boundary conditions and assumptions that are required for this assessment. The major assumptions are summarized below.

- Offsite power is assumed to be lost following the seismic event. The analyst should, however, consider the potential for adverse effects should ac power not be lost or if it should be restored.
- The success paths must be capable of maintaining the plant in either hot or cold shutdown for a period of 72 hours.
- The SMA should address two conditions. The first is a transient without RCS leakage and the second is a 1" LOCA condition. For the LOCA case, one reactor coolant system inventory control path must be capable of mitigating a 1 inch LOCA.
- Success is measured at the system level for success path logic diagram elements that represent multiple train systems. In other words, if one train is sufficiently rugged the other trains should provide similar seismic capacity.
- Non-seismic component failures should not be explicitly addressed within the EPRI process. The analyst should provide a check to ensure that the reliability of components will be adequate to exclude random failures. This is especially important for single train systems.
- The potential for relay chatter should be addressed. Note: Relay identification is provided in a separate analysis.
- Only core damage prevention systems should be addressed. Containment mitigation systems are not in the scope of the seismic margins evaluation.

The NRC, in their generic letter (Reference 1), indicated that the EPRI methodology is acceptable given two proposed supplements are adopted. Non-seismic failures and human actions should be considered in accordance to the guidance provided in NUREG-1407[3] and containment isolation and required mitigation systems should be examined as appropriate.

NUREG-1407 (Reference 3) indicates that non-seismic failures and human errors should be considered during the selection of systems needed to respond to a seismic event. It further suggests that a method similar to the method provided in NUREG/CR-4826[4] (Maine Yankee evaluation) is considered acceptable. In this evaluation quantitative guidance is provided for determining if non-seismic or human error events should be included.

The EPRI approach adopts a more qualitative criterion that serves as a guide for choosing systems and equipment for the success path logic diagram. In choosing the systems required for the SHNPP success paths, the equipment train reliability is qualitatively considered and only the most reliable alternative is chosen.

With regard to the analysis of the containment, NUREG-1407 (Reference 3) states that "the primary purpose of the evaluation for a seismic event is to identify vulnerabilities that involve early failure of containment functions. These include containment integrity, containment isolation, prevention of bypass functions, and some specific systems depending on a containment design (e.g., ignitors, suppression pools, ice baskets)." The major concern presented is for early containment failure modes.

The guidance further states that "generally containment penetrations are seismically rugged; a rigorous fragility analysis is needed only at review levels greater than 0.3g, but a walkdown to evaluate for unusual conditions (for example, spatial interactions, unique penetration configurations) is recommended." With regard to containment systems, the guidance provided is that "seismic failures of actuation and control systems are more likely to cause isolation system failures and should be included in the examination." The major concern deals with relay chatter that is out of scope for this evaluation. Isolation valves are expected to be seismically rugged and the walkdown should confirm this belief. The containment walkdown should also examine containment systems, for example, containment spray and fan coolers.

In considering this guidance, there appears to be only a marginal benefit to be gained by preparing a listing for containment functions (which is not required by either the EPRI or NRC guidance) and only a brief discussion is provided in Section 5.0 of this report to assist in performing the walkdown.

The information provided in the EPRI report outlines each step in the seismic margins evaluation process. This report documents the performance of step 3 of the EPRI process which involves the development of the success plant logic diagram (SPLD) for Shearon Harris, the development of equipment walkdown lists for systems of interest, and the execution of a pre-walkdown to provide early identification of any components with potentially low seismic ruggedness.

The SPLD is in the format of a reliability block diagram which identifies the systems required for success. The methodology requires that two or more success paths be provided for each of the major functions that must be accomplished to meet the success criteria. It is read in a similar fashion to an electrical diagram. Single entries indicate that the system must function to ensure success. Parallel entries indicate two or more options for success. The following discussion outlines the development of success paths for Shearon Harris and serve as the basis for the SPLD.

1.1 Required Support Systems

Along with the frontline systems that are assigned to the success paths, the status of support systems necessary to maintain required frontline functions must be identified. To define these systems a review of the draft Shearon Harris IPE system notebooks was performed to identify interfaces between frontline and support systems. The information contained in the IPE system notebooks provides a concise source for identifying support system requirements. In addition to frontline systems, some support systems require cooling or power. Table 1-1 summarizes the links between the frontline and support systems addressed in the SPLD.

Using the information presented in Table 1-1, the support systems which must be addressed in the assessment are chosen. As the table demonstrates, ac power is required by most equipment following a seismic event. Some systems, however, are only needed for selected equipment. For example, HVAC is only required for operation of the charging pumps and the diesel generators. Other components do not require HVAC cooling over the period of interest. The pressurizer power-operated relief valves (PORVs) are equipped with air accumulators which provide sufficient air for PORV operation. The compressed nitrogen and instrument air systems, therefore, are not required or addressed by this evaluation. Based on this assessment six support systems are identified as important and are examined by this report. These support systems are:

- Safety-related ac power (including diesel generators)
- Safety-related dc power (including 120 Vac)
- HVAC cooling for CSIPs and diesel generators
- Emergency service water
- Component cooling water
- Essential chilled water (ECW)

Each of these systems provides an important support function which must be assured following a seismic event. As such, the important components in each support system success path must be included in the development of the safe-shutdown equipment list (SSEL) and evaluated.

Table 1-1
Support System Dependency Matrix

Frontline/Support System	Ac Power	Dc Power[a]	Emergency Service Water	Component Cooling Water	HVAC	Compressed Nitrogen
Auxiliary Feedwater System	X[b]	X				
Charging/Safety Injection System	X	X	X		X	
Residual Heat Removal/ Low Pressure Injection System	X	X		X[c]		
Pressurizer PORVs		X				X[e]
Steam Generator PORVs	X					
HVAC/ESCW	X	X	X[d]			
Component Cooling Water System	X	X	X			
Emergency Service Water	X	X				
Control Room					X[f]	
Ac Power (diesel generators)		X	X		X	

a - Many systems require dc power to start equipment.
b - Ac power is not directly required for steam-driven pump operation.
c - CCW required for recirculation and RHR cooling.
d - ESCW is also required for some HVAC.
e - The PORV accumulators have sufficient nitrogen for PORV operation.
f - Control room cooling required over the 72 hour period.

1.2 Reactivity Control

Following the convention established by the EPRI document (Reference 2), the next block involves the ability of the plant to establish and to maintain adequate shutdown margin following the seismic event. Two paths are identified for this function. The primary path is the insertion of the control rods. This is the normal method for reactor shutdown and occurs automatically when a reactor trip signal is generated. As a backup action the operators can execute a reactor trip from the main control board. Another possibility is that the loss of offsite ac power will result in a loss of power to the control rod motor control centers. This will result in rod insertion by gravity as the motor control rod drives unlatch and release the control rods. Since the EPRI guidance suggests that the analyst should consider averse effects due to power not being lost, this path is not considered a success and a trip signal must be received to ensure rod insertion. The control rods provide adequate shutdown margin to allow for the control rod of the highest worth to fail to insert.

As the RCS temperature decreases, additional boration may be required to maintain adequate shutdown. This function can be accomplished using the normal charging system. If normal charging is not present the RCS may begin to heatup which will increase the temperature component of negative reactivity and trend the reactor to shutdown. RCS inventory control addresses the need to monitor and maintain long-term shutdown.

Should an inadequate number of control rods be inserted, a backup action can be initiated by the operators to introduce makeup water with a high boron concentration using either of two paths. Inadequate control rod insertion could be the result of control rod binding caused by a shift in reactor internals due to the seismic event. The operators can align the charging system to the boration system and provide highly borated water to the RCS to increase shutdown margin using the emergency boration steps of the Shearon Harris plant ATWS procedure (EOP-FRP-S.1). The operators can also use the RWST source as a means of increasing boron concentration and negative reactivity. The use of the RWST is somewhat slower due to the lower concentration of boron but is adequate to ensure shutdown.

The component review identified that instrumentation called for in the emergency boration procedure may not be available following the seismic event. Flow meter FT-110 is used to monitor flow from the boric acid storage tank to the charging pump suction. This instrument is powered from a non-safety power bus that may not be available is offsite power is disrupted. An acceptable alternative is the level instruments mounted on the boric acid storage tank (LT-106, LT-161). These instruments are powered by vital power supplies and can be used to confirm flow from the tank to the charging pumps. Level indication is provided in the control room and the operators could substitute this information in the absence of the specified flow meter.

The high reliability of the control rod drives and the need for operator supports the use of the control rod drives as the primary path and emergency boration is chosen as a secondary option. The block diagram for reactivity control is shown below in Figure 1-1.

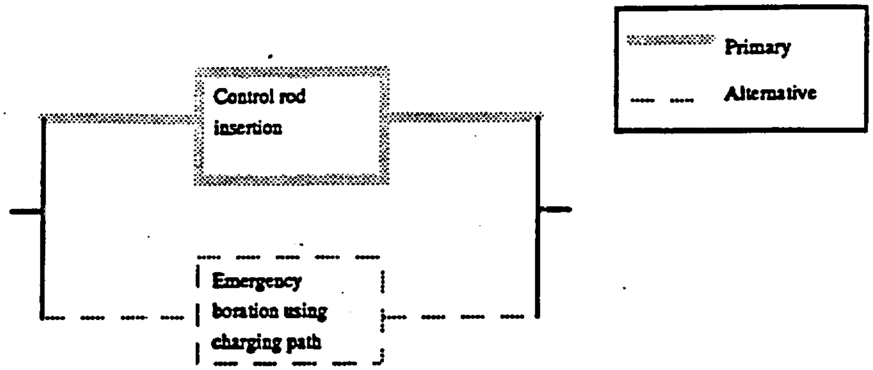


Figure 1-1. Success Path Logic Diagram: Reactivity Control Block

1.3 Reactor Coolant System Inventory Control

RCS inventory control requires that the operators be able to maintain core coverage and decay heat removal. Inventory may be lost from the RCS due to normal letdown. The normal letdown lines can be isolated to preclude this path but would preclude other normal activities such as chemistry control or the addition of additional boron for long-term shutdown. The RCP seals also provide a path for small inventory losses (~8 gpm/pump). For these smaller leakage paths the normal charging process is adequate.

At Shearon Harris, the RCS high pressure makeup capability is provided by the combined charging and safety injection pumps (CSIPs). The normal makeup function is provided by taking suction from the volume control tank (VCT) to the CSIPs and then discharging through the normal charging paths to the RCS. As an alternative, the RWST can be employed as a suction path when the VCT is unavailable with the CSIPs discharging through the safety injection cold and hot leg injection points. This path is also available for responding to the 1" LOCA required to be evaluated by the EPRI guidance.

Evaluation of the VCT level instrumentation identified that level transmitters LT-115 and LT-112 are powered from non-vital power supplies. This may result in a loss of these instruments which will reduce the operator's ability to maintain adequate inventory control. The loss of the level instrumentation, however, will most likely result in one of two outcomes. If both instruments are lost, an automatic signal will swap the charging pump suction from the VCT to the RWST and this will eliminate the need for level monitoring. If only one instrument is lost, the operators may elect to swap to the RWST. In either case, the loss of instrumentation would not greatly impact the potential for success.

The use of the CSIPs to support RCS makeup is governed by procedure EOP-EPP-004 which deals with the response to a reactor trip and operating procedure OP-107 which addresses chemical and volume control. Because of the potential for a loss of the VCT and since both the normal charging and safety injection paths require the same pumps a secondary alternative path is considered.

Based on procedural guidance (EOP-EPP-009, Post-LOCA Cooldown and Depressurization) the operators are directed to cooldown and depressurize the RCS if safety injection is not available and use the RCS accumulators and residual heat removal system to provide makeup. Analysis performed for the IPE using the MAAP code indicate that the accumulators are not required for a 1" LOCA and their operation does not preclude successful injection using LPI. This requires the availability of secondary-side heat removal and some operator action. The use of this path does provide a means independent of the other paths with the exception of the common injection lines. For cases involving a LOCA, the need for additional makeup will also require the use of the RWST in a similar manner as used in the CSIP path.

In considering the success paths for this function several factors influence the final choice. First, isolation of normal letdown would significantly reduce the need for RCS makeup such that normal charging may not be required. Over 72 hours, however, RCS shrinkage and small leaks within the range of technical specification allowances may result in unacceptable RCS inventory loses and a need for additional makeup. Additional boron may be required to maintain adequate shutdown margin after many hours of decay heat removal. To increase boron concentration the letdown path is, although not required, desirable. These considerations lead to the conclusion that the isolation of letdown is overly restrictive and not necessary to ensure RCS inventory control.

For cases without a LOCA the use of normal charging seems the most logical choice since it is the normal method of control and provides reactor coolant pump seal injection. The combination of makeup and letdown provides the operators with a flexible means to control RCS inventory and is a method familiar to the operators. The normal charging path, therefore, is chosen as the primary path for RCS inventory control. Although letdown is not required; its presence would improve the operators ability to respond to any challenges.

The normal charging flow is not capable of mitigating a 1" LOCA. The use of the CSIPs in their safety injection mode provides an adequate response to a 1" LOCA and is a secondary means of RCS inventory control. It does require the use of the same pumps as the charging function but utilizes different suction sources and discharge paths. Based on seismic evaluations for other plants[5], the pumps are not expected to be a potentially limiting component for the either path. Past studies have indicated median capacities for pumps on the order of 1.5 mpga (β_c = 0.45). This converts to a HCLPF value of about 0.34g which exceeds the Shearon Harris review level earthquake.

The use of the RHR system does provide additional independence but requires that additional systems function. Further, the use of this success path requires additional operator actions and monitoring. Thus, the use of the CSIPs in their safety injection path is considered the alternative with the RHR path being a secondary alternative. Figure 1-2 summarizes the success paths for this function.

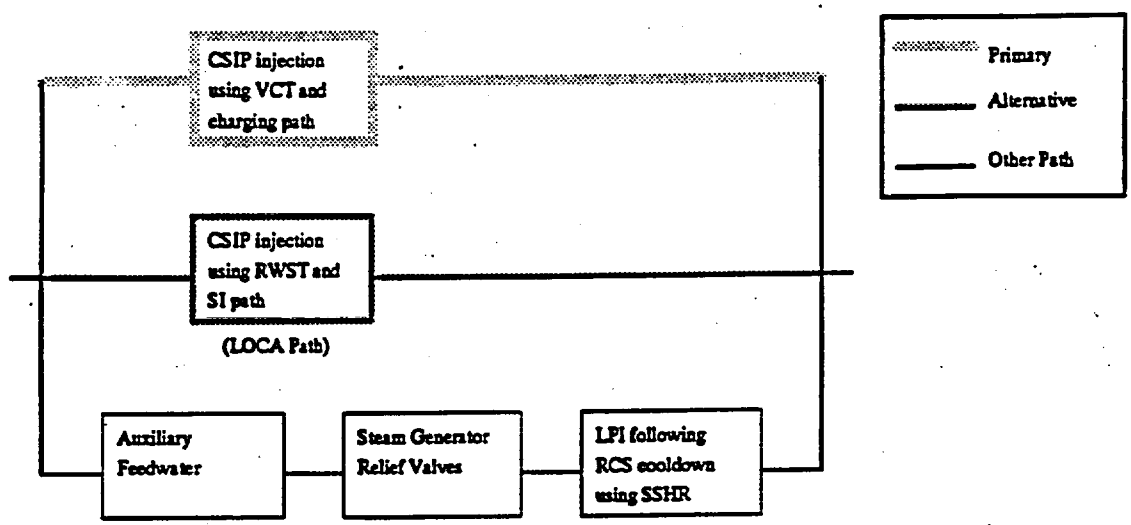


Figure 1-2. Success Path Logic Diagram: RCS Inventory Control

1.4 Reactor Coolant System Pressure Control

The potential exists for a seismically-induced loss of offsite power and for an RCS pressure challenge due to the sudden loss of condenser cooling and an isolation of the power conversion system due to the closure of the main steam isolation valves. This, in turn, temporarily increases RCS temperature and pressure and may require RCS pressure relief and control.

Several potential paths exist for pressure control. Under normal situations the pressurizer sprays can be used to reduce RCS pressure. The spray driving force is provided by the reactor coolant pumps. The assumption that ac power is lost results in a loss of the reactor coolant pumps and normal sprays as a means of pressure control. It is possible to provide auxiliary spray from the normal charging system. RCS pressure reduction would not occur sufficiently to preclude a relief valve challenge. This option is covered by procedure AOP-019 "Malfunction of RCS Pressure Control" which is consulted immediately after trip and referenced in EPP-004 and EPP-005.

Two sets of diverse pressure relief valves also provide pressure control. These pressurizer relief valves provide adequate capacity to mitigate any pressure transient as a result of a loss of offsite power. The pressurizer PORVs are considered the primary means of pressure control with the secondary path involving the pressurizer safety relief valves. Three PORVs are provided with each having sufficient capacity to mitigate the pressure rise associated with a loss of offsite power. The PORVs require dc power control power and either compressed nitrogen or air to function. Two sources of compressed gas are available, instrument air and nitrogen. Following a loss of power the instrument air system is lost and the containment air supply line is isolated. Accumulators present on the PORV supply lines maintain adequate pressure to allow PORV operation (98 psi). This provides a more than adequate supply of compressed gas for RCS pressure challenges following reactor trip. Three spring-loaded safety relief valves are present. The safety relief valves are designed to function at a preset pressure and do not require any support system in order to function.

The PORVs have the benefit of an ac-powered block valve which may be closed if a PORV fails to close. The block valves, however, are not needed for pressure control. By code requirements, the safety relief valves do not have an associated block valve.

Due to the presence of block valves and the fact that the PORVs will be utilized for other functions, the PORVs are chosen as the preferred path for RCS pressure control with the safety relief valves being considered as the alternative path. The two success paths for this function are identified in Figure 1-3.

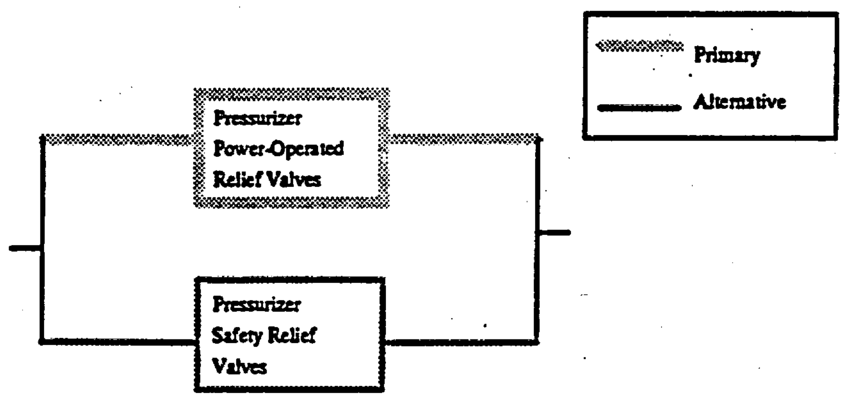


Figure 1-3. Success Path Logic Diagram: RCS Pressure Control

1.5 Decay Heat Removal

The final function addressed is decay heat removal. Generally, decay heat removal following a reactor trip is provided using the steam generators (Reference EPP-005). The auxiliary feedwater system provides steam generator makeup. In addition to a supply source the steam generators must be able to dump steam. Given that the condenser is isolated following the event, steam can be relieved by either the steam generator safety relief valves or the steam generator PORVs. The safety relief valves cannot be used to perform an RCS cooldown to allow the use of RHR cooling. In order to simplify the analysis, only the steam generator PORVs are included for steam removal. The use of the steam generator PORVs allows both normal steam generator cooling and provides an alternative long-term cooling mechanism.

An RCS cooldown may be initiated if either the condenser or steam generator PORVs are available and the residual heat removal (RHR) system initiated when RCS conditions are within the operating limits of the RHR system. The mission time is 72 hours. Based on the inventory present in the condensate storage tank (CST) the tank will empty prior to meeting 72 hours of decay heat removal.

Two options are available to extend cooling for 72 hours. The operators can maintain hot shutdown conditions by aligning the emergency service water header to the suction of the AFW pumps (Reference procedures OP-137 and EPP-005). This will provide a source of water which will exceed that required for 72 hours of core cooling but requires manual action.

As an option, the operators can perform RCS cooldown and establish cold shutdown using RHR cooling (using the RHR pumps and heat exchangers) prior to CST depletion. The RHR system circulates RCS inventory through the RHR heat exchanger and transfers RCS decay heat to the component cooling water system. One consideration in establishing RHR cooling is the presence of adequate instrumentation. The normal RCS temperature instruments do not provide an adequate representation of the temperatures within the reactor vessel if the reactor coolant pumps are stopped, as is the case during shutdown cooling. For this situation, the instruments provided in the RHR system are required. On the basis of an instrumentation review associated with the SSEL development, the normal temperature indication (TE-606A, TE-606B) may not be available to the operators. These instruments are powered by non-vital power supplies an may be lost following the seismic event. As a result, the operators will need to use alternative temperature indicators to ensure that adequate margins are met.

The use of RHR is not an immediate action and there is considerable time between the seismic event and the time that operators achieve RHR entry conditions. This provides time for operator mitigative actions and the investigation of other alternatives. Two local instruments (TI-5551A, TI-5551B) are mounted near the RHR heat exchangers and are available to provide temperature indication if required. These instruments are located in a radiation area and personnel exposure is a concern. The expected dose, however, would not exceed acceptable dose limits.

In the absence of secondary-side heat removal, an alternative cooling method is possible. The CSIPs and pressurizer PORVs may be used to establish feed-and-bleed cooling. The CSIPs inject cool water into the RCS and the PORVs relieve heated water to the containment which transfers the decay heat from the RCS to the containment. This option is addressed in EOP-CSFST "Critical Safety Function Status Tree" and EOP-FRP-H.1.

For the PORVs to function, dc power and a compressed gas supply must be present. Two sources of compressed gas are available, instrument air and nitrogen from accumulators. Following a loss of power the instrument air system is lost and the containment air supply line is isolated. Accumulators present on the PORV supply lines maintain adequate pressure to allow PORV operation (98 psi). The leakage rate through the lines is estimated to be on the order of two pounds per hour. The operational range for the PORVs is from about 80 to 60 psi. Given the leakage rate, the PORVs will remain open for approximately 19 hours. At this point the PORVs would fully close and the CSIPs would increase RCS pressure to the SRV setpoint. The CSIPs can continue to inject at the SRV opening setpoint. This mode of feed-and-bleed cooling provides adequate heat removal given the reduced decay heat load at 19 hours. This conclusion is supported by plant-specific MAAP analysis. The PORVs and the pressurizer SRVs, therefore, must be available for successful feed-and-bleed cooling or the RCS pressure must be lowered to allow for shutdown cooling.

The inventory used during feed-and-bleed comes from the RWST. Once this inventory is depleted, the operators establish high pressure recirculation. This involves the automatic alignment of the RHR pumps to the containment sump, manually establishing CCW flow to the RHR heat exchangers, and swapping the CSIP suction from the RWST to the discharge of the RHR pumps. The RHR heat exchangers provide necessary cooling to maintain RCS conditions within limits. Required operator actions are identified in procedure EPP-EOP-010.

The primary method for decay heat removal utilizes the steam generators. This involves the use of AFW, steam generator PORVs, and a source of water. The CST provides the water source initially. After this source is depleted, the emergency service water system is used. The alternative method for decay heat removal is the use of feed-and-bleed cooling as described by EOP FRP-H.1. This requires the operation of the CSIPs in safety injection mode, the operation of the pressurizer PORVs, and the pressurizer SRVs. The use of RHR cooling is included as a long-term alternative to aligning AFW to essential service water. Figure 1-4 presents the success logic associated with decay heat removal.

1.6 Overall Success Path Logic Diagram

The individual functions are combined to develop an overall success path logic diagram. Two diagrams (Figures 1-5 and 1-6) are used to address the two different cases. The first case addresses the transient and assumes that no leakage is present. The second logic diagram is provided for the LOCA case. For both cases, the first consideration is the status of the support systems. Success indicates that all support systems are functioning. The next block addresses the ability to control reactivity. This block is equivalent for both cases.

The RCS inventory control block is somewhat different for the two cases. In the transient case success requires that makeup using charging flow rates be provided. The LOCA case requires that additional RCS makeup be provided using either safety injection or low pressure injection. In the case of the transient event, a need for RCS pressure control exists and the RCS pressure control block is included. Following a 1" LOCA, the RCS pressure will decrease and no pressure challenge sufficient to lift the RCS relief valves is expected. The pressure control block is, therefore, not included. Finally, the decay heat removal function required for both cases is the same.

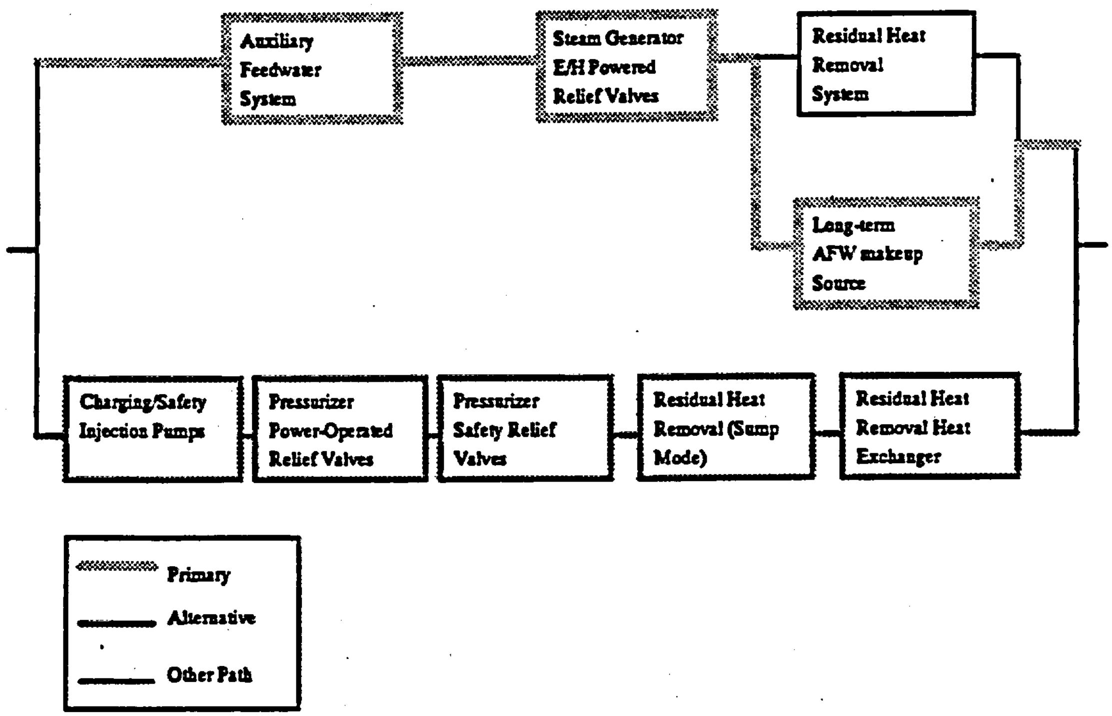


Figure 1-4. Success Path Logic Diagram: Decay Heat Removal

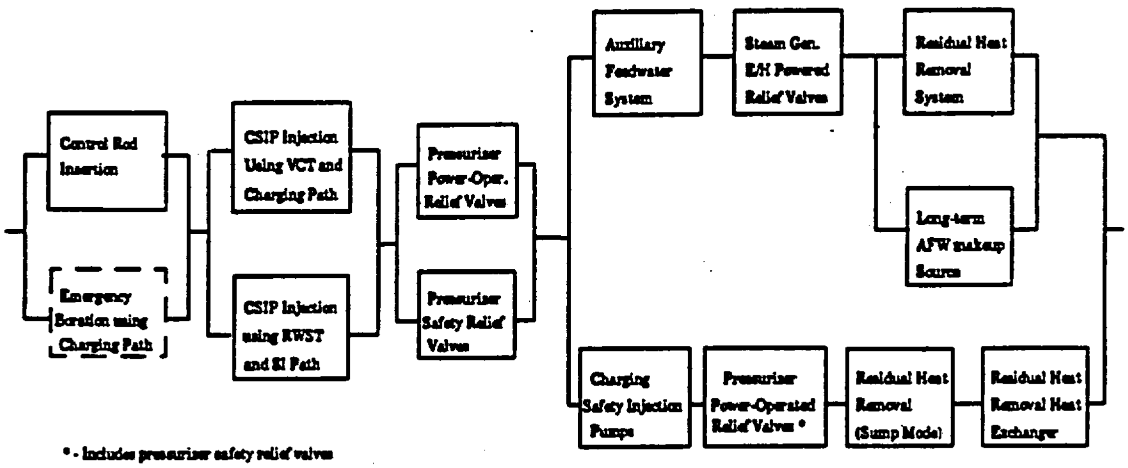


Figure 1-5. Success Path Logic Diagram: Transient Case

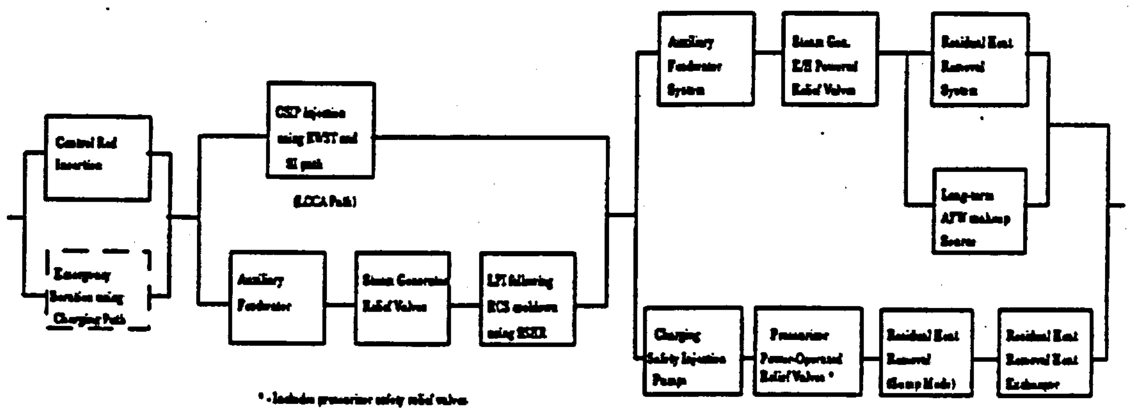


Figure 1-6. Success Path Logic Diagram: LOCA Case

In examining the SPLD it is important to realize that the earlier failure of some paths may preclude success of other functions. As an example, if the CSIPs fail the RCS inventory control path the path for feed-and-bleed cooling will also be lost. In other words, the loss of particular paths within functions due to a system failure may result in other paths also being failed for other functions. The converse of this is also true in that the failure of a particular path may not preclude any paths for other functions. As an illustration, if the CSIPs succeed in maintaining RCS inventory following a LOCA, the operators may have successful heat removal by either the AFW system or bleed-and-feed cooling. The success of CSIP injection for the RCS inventory function does not require that only bleed-and-feed cooling be used for secondary-side heat removal.

2.0 Early Component Seismic Walkthrough

As part of the process of identifying the components necessary for ensuring safe shutdown following a seismic event, an early walkthrough was performed. This walkthrough identified, at an early stage, any components which have the potential for low seismic capacity and are identified in the shutdown paths. The walkthrough did not involve a detailed evaluation of all components but concentrated on some of the more critical components for each system. The walkthrough did not examine components in the containment or areas requiring significant radiation protection. Detailed screening and evaluations will occur during the required walkdown that is performed by the seismic review team (SRT).

Prior to the walkthrough a component listing was generated which identified equipment to be examined. This listing is based on the SPLD paths and engineering judgment. For most cases the components chosen represent active components which are required to function following a seismic event (pumps, motor-operated valves, diesel generator). Components with the potential for low seismic capacities, as found in other seismic assessments, are also included (batteries, tanks). The list developed for Shearon Harris is provided as Table 2-1.

Table 2-1
Walkthrough Equipment List for SHNPP Seismic IPEEE

SPLD Function	System	Equipment
Reactivity Control	Control Rod Drives	Control cabinets and MCCs
RCS Inventory Control	Charging/Safety Injection	CSIPs 1A-SA, 1B-SB
		RWST and suction valves 1CS-291, 1CS-292
		VCT and suction valves 1CS-165, 1CS-166
		CSIP safety injection discharge valves 1SI-1, 1SI-2, 1SI-3, 1SI-4
	Residual Heat Removal (low pressure injection mode)	RHR pumps 1A-SA, 1B-SB
		RHR heat exchangers 1A-SA, 1B-SB

Table 2-1 (continued)
Walkthrough Equipment List for SHNPP Seismic IPEEE

SPLD Function	System	Equipment
RCS Inventory Control		RWST suction valves 1SI-322, 1SI-323
		RHR to CSIP suction valves 1RH-25, 1RH-63
RCS Pressure Control	Nitrogen System	Storage Tanks
Decay Heat Removal	Auxiliary Feedwater	Pumps 1A-SA, 1B-SB, and, 1X-SAB
		SD pump steam inlet valves 1MS-70, 1MS-72 and, 1MS-G
Decay Heat Removal	Auxiliary Feedwater	Control valves 1AF-131, 1AF-130, 1AF-129, 1AF-51, 1AF-50, 1AF-49
		Condensate storage tank
		SWS to AFW suction valves 1SW-121, 1SW-123, 1SW-124, 1SW-126, 1SW-129, 1SW-127, 1SW-130, and 1SW-132
	Steam Dumps	Steam generator power operated steam dump valves 1MS-58, 1MS-60, 1MS-62
Support Systems	Ac Power	Diesel generators and support equipment (day tank, jacket cooler, etc.)
		Fuel oil transfer pumps 1A-SA, 1B-SB
		Buses 1A-SA, 1B-SB
	Dc Power	Batteries and racks

Table 2-1 (continued)
Walkthrough Equipment List for SHNPP Seismic IPEEE

SPLD Function	System	Equipment
	Dc Power	Chargers and buses 1A-SA and 1B-SB
Support Systems (cont.)	Service Water System	ESW pumps 1A-SA, 1B-SB
		Expansion joints 2A, 2B
		Normal service water isolation valves 1SW-39, 1SW-40
		SWS return valves 1SW-275, 1SW-276 and 1SW-274
		CCW to SWS heat exchangers 1A-SA, 1B-SB
	Component Cooling Water System	CCW surge tank
		CCW pumps 1A-SA, 1B-SB
		RHR to CCW heat exchangers 1A-SA and 1B-SB discharge isolation valves 1CC-147 and 1CC-167
	HVAC	Air handling units AH-9 (1A-SA) and AH-9 (1B-SB) cooling for CSIPs
	ESCW system	Pumps P4 (1A-SA) and P4 (1B-SB)
		Chiller/condenser WC-2 for 1A-SA and 1B-SB

A standard form was developed which documented the findings of the walkthrough. The form provided guidance to the walkthrough team in investigating the potential for low seismic capacity components. In addition to identifying the component the form addressed anchorage, elevation, orientation, interaction, and structural issues. An example form is provided as Figure 2-1.

The walkthrough was performed using four individuals. Three of the team members were from CP&L's Nuclear Engineering Department. Two had been to the EPRI course on seismic walkdown. The fourth member was a consultant who was familiar with the Shearon Harris IPE and had considerable experience in the performance of seismic risk analyses. The walkthrough was performed on January 14-15, 1993 and included as many components as possible. To expedite the process, like components were not examined if they were of similar function, kind, and location. For example, only one CSIP pump was examined since they are from the same manufacturer and are located at the same elevation and have the same orientation. Some listed components were not examined due to radiation control concerns. The volume control tank was an example of an item not examined due to this consideration. The team examined approximately 50 components. The findings are documented in Appendix A.

The general purpose of the walkthrough is to search for any potential low seismic capacity components which could result in low system seismic capacity. Additionally, the information can streamline the detailed walkdown and capacity evaluation. The insights obtained from the walkthrough are provided below.

- The examination of pumps and drivers did not uncover any significant factor which would lead to the potential for low seismic capacity. The components examined are mounted on common skids with what appears to be adequate anchorage. It is reasonable to assume that average component capacities will be present and that pumps will not be a "weak link".

- The anchorage for the motor-operated valves, where present, did not involve the potential for operator and valve differential displacement due to using two different anchorage surfaces.

- The examined heat exchangers are well anchored on common pads and should provide adequate seismic capacity. The RHR heat exchanger anchorage design, however, should be examined since it was not visible during the walkthrough.

- The battery racks appear rugged and should provide adequate seismic capability. The inclusion of crush resistant spacers also supports this conclusion. The eyewash stations located in each room, however, are of some concern. It is unclear if they are seismically rugged. Given their proximity to the batteries, their similar design, location, and orientation, they should be examined further.

Figure 2-1
Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:</td><td><u>Component Type</u>:</td></tr>
<tr><td><u>Anchorages:</u>

Concrete pad

Bolted

Welded</td><td><u>Elevation from floor:</u></td><td><u>Orientation:</u> (for valve orientation of operator)</td></tr>
<tr><td><u>Seismic II/I:</u></td><td><u>Adjoining structures:</u></td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u></td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

- The mounting flange for the vital chargers may be a potential weak point for the long-term availability of dc power. The mounting flange was thin and could tear which would allow the charger to topple. The strength of the material should be examined along with the weight distribution in the charger.

- A diesel generator control panel found near the diesel generator is welded to a support plate only on one side at the four corners. This may be a concern if the panel is needed. Other more important panels could not be explicitly examined due to base plates. These panels should be more closely examined due to their proximity.

- Examination of the steam generator PORVs found that they may be capable of meeting the required seismic capacity. Their proximity to walkways and light fixtures may be somewhat important but should not be a significant concern.

- The essential service water system equipment provides a key support system link through the need for diesel generator cooling and a long-term AFW source. The service water intake structure and equipment were not examined during the walkthrough. The pumps should be examined to ensure that they are adequately supported. This is especially true for the long shaft associated with vertical suction pumps. Given the observations from the plant walkthrough and the vintage of the plant design this is not expected to be a concern but should be verified.

As previously noted, the above observations are based on the initial walkthrough. The final results and conclusions are derived from the detailed screening and evaluation performed by the SRT.

3.0 Operational Review of Success Path Logic Diagram

The draft SPLD was provided to SHNPP operations personnel to provide a plant review of the success paths and the required equipment. The reviewer examined the paths and components for correctness, applicability to plant procedures, and to identify any other alternatives that are not addressed. A meeting was held between the plant reviewer and the team responsible for the development of the SPLD with two main purposes. The first was to resolve any comments generated during the plant review and the second purpose was to refine the required instrumentation listing. The plant reviewer concluded that the SPLD and required systems are appropriate and did reflect the various success paths that would be available and utilized by the plant operators following a seismic event. The important comments and resolutions are summarized below.

- Control room HVAC may be important over a 72 hour period and should be considered. *Resolution:* Control room air handlers (AHU-15 and AHU-16) were added to the HVAC listing.

- The steam-driven pump supply line could be used as a means for dumping steam if the steam generator PORVs are unavailable and that plant operations are familiar with this option. *Resolution:* The group resolved that this option would only be included if the steam generator PORVs could not meet the required seismic capacity.

- The procedures direct the operators to use both accumulators and low pressure injection following a loss of the CSIPs which is not reflected by the present text. *Resolution:* The text was changed to include the accumulators. Based on MAAP analysis, however, the accumulators are not included in the SPLD required equipment.

- The operators are directed to open the reactor head vents if the PORVs are unavailable. This may provide a bleed path for feed-and-bleed cooling. *Resolution:* The reactor head vents are considered too small to provide adequate feed-and-bleed cooling and are not included in the SPLD listing.

Other comments were more editorial in nature and were resolved accordingly.

A review of the instrumentation listing was performed for each system. The process used involved a discussion of the function required of the system, a listing of available instrumentation, and the identification of the minimal set of instruments required to maintain the system. In some cases the components performed multiple functions. For these systems each function was reviewed individually. A final instrumentation list was developed based on this review.

4.0 Modifications to Equipment Listing Based on Seismic Walkdown

Several modifications were made to the SSEL following the completion of the seismic walkdown. Changes were made to address the addition or deletion of some components to the SSEL listing and corrections due to input errors. The largest addition to the listing is instrumentation racks and cabinets housing essential relays. Using the "rule of the box" definition several instruments were grouped according to their common instrumentation rack and the rack was added to the SSEL listing. In addition, a complete review of the SSEL component list was performed to ensure that component information (i.e, tag numbers, reference drawings, etc.) was correct. Examples of changes to the SSEL are presented below with an associated rationale.

Action: Removed switchgears 1A1, 1B1, transformers 1A1, 1B1, and motor control centers 1A22, 1B22, 1A24, and 1B24 from the ac power system listing.

Rationale: These components are not required to support SSEL components.

Action: Remove items 23 and 24 from the essential chilled water system listing.

Rationale: The purpose of these temperature switches, TS-6522A1-SA(B1-SB), is to provide control for air handling units which supply cooling to CSIP A & B. This control is only applicable for cases without a safety injection signal. For the SSEL the CSIPs are used to respond to two situations, a small LOCA and feed-and-bleed cooling. For the small LOCA, the loss of RCS coolant will result in a safety injection signal and, therefore, the temperature switch will be overridden. In a similar manner the implementation of feed-and-bleed cooling will result in a loss of RCS inventory and a subsequent safety injection signal. Thus, for the cases covered by the SSEL the control function of the devices will be overridden and they can be removed from the list. From information obtained during the 3/25/93 SSEL review meeting, no important instrumentation function is provided by these components.

Action: Components PS-2250A, PS-2250B, and PS-2270 should be listed as pressure switches and not pressure sensors. The SSEL review will include both the switches and the signal transmitted to the control room.

Rationale: From the 3/25/93 meeting, SHNPP operations indicated that suction pressure, along with a table provided in AOP-004, would be used to determine CST level if level indication were lost. It is important, therefore, that suction pressure indication be provided in the control room.

Action: Added components associated with the diesel generator starting air system.

Rationale: These components were inadvertently omitted from the report. Adding these components to the SSEL corrects this omission.

Action: Added nitrogen/air accumulator tanks for PORVs to SSEL.

Rationale: The accumulators provide air to the pressurizer PORVs and serve as an alternative to instrument air. These accumulators are added to allow the removal of the dependence on instrument air.

Action: Added PORV control solenoid valves to listing. Action: The valve tag numbers were changed from 1SI-411, 1SI-412, 1SI-415, and 1SI-416 to 1RC-114:002, 1RC-114:003, 1RC-118:002, and 1RC-118:003 respectively to reflect current valve tags.

Rationale: These valves are separate from valve control and should be listed separately.

Action: Deleted valve 1CS-282 from the SSEL listing.

Rationale: This valve is associated with an alternative boration path that is not utilized in the SSEL.

Action: Deleted duplicate listings for components associated with more than one function.

Rationale: The initial report listed several components, such as the steam generators, under different systems. Duplicate listings have been deleted to avoid future confusion.

Action: Deleted ECS instruments PS-9426A and PS-9426B from the SSEL listing.

Rationale: These instruments are not required for operation of ECW.

Action: Added rugged valves associated with the starting air system to the SSEL.

Rationale: Including the rugged valves is consistent with other system listings in the SSEL and provides a clear indication of the success path.

Action: Added boric acid tank level transmitters LT-106 and LT-161, and RHR temperature instruments TI-5551A and TI-5551B to the SSEL.

Rationale: As discussed earlier in this report, additional instrumentation was found to be necessary and has been added to the listing.

5.0 Safe Shutdown Equipment Listing

Based on the requirements for maintaining a safe stable state following a seismic event the required frontline and support systems are identified. The equipment required for the system to function is evaluated to ensure a high degree of confidence of a seismic capacity which exceeds the review level earthquake. Although not required, a form similar to that specified by the Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment[6] is utilized for recording the equipment necessary for system function.

For Shearon Harris a total of 11 systems are included in the search to identify required equipment. Components included in the listing are chosen based on one-line flow diagrams and guidance contained in EPRI report NP-6041 (Reference 2). NP-6041 suggests that the components be specified by system and that the following information be made available:

- General description (e.g., 6 inch MOV)
- Component identification (tag identifier)
- General building location (e.g., reactor auxiliary building)
- Additional comments

This information is contained on the forms. In addition to the required information, the drawing number, normal state, desired state, and power requirements are included. For components requiring support systems, the support system interface is identified (e.g., 1A-SA, CCW, DP-1A, ...). The expected type of evaluation is also included. Acronyms are used in some cases. Each column is briefly described below.

Column 1 - Line Number

This column provides each component a unique number for each system.

Column 2 - Train

A numeric value is provided for frontline systems that represents the associated system train. For example, AFW train 1 includes the components associated with auxiliary feedwater motor-driven pump 1A-SA.

Column 3 - Equipment Class

This column provides the equipment classification according to a standard listing provided in the GIP (Reference 6, Table 3-1). In addition to the standard listing, two other characters are used. Components which are considered seismically rugged and do not require evaluation are specified by an "R". Some components identified for the IPEEE are not required to be evaluated by the GIP. For these components an "*" is used to show that no equivalent GIP class is provided.

Column 4 - Equipment ID Number

This column lists the equipment tag number, or equivalent, which can be used to identify the specific component on P&IDs and during the walkdown.

Column 5 - System/Equipment Description

This column provides a brief description of the component being addressed.

Column 6 - Drawing No.

This column lists the drawing which was used to locate the component and serves as a documentation reference.

Columns 7, 8, & 9 - Building, Floor Elevation, and Room or Row/Column

The location of the component is given in terms of building and the plant elevation. The following building codes are used for location information:

- SW Emergency Service Water Intake
- RAB Reactor Auxiliary Building
- CB Containment Building
- DG Diesel Generator Building
- MST Main Steam Tunnel
- TANK Tank Area
- YARD Yard Area
- FO Fuel Oil Storage Area

The elevations reflect the floor elevation and may or may not represent the actual component elevation. The specification of room or row/column information is beyond the scope of this effort and is not input into the table.

Column 10 - Evaluation Type

This column specifies the type of evaluation which may be required for the component. Three different responses are provided. An "S" indicates that a seismic loading evaluation is needed. The addition of an "R" indicates that if relay chatter were to occur the component could react in a way which may impact the successful operation of the system or subsystem. For these cases, and if low ruggedness relays are identified, a relay evaluation may be necessary. The final classification is "None". This classification is used for any component which is listed for completeness but does not require evaluation.

Column 11 - Notes

This column provides reference numbers for important assumptions and other information which is provided below the component listing.

Columns 12 & 13 - Normal State and Desired State

These columns specify the normal state of the component and the desired state after the seismic event. The following abbreviations are used:

- OP - Open
- CL - Closed
- CL/OP - Component cycles over mission time
- OFF - Equipment stopped
- ON - Equipment functioning
- N/A - State not applicable

Column 14 - Power Required

This column indicates if ac or dc power is required in order for the component to perform its function or maintain its desired state.

Column 15 - Required Supporting Systems or Components

This column lists the support system interfaces with the component being addressed. For example, in order for AFW MDP 1A-SA to start and function the following support system interfaces must function:

- AC switchgear 1A-SA
- DC distribution center DP-1A
- Engineered safeguards actuation relay K640A

These three interfaces are identified in an abbreviated format. The required support systems are listed in a specific order to aid the reader. The order is presented below:

Ac power bus; Dc power bus; Cooling source; Control signal

Only those support systems which are necessary, as defined by the Shearon Harris IPE system notebooks, are listed. The system equipment lists are based on information from the IPE system notebooks and other plant sources, including the plant walkthrough and walkdown. The system equipment listings are provided in Appendix B.

In addition to the equipment listings, other important issues must be addressed in the development of the SPLD and to complete the information needed for the SMA. The following discussion provides the resolution of these issues for the Shearon Harris evaluation within the context of this report.

Nuclear Steam Supply System (NSSS) Components

In addition to the system equipment lists provided in Appendix B, NP-6041 requires that other components be evaluated. This includes an evaluation of major NSSS components, or more specifically the component supports, to ensure that component failure will not occur following the seismic margin earthquake. Thus, the following components should be examined and screened if possible

- Reactor vessel and supports
- Steam generators and supports
- Pressurizer and supports
- Reactor coolant pumps and supports
- Reactor coolant piping

In addition to these components, the reactor vessel internal package and the control rod drive packages must be examined. A comparison of prior plants has been compiled and is documented in Reference 5. This information indicates that an average expected median component capacity would be greater than 1.2g and that the HCLPF value should exceed the SME acceleration level. Based on the plant vintage and design considerations it is unlikely that these components will provide plausible "weak-links". A screening evaluation to ensure this, however, is necessary.

System Piping

A general rule was applied when piping was considered. Safety-related piping which is adequately anchored has been shown to be very rugged and would not be challenged by an earthquake level postulated for the SME. A high seismic capacity is anticipated and the piping is expected to be screened from assessment. A verification walkdown will be required to ensure this conclusion which will include examination of instrumentation and other connections to the piping path for potential vulnerabilities. Since a verification walkdown will be necessary, it was deemed more appropriate and efficient to examine piping concerns during the walkdown and not to include each connection in the component listing. Further, a specific listing is not required by the procedure and this approach does not represent a deviation from the methodology. The walkdown will ensure that the preliminary conclusion about the piping strength will be verified.

Containment Isolation and Mitigation Systems

The main objective of the containment analysis is to identify vulnerabilities that involve early failure of containment functions. This includes consideration of containment integrity, containment isolation, and other containment functions

The guidance provided in Reference 3 states that "generally containment penetrations are seismically rugged; a rigorous fragility analysis is needed only at review levels greater than 0.3g, but a walkdown to evaluate for unusual conditions (e.g., spatial interactions, unique penetration configurations) is recommended." With regard to containment systems, the guidance provided is that "seismic failures of actuation and control systems are more likely to cause isolation system failures and should be included in the examination." The major concern deals with relay chatter which is addressed in Reference 8.

The containment isolation function is expected to be rugged with respect to seismic events. A walkdown that examines representative containment penetrations to ensure that the Shearon Harris design does not have any unique configurations that would lead to conclusions which are contrary to those found in prior studies will be accomplished.

A review of seismic capacities for containments of similar design to Shearon Harris indicates that the containment structure is expected to have a seismic capacity far above the review level earthquake[7]. In addition to the containment structure, NUREG-1407 (Reference 3) suggests that certain considerations could require some additional study. Hatches that employ inflated seals is one potential are for concern.. The Shearon Harris design does not employ this time of seal. Another concern is the post-operation of penetration cooling that is present in some designs. Shearon Harris, however, does not employ this design feature. Finally, air-closed valves used for isolation are also listed as a possible concern. Shearon Harris does not utilize air-operated valves for containment isolation that require a supply of air to function. Thus, failures in containment isolation would not be expected due to containment system failures.

Containment heat removal is an important aspect in evaluating containment performance. If heat is not adequately removed from the containment the containment pressure may increase to the containment failure pressure. Two mechanisms can lead to energy being transmitted to the containment. The first is due to the small LOCA. As RCS inventory is lost through the break it carries stored energy which is then release to the containment and pressurization occurs. Feed-and-bleed cooling also results in energy being transferred to the containment. Containment fan coolers can reduce the pressurization due to these mechanisms.

Based on MAAP analyses performed for the IPE the containment pressure is not expected to increase to the design limit as long as the RHR heat exchangers are available to remove heat. Thus, the fan coolers represent an additional heat removal mechanism but are not required for successful containment cooling as long as the RHR heat exchangers are present. Failure of this heat removal function will result in containment heatup and pressurization.

The pressurization, however, is predicted to occur over many hours and would not result in an early, rapid containment overpressurization. It is concluded that containment fan coolers are not needed to ensure early containment integrity. As a result, containment issues are not addressed in this report and are expected to be addressed through a mixture of the seismic relay review and walkdown.

Random Component Failures and Human Errors

Reference 3 indicates that non-seismic failures and human errors should be considered during the selection of systems needed to respond to a seismic event. It further suggests that a method similar to the method provided in NUREG/CR-4826[4] (Maine Yankee evaluation) is considered acceptable. In this evaluation quantitative guidance is provided for determining if non-seismic or human error events should be included.

The EPRI approach (Reference 2) adopts a more qualitative criteria which serves as a guide for choosing systems and equipment for the success path logic diagram. Specifically, the analyst should consider equipment train reliability and required operator actions when choosing the systems required for the SHNPP success paths. The analyst is directed to only consider the most reliable paths.

The reliability of components identified in the success paths were considered to ensure that only the more reliable systems and components were included. Where more than one system was available to meet a particular function, the most reliable components were chosen. In addition, system alignments which required considerable operator action or were not well documented in procedures were avoided.

The primary paths chosen for the SPLD require limited operator action. These actions are long-term in nature and require the operators to perform actions many hours after the event occurs and provides considerable time for the operators to prepare. For alternative paths some operator action is required within a shorter time frame. The major operator actions are identified in Table 4-1 along with procedures which direct the action.

The first operator action is associated with the alternative reactivity shutdown path. Emergency boration requires the operators to align the chemical volume and control system suction to the boron transfer tanks. The required actions can be performed from the control room and adequate indication is provided to the operators to monitor the success of the operation.

Feed-and-bleed cooling is an alternative to the normal decay heat removal path. To start feed-and-bleed cooling the operators must manually open the pressurizer PORVs and initiate safety injection. The actions to open the valves and to start the pumps are performed from the control room and the operators are well trained on these actions.

Table 4-1
Major Operator Actions Required in the SPLD

Operator Action	Procedure
Emergency boration	EOP-FRP-S.1/AOP-002[1]
Feed-and-bleed cooling	EOP-FRP-H.1
RCS cooldown (non-LOCA)	EOP-EPP-005
RCS cooldown (LOCA)	EOP-EPP-009
Swapover of AFW source	EOP-EPP-005
Recirculation swapover	EOP-EPP-010

Notes:
1. EOP-FRP-S.1 addresses ATWS and requires the implementation of AOP-002 (emergency boration)

RCS cooldown requires the operators to utilize the steam generators to reduce RCS pressure to establish shutdown cooling using the residual heat removal system. Two different situations are addressed in the SPLD. The actions required by the operators is similar in both cases. As with the prior operator actions, the operator actions can be performed from the control room.

The AFW swapover is performed many hours after the postulated seismic event has occurred and allows considerable time for remedial actions. The operators must open paths between the AFW and service water systems by opening several motor-operated valves. This action can be accomplished from the control room. Recirculation swapover is similar to AFW swapover and involves operator action many hours after the seismic event. Most of the recirculation swapover is automatic with the operators only performing a few actions from the control room.

Instrumentation and Control

The identification of component control is limited to identifying only those signals which are needed to operate equipment and does not include actuation circuits and relays which are beyond the scope of this effort and require special consideration. Since Shearon Harris is not an A-46 plant, NUREG-1407 (Reference 3) requires that only low ruggedness relays be evaluated. A limited number of relays were identified based on a search of relay information. This evaluation is documented in Reference 8. The impact of these low ruggedness relays on operating equipment is examined in this report.

Instrumentation identification is limited to that which is required to maintain system function and does not include local indicators which are not required. Two conditions are considered and reflect assumptions used in the Shearon Harris IPE. Instrumentation is only addressed if it (1) controls active components or (2) if it is required by the operators in order to maintain system operation.

It is believed that this level of investigation meets the intent of the IPEEE for a focused scope plant and provides the necessary information required for the walkdown associated with EPRI report NP-6041. Although limited in this evaluation, other tasks will be used to provide assurance that any potentially important control malfunction or instrumentation failure will be addressed. The piping walkdown will be used to insure that unlisted instrumentation does not effect system performance or piping integrity.

The detailed screening process for potential low ruggedness relays (Reference 8) identified any relays for which relay chatter is a concern. This work also examined if identified relays could impact system operation and what operator actions might be necessary.

6.0 References

1. Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities - 10CFR 50.54(f), Generic Letter No. 88-20, Supplement 4, USNRC, June 28, 1991.

2. Reed, J. W., et al, A Methodology for Assessment of Nuclear Power Plant Seismic Margin (Revision 1), Electric Power Research Institute, NP-6041, August 1991.

3. Chen, J. T., et al, Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities, USNRC, NUREG-1407, June 1991.

4. Prassinos, P. G., et al, Seismic Margin Review of the Maine Yankee Atomic Power Station, Vols 1-3, Lawrence Livermore National Laboratory, NUREG/CR-4826, March 1987.

5. Campbell, R. D., et al, Compilation of Fragility Information from Available Probabilistic Risk Assessments, Lawrence Livermore National Laboratory, UCID-20571, September 1985.

6. Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment, Seismic Qualification Utility Group (SQUG) and the Electric Power Research Institute, February 1992.

7. Summitt, R. L., Assessment of Containment Capacity for the ALWR Based on Prior PRA Assessments, USDOE Advanced Reactor Severe Accident Program, April 1990.

8. Boyd, G. J., et al, Relay Study for the Shearon Harris Individual Plant Examination of External Events, SAROS 93-9, Safety and Reliability Optimization Services, Inc., December 1993.

Referenced Drawings

2165-S-0542, Rev. 19
2165-S-0544, Rev. 20
2165-S-0545, Rev. 31
2165-S-0547, Rev. 22
2165-S-0550, Rev. 12
2165-S-0563, Rev. 6
2165-S-1300, Rev. 17
2165-S-1301, Rev. 6
2165-S-1303, Rev. 9
2165-S-1305, Rev. 12
2165-S-1307, Rev. 5
2165-S-1308, Rev. 8

Referenced Drawings (continued)

2165-S-1309, Rev. 15
2165-S-1310, Rev. 10
2165-S-1319, Rev. 13
2165-S-1320, Rev. 3
2165-S-1324, Rev. 9
2165-S-1344, Rev. 4
2165-S-633S02, Rev. 8
2165-S-633S03, Rev. 5
2165-S-633S04, Rev. 13
2165-S-998S02, Rev. 12
2165-S-998S03, Rev. 7
2165-S-999S03, Rev. 6
2166-B-401-S1470
2166-G-030, Rev. 12
2166-G-0324
2166-G-042S01, Rev. 14
2168-G-499S02, Rev. 19
2168-G-548, Rev. 9
2166-B-401/sh 1995
2166-B-401/sh 2008

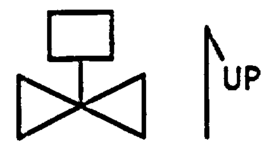
Appendix A

Walkthrough Documentation

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
CSIP 1A-SA</td><td><u>Component Type</u>:
Motor-driven pump</td></tr>
<tr><td><u>Anchorages:</u>
Mounted on common skid which is anchored to concrete pad ~4" high by 16 -1" bolts.</td><td><u>Elevation from floor:</u>
1 ft</td><td><u>Orientation:</u>
90 degrees from CCW pumps but parallel to other CSI pumps at same elevation</td></tr>
<tr><td><u>Seismic II/I:</u>
A fire header is located above the pump and motor</td><td><u>Adjoining structures:</u>
Inside reinforced concrete room</td><td><u>Nearby walls or piping:</u>
Not a concern</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
The pump is well mounted and the piping appears rugged. A non Q-list switch is located on separate wall and the potential exists for short.</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u>
The control cabling does not have as much slack as was found at some other pumps.</td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
CS-291</td><td><u>Component Type</u>:
Electric motor operated valve</td></tr>
<tr><td><u>Anchorages:</u>
Piping is anchored but operator is not</td><td><u>Elevation from floor:</u>
1 ft from floor about elevation 246 above CSIP rooms</td><td><u>Orientation:</u>

</td></tr>
<tr><td><u>Seismic II/I:</u>
HVAC duct sections above which are bolted together</td><td><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u>
none</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Anchorage for piping includes pipe being welded to anchor</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u>
A unrelated piping restraint device is about 2" from valve operator</td></tr>
</table>

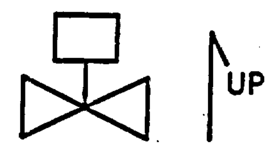
Seismic Walkthrough Checklist

Component Identification: RHR pump 1A-SA	Component Type: Vertical suction pump	
Anchorages: Pump anchored to stand which is, in turn, anchored to concrete pad about 8 inches tall. The stand had three legs for which 2" bolts were used for anchorage. The motor did not have apparent anchorage except for that from the pump connection.	**Elevation from floor:** 5 ft from floor mounted to metal stand.	**Orientation:** The pump was located near the containment wall and was elevated from the floor.
Seismic II/I: HVAC duct sections above which are bolted together	**Adjoining structures:** none	**Nearby walls or piping:** Containment wall
Support Equipment Mounting/Flexibility: It is unclear how the pump was anchored to the motor. Could not examine closely due to contamination.		
Comments/Insights: Near the pump valve SI-322 was found.		

Seismic Walkthrough Checklist

Component Identification: RHR heat exchanger 1A-SA		Component Type: Vertical heat exchanger
Anchorages: Due to skirt around base could not examine the actual anchorage	Elevation from floor: Mounting approximately 1 ft from floor	Orientation: The heat exchanger was vertically mounted with what appeared to be a skirt arrangement.
Seismic II/I: None identified	Adjoining structures: Permanent scaffolding surrounded the heat exchanger about 8 ft from floor	Nearby walls or piping: Inside reinforced wall structure. No block walls
Support Equipment Mounting/Flexibility:		
Comments/Insights:		

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
RH-25</td><td><u>Component Type</u>:
Electric motor operated valve</td></tr>
<tr><td><u>Anchorages:</u>
Valve is not anchored but piping is</td><td><u>Elevation from floor:</u>
Located approximately 4 ft from floor</td><td><u>Orientation:</u>

</td></tr>
<tr><td><u>Seismic II/I:</u>
One light fixture directly above the operator</td><td><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u>
Reinforced wall structure.
No block walls</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Cables a flexible</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u>
The valve hand wheel release is very close to a mounted ladder and could strike it if movement occurred.</td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
Nitrogen storage tank</td><td colspan="2"><u>Component Type</u>:
Vertical and horizontal tanks</td></tr>
<tr><td><u>Anchorages:</u>
vertical tank mounted on pad using 4 one inch bolts</td><td colspan="2"><u>Elevation from floor:</u>
Located approximately 4 ft from ground level</td><td><u>Orientation:</u>
Three tanks horizontal, one large tank vertical. The vertical tank is approximately 20 ft tall</td></tr>
<tr><td><u>Seismic II/I:</u></td><td colspan="2"><u>Adjoining structures:</u></td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="4"><u>Support Equipment Mounting/Flexibility:</u></td></tr>
<tr><td colspan="4"><u>Comments/Insights:</u>
Located in yard. If needed would be difficult to provide acceptable due to long distances of piping and tank supports.</td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification:</u>
AFW MDP 1A-SA</td><td><u>Component Type:</u>
Motor driven pump</td></tr>
<tr><td><u>Anchorages:</u>
Pump and motor bolted to common skid. The skid is bolted to 4" pad using eight 1" bolts</td><td><u>Elevation from floor:</u>
Located about 3 ft from floor</td><td><u>Orientation:</u>
Located in parallel to other AFW pumps</td></tr>
<tr><td><u>Seismic II/I:</u></td><td><u>Adjoining structures:</u>
Missile shield wall is reinforced and not block</td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u></td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

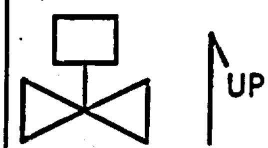
Component Identification: AFW MDP 1B-SB		Component Type: Motor driven pump
Anchorages: Pump and motor bolted to common skid. The skid is bolted to 4" pad using eight 1" bolts	Elevation from floor: Located about 3 ft from floor	Orientation: Located in parallel to other AFW pumps
Seismic II/I:	Adjoining structures: Missile shield wall is reinforced and not block	Nearby walls or piping:
Support Equipment Mounting/Flexibility:		
Comments/Insights:		

Seismic Walkthrough Checklist

Component Identification: AFW SDP XAB	Component Type: Steam driven pump	
Anchorages: Pump and turbine bolted to common skid. The skid is bolted to 6" pad using 10 1" bolts	Elevation from floor: Located about 3 ft from floor	Orientation: Located in parallel to other AFW pumps
Seismic II/I:	Adjoining structures: Missile shield wall is reinforced and not block	Nearby walls or piping:
Support Equipment Mounting/Flexibility:		
Comments/Insights: Local control panel is located off skid and mounted to wall by angle iron		

Seismic Walkthrough Checklist

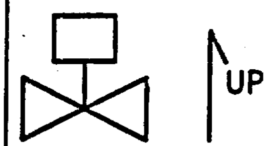
Component Identification:	Component Type:
AFW valves AF-51, AF-50, AF-49	Air operated control valve

Anchorages:	Elevation from floor:	Orientation:
Valves are not anchored although piping is. Operators are not anchored	Located about 3 ft from floor	Valves located in parallel with each other 
Seismic II/I:	**Adjoining structures:**	**Nearby walls or piping:** Block wall located next to AF-49

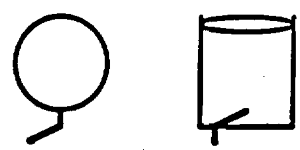
Support Equipment Mounting/Flexibility:
Piping strongly anchored. The operators are tall ~3.5 ft and are not anchored.

Comments/Insights:

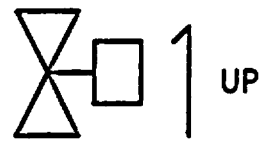
Seismic Walkthrough Checklist

Component Identification: AFW valves AF-131, AF-130, AF-129		Component Type: Hydraulic motor valves
Anchorages: Valves are mounted with x-y anchorage on operator. Valve body and operator are mounted to common anchorage	Elevation from floor: Located about 3 ft from floor	Orientation: Located in parallel to each other 
Seismic II/I:	Adjoining structures:	Nearby walls or piping:
Support Equipment Mounting/Flexibility:		
Comments/Insights:		

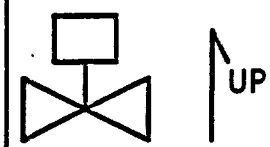
Seismic Walkthrough Checklist

<table>
<tr><td colspan="2">Component Identification:
Condensate Tank</td><td>Component Type:
Vertical tank</td></tr>
<tr><td>Anchorages:
Mounted to concrete pad using 3" bolts spaced about 1' apart</td><td>Elevation from floor:</td><td>Orientation:</td></tr>
<tr><td>Seismic II/I:</td><td>Adjoining structures:
Located in tank room</td><td>Nearby walls or piping:</td></tr>
<tr><td colspan="3">Support Equipment Mounting/Flexibility:
AFW discharge piping is fixed to the tank and the concrete basemat without any support.</td></tr>
<tr><td colspan="3">Comments/Insights:

Simple schematic of CST tank AFW suction line (top and side view)</td></tr>
</table>

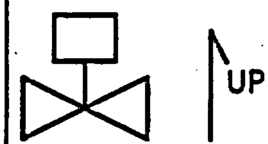
Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
SW valves SW-124, SW-126, SW-127, SW-129; AFW supply</td><td><u>Component Type</u>:
Electric motor operated</td></tr>
<tr><td><u>Anchorages:</u>
Piping anchored but valves are not. In particular the operators are not anchored.</td><td><u>Elevation from floor:</u>
Located about 3.5 ft from floor near post 28/C</td><td><u>Orientation:</u>
Located in parallel to each other
</td></tr>
<tr><td><u>Seismic II/I:</u></td><td><u>Adjoining structures:</u></td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
The control and power cables for SW-127 seem somewhat tight</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
SW valves SW-121, SW-123</td><td><u>Component Type</u>:
Electric motor operated valve</td></tr>
<tr><td><u>Anchorages:</u>
Valves and operators are not anchored. An xyz anchorage is present on the piping near the valves</td><td><u>Elevation from floor:</u>
Located about 1 ft from floor</td><td><u>Orientation:</u>
Located in parallel to each other

</td></tr>
<tr><td><u>Seismic II/I:</u></td><td><u>Adjoining structures:</u></td><td><u>Nearby walls or piping:</u>
concrete walls nearby</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Control cabling seemed tight</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
SG PORVs, SM-58, SM-60, SM-62</td><td><u>Component Type</u>:
Electric-hydraulic valves</td></tr>
<tr><td><u>Anchorages:</u>
PORVs are not anchored</td><td><u>Elevation from floor:</u>
Located about 6 ft from floor</td><td><u>Orientation:</u>
Located in parallel to each other

</td></tr>
<tr><td><u>Seismic II/I:</u>
Light fixture is mounted over valve SM-60</td><td><u>Adjoining structures:</u></td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Valves are close to walkway railing and steam lines could have interaction potential</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

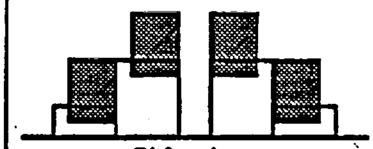
Component Identification: DG-1B (1A similar)		Component Type: Diesel Generator
Anchorages: Diesel generator is mounted to common pad - 8 " pad. Two skids are used, however, between the diesel and some support systems. Lubrication oil cooler and jacket water cooler are saddle mounted with 3 brackets which are 1/2 up heat exchanger and bolted to pad	Elevation from floor: Diesel is located about 3 ft from floor	Orientation: Located in parallel to each other
Seismic II/I:	Adjoining structures: in diesel generator building	Nearby walls or piping:
Support Equipment Mounting/Flexibility: Control panel 1E-23 has four fillet welds on only one side of panel anchorage. Anchorage for other control panels needs to be examined.		
Comments/Insights:		

Seismic Walkthrough Checklist

<table>
<tr><td colspan="3"><u>Component Identification</u>:
Fuel oil transfer pump 1A-SA</td><td colspan="2"><u>Component Type</u>:
Electric motor pump</td></tr>
<tr><td><u>Anchorages:</u>
Small motor mounted on 4" pad by four 0.5" bolts</td><td colspan="2"><u>Elevation from floor:</u>
4" from floor on pad</td><td colspan="2"><u>Orientation:</u>
Pumps are located at fuel building about 20" underground in separate rooms.</td></tr>
<tr><td><u>Seismic II/I:</u></td><td colspan="2"><u>Adjoining structures:</u></td><td colspan="2"><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="5"><u>Support Equipment Mounting/Flexibility:</u>
Piping for fuel oil in building is supported at the top of the run in the room but there exists several 90-degree elbows which do not have support</td></tr>
<tr><td colspan="5"><u>Comments/Insights:</u>

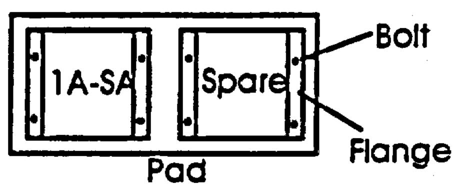
1B-SB is similar in design</td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification:</u>
Vital batteries 1A-SA (1B-SB similar)</td><td><u>Component Type:</u>
DC batteries</td></tr>
<tr><td><u>Anchorages:</u>
Batteries are located on two racks which are mounted to the floor through five "feet" which are bolted to floor using 0.5" bolts with four bolts for each "foot". Batteries are braced and have crush resistant spacers.</td><td><u>Elevation from floor:</u>
Batteries located on rack from <6" to 2.5 ft from floor</td><td><u>Orientation:</u>

Side view
One bank (1B-SB) orientation</td></tr>
<tr><td><u>Seismic II/I:</u>
Light fixtures are located in room above batteries</td><td><u>Adjoining structures:</u>
Inside reinforced structure</td><td><u>Nearby walls or piping:</u>
Eyewash station located in room with shower head near position to spray batteries</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Batteries are well mounted and anchored within each rack but are not anchored between racks.</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u>
The eyewash stations in both rooms are of some concern if both were to fail (similar location, orientation, and elevation).</td></tr>
</table>

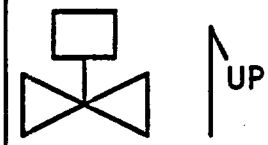
Seismic Walkthrough Checklist

Component Identification: Charger 1A-SA (1B-SB similar)	Component Type: DC Charger	
Anchorages: Mounted to concrete pad about 6" from floor by 4 3/8" bolts. The mounting flange for the charger cabinet is very thin and about 1" long. No welds present	Elevation from floor: 6" from floor on pad	Orientation: All chargers are located in similar orientation at the same elevation
Seismic II/I: None	Adjoining structures: none	Nearby walls or piping: Battery room wall
Support Equipment Mounting/Flexibility: The flange for mounting the charger unit needs to be examined to ensure structural capability.		
Comments/Insights:		

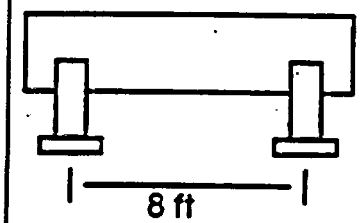
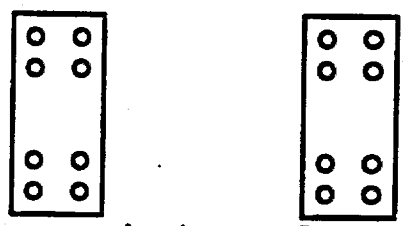


Orientation of 1A-SA and installed spare

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
SW discharge valves SW-274, SW-276</td><td colspan="2"><u>Component Type</u>:
Electric motor operated valve</td></tr>
<tr><td><u>Anchorages:</u>
No anchorage for valve but pipe is anchored</td><td colspan="2"><u>Elevation from floor:</u>
5' from floor</td><td><u>Orientation:</u>

</td></tr>
<tr><td><u>Seismic II/I:</u>
None</td><td colspan="2"><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u>
Reinforced wall</td></tr>
<tr><td colspan="4"><u>Support Equipment Mounting/Flexibility:</u>
Adequate cable flexibility. Valve motor operator for valve SW-276 is ~4" from adjacent piping. The bottom of valve SW-274 is about 1" from piping anchorage.</td></tr>
<tr><td colspan="4"><u>Comments/Insights:</u></td></tr>
</table>

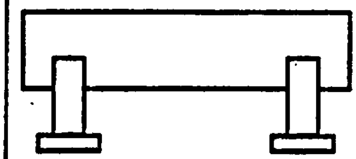
Seismic Walkthrough Checklist

Component Identification:	Component Type:	
CCW surge tank	Horizontal tank	
Anchorages: Located on concrete pad with 1" bolts for anchorage. Eight bolts for each saddle.	**Elevation from floor:** 5' from floor	**Orientation:** 
Seismic II/I: None	**Adjoining structures:** Inside wall of tank room is block	**Nearby walls or piping:** Block wall
Support Equipment Mounting/Flexibility: Tank appears to be well supported.		
Comments/Insights:  Anchorage Pattern		

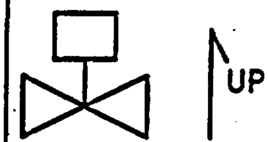
Seismic Walkthrough Checklist

Component Identification: CCW pump 1A-SA (1B-SB similar)	Component Type: Electric motor pump	
Anchorages: Mounted on common skid which is anchored to 4" pad using 12 1" bolts. Five on each side and two at each end.	Elevation from floor: 5' from floor	Orientation: Located at same elevation and orientation as other CCW pumps
Seismic II/I: HVAC ducting above 1A-SA but not major issue. For 1B-SB, lighting is located above pump	Adjoining structures: none	Nearby walls or piping: 4" ESW line located above pump
Support Equipment Mounting/Flexibility: Electrical connections flexible. Local control and instrumentation is separate from skid on nearby wall. For pump 1A-SA, the motor is located ~1" from piping support.		
Comments/Insights:		

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification:</u>
CCW heat exchanger</td><td><u>Component Type:</u>
Heat exchanger</td></tr>
<tr><td><u>Anchorages:</u>
Located on concrete pad with two saddle supports welded to heat exchanger. Saddle supports are anchored to pad by eight 3" bolts</td><td><u>Elevation from floor:</u>
2' from floor at base of heat exchanger. 4' to horizontal centerline</td><td><u>Orientation:</u>
</td></tr>
<tr><td><u>Seismic II/I:</u>
None</td><td><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u></td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Tank appears to be well supported.</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification:</u>
RHR HX isolation valve CC-142</td><td><u>Component Type:</u>
Electric motor operated valve</td></tr>
<tr><td><u>Anchorages:</u>
Valve is not anchored. The pipe is welded to supports in both lateral and vertical directions</td><td><u>Elevation from floor:</u>
1 ft from floor</td><td><u>Orientation:</u>
</td></tr>
<tr><td><u>Seismic II/I:</u>
Some non-safety equipment (speaker) located above operator</td><td><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u>
Reinforced wall, RHR line above (well supported)</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
The operator for the valve is not supported and is located about 4' above floor</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

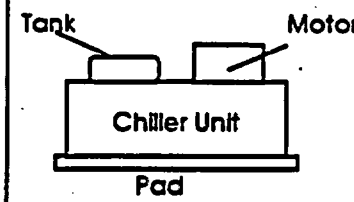
Seismic Walkthrough Checklist

Component Identification: CSIP AHU AH-9-1A (AH-9-1B similar)	Component Type: Air handling unit	
Anchorages: Mounted on common skid which is bolted to 6" concrete pad using sixteen 0.5" bolts. Six on each side and two at either end.	Elevation from floor: 6"	Orientation: Located above CSIP room with all oriented in same direction
Seismic II/I: Ductwork shielded by other anchorage supports	Adjoining structures: none	Nearby walls or piping: Reinforced wall, RHR line above (well supported)
Support Equipment Mounting/Flexibility:		
Comments/Insights:		

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2"><u>Component Identification</u>:
Essential chilled service water pump 1A-SA</td><td><u>Component Type</u>:
Electric motor pump</td></tr>
<tr><td><u>Anchorages:</u>
Mounted on skid which is bolted to 6" concrete pad using 10 1" bolts. Five on each side.</td><td><u>Elevation from floor:</u>
Pump about 2' from floor</td><td><u>Orientation:</u>
Located near chiller</td></tr>
<tr><td><u>Seismic II/I:</u>
None</td><td><u>Adjoining structures:</u>
none</td><td><u>Nearby walls or piping:</u>
Reinforced wall</td></tr>
<tr><td colspan="3"><u>Support Equipment Mounting/Flexibility:</u>
Control cables are not supported over four foot span and then anchored to wall. Could have some displacement</td></tr>
<tr><td colspan="3"><u>Comments/Insights:</u></td></tr>
</table>

Seismic Walkthrough Checklist

<table>
<tr><td colspan="2">Component Identification:
Essential chiller unit WC-2</td><td>Component Type:
Chiller package</td></tr>
<tr><td>Anchorages:
Unit on common skid with tank and motor above. It is setting on concrete pad supported at the four end points. No mounting apparent although unable to confirm due to coverings</td><td>Elevation from floor:
Unit about 1' from floor</td><td>Orientation:

</td></tr>
<tr><td>Seismic II/I:
None</td><td>Adjoining structures:
none</td><td>Nearby walls or piping:
Reinforced wall</td></tr>
<tr><td colspan="3">Support Equipment Mounting/Flexibility:</td></tr>
<tr><td colspan="3">Comments/Insights:
Unit does not appear to be mounted to concrete pad. Additional information should be obtained about anchorage. [Later found to be well anchored.]</td></tr>
</table>

Appendix B

Safe Shutdown Equipment Listing

Auxiliary Feedwater System

21-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	5	1A-SA	AFW motor-driven pump 1A-SA	2165-S-0544, Rev. 20	RAB	236	S,R		OFF	ON	Yes	1A-SA;DP-1A; K640A
2	1	R	1AF-16	Check valve	2165-S-0544, Rev. 20	RAB	236	None		CL	CL/OP	No	
3	1	7	1AF-19	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	236	S,R	1	OP	OP	No	
4	1	R	1AF-40	Manual valve	2165-S-0544, Rev. 20	RAB	261	None		OP	OP	No	
5	1	7	1AF-49	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	261	S,R	1	OP	OP	No	
6	1	R	1AF-201	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
7	1	R	1AF-54	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
8	1	8a	1AF-55	Electric motor operated valve	2165-S-0544, Rev. 20	RAB	236	S,R		OP	OP	No	
9	2	5	1B-SB	AFW motor-driven pump 1B-SB	2165-S-0544, Rev. 20	RAB	236	S,R		OFF	ON	Yes	1B-SB; DP-1B; K640B
10	2	R	1AF-31	Check valve	2165-S-0544, Rev. 20	RAB	236	None		CL	CL/OP	No	
11	2	7	1AF-34	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	236	S,R	1	OP	OP	No	
12	2	R	1AF-42	Manual valve	2165-S-0544, Rev. 20	RAB	261	None		OP	OP	No	
13	2	7	1AF-51	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	261	S,R	1	OP	OP	No	
14	2	R	1AF-202	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
15	2	R	1AF-92	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
16	2	8a	1AF-93	Electric motor operated valve	2165-S-0544, Rev. 20	RAB	261	S,R		OP	OP	No	
17	3	5	1X-SAB	AFW steam-driven pump 1X-SAB	2165-S-0544, Rev. 20	RAB	236	S,R		OFF	ON	Yes	DP-1B; K641A/B
18	3	R	1AF-117	Check valve	2165-S-0544, Rev. 20	RAB	236	None		CL	CL/OP	No	
19	3	R	1AF-120	Manual valve	2165-S-0544, Rev. 20	RAB	261	None		OP	OP	No	
20	3	R	1AF-121	Manual valve	2165-S-0544, Rev. 20	RAB	261	None		OP	OP	No	
21	3	R	1AF-122	Manual valve	2165-S-0544, Rev. 20	RAB	261	None		OP	OP	No	
22	3	7	1AF-129	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	261	S,R	1	OP	OP	No	
23	3	7	1AF-130	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	261	S,R	1	OP	OP	No	
24	3	7	1AF-131	Electric-hydraulic valve	2165-S-0544, Rev. 20	RAB	261	S,R	1	OP	OP	No	
25	3	R	1AF-204	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
26	3	R	1AF-205	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
27	3	R	1AF-206	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
28	3	R	1AF-136	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
29	3	R	1AF-148	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
30	3	R	1AF-142	Check valve	2165-S-0544, Rev. 20	RAB	261	None		CL	CL/OP	No	
31	3	8a	1AF-137	Electric motor operated valve (D.C.)	2165-S-0544, Rev. 20	RAB	261	S,R		OP	OP	No	
32	3	8a	1AF-149	Electric motor operated valve (D.C.)	2165-S-0544, Rev. 20	RAB	261	S,R		OP	OP	No	
33	3	8a	1AF-143	Electric motor operated valve (D.C.)	2165-S-0544, Rev. 20	RAB	261	S,R		OP	OP	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Position	Required Support Systems or Components
34	1,2,3	R	1AF-68	Check valve	2165-S-0544, Rev. 20	RAB	286	None		CL	CL/OP	No	
35	1,2,3	R	1AF-106	Check valve	2165-S-0544, Rev. 20	CB	286	None		CL	CL/OP	No	
36	1,2,3	R	1AF-87	Check valve	2165-S-0544, Rev. 20	CB	286	None		CL	CL/OP	No	
37	1,2,3	21	1X-SAB	Condensate storage tank	2165-S-0545, Rev. 31	TANK	261	S		N/A	N/A	No	
38	1,2,3	R	1CE-34	Manual valve	2165-S-0545, Rev. 31	TANK	261	None		OP	OP	No	
39	1	R	1CE-35	Manual valve	2165-S-0545, Rev. 31	RAB	236	None		OP	OP	No	
40	1	R	1CE-36	Check valve	2165-S-0545, Rev. 31	RAB	236	None		CL	CL/OP	No	
41	2	R	1CE-45	Manual valve	2165-S-0545, Rev. 31	RAB	236	None		OP	OP	No	
42	2	R	1CE-46	Check valve	2165-S-0545, Rev. 31	RAB	236	None		CL	CL/OP	No	
43	3	R	1CE-55	Manual valve	2165-S-0545, Rev. 31	RAB	236	None		OP	OP	No	
44	3	R	1CE-56	Check valve	2165-S-0545, Rev. 31	RAB	236	None		CL	CL/OP	No	
45	1,2,3	18	PT2050A	AFW flow transmitter PT 2050A	2165-S-0544, Rev. 20	RAB	261	None	24	N/A	N/A	Yes	1DP-1A-S3
46	1,2,3	18	PT2050B	AFW flow transmitter PT 2050B	2165-S-0544, Rev. 20	RAB	261	None	24	N/A	N/A	Yes	1DP-1B-S2
47	1,2,3	18	PT2050C	AFW flow transmitter PT 2050C	2165-S-0544, Rev. 20	RAB	261	None	24	N/A	N/A	Yes	1DP-1B-S2
48	1	18	PT2150A	AFW pressure transmitter PT 2150A	2165-S-0544, Rev. 20	RAB	236	None	24	N/A	N/A	Yes	1DP-1A-S3
49	2	18	PT2150B	AFW pressure transmitter PT 2150B	2165-S-0544, Rev. 20	RAB	236	None	24	N/A	N/A	Yes	1DP-1B-S2
50	3	18	PT2170	AFW pressure transmitter PT 2170	2165-S-0544, Rev. 20	RAB	236	None	24	N/A	N/A	Yes	1DP-1B-S2
51	1	8a	1SW-121	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1A-35-SA
52	1	8a	1SW-123	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1A-35-SA
53	3	8a	1SW-124	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1A-35-SA
54	3	8a	1SW-126	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1A-35-SA
55	3	8a	1SW-127	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1B-35-SB
56	3	8a	1SW-129	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1B-35-SB
57	2	8a	1SW-130	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1B-35-SB
58	2	8a	1SW-132	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	2	CL	OP	Yes	1B-35-SB
59	3	8a	1MS-70	Electric motor operated valve (D.C.)	2165-S-0542, Rev. 19	MST	261	S,R		CL	OP	Yes	1DP-1A2-SA
60	3	8a	1MS-72	Electric motor operated valve (D.C.)	2165-S-0542, Rev. 19	MST	261	S,R		CL	OP	Yes	1DP-1B2-SB
61	3	R	1MS-71	Check valve	2165-S-0542, Rev. 19	RAB	261	None		CL	CL/OP	No	
62	3	R	1MS-73	Check valve	2165-S-0542, Rev. 19	RAB	261	None		CL	CL/OP	No	
63	3	R	1MS-74	Manual valve	2165-S-0542, Rev. 19	RAB	236	None		OP	OP	No	
64	3	8a	1MS-T	Electric motor operated valve (D.C.)	2165-S-0542, Rev. 19	RAB	236	S,R		OP	OP	No	
65	3	7	1MS-G	Electric hydraulic valve	2165-S-0542, Rev. 19	RAB	236	S,R		CL	OP	Yes	1DP-1B-SB
66	1,2,3	18	LT-9010A	Level instrument (CST level)	2165-S-0545, Rev. 31	TANK	236	None	24	N/A	N/A	Yes	1DP-1A-S3
67	1,2,3	18	LT-9010B	Level instrument (CST level)	2165-S-0545, Rev. 31	TANK	236	None	24	N/A	N/A	Yes	1DP-1B-S2
68	1	18	PS-2250A	Pressure switch	2165-S-0545, Rev. 31	RAB	305	S,R	3	N/A	N/A	Yes	1DP-1A-S3

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
69	2	18	PS-2250B	Pressure switch	2165-S-0545, Rev. 31	RAB	305	S,R	3	N/A	N/A	Yes	1DP-1B-S2
70	3	18	PS-2270	Pressure switch	2165-S-0545, Rev. 31	RAB	305	None	3	N/A	N/A	Yes	1DP-1B-S2
71	3	18	PS-431	Pressure switch	2165-S-0542, Rev. 19	RAB	236	None	3	N/A	N/A	Yes	1DP-1B-S2
72	1	18	PT-2250A	Pressure transmitter for PS-2250A	2165-S-0545, Rev. 31	RAB	236	S,R		N/A	N/A	Yes	PIC-C9
73	2	18	PT-2250B	Pressure transmitter for PS-2250B	2165-S-0545, Rev. 31	RAB	236	S,R		N/A	N/A	Yes	PIC-C10
74	3	18	PT-2270	Pressure transmitter for PS-2270	2165-S-0545, Rev. 31	RAB	236	S,R		N/A	N/A	Yes	PIC-C10
75	1	18	PS-2150A	Pressure switch for PT-2150A	2165-S-0544, Rev. 20	RAB	305	S,R		N/A	N/A	Yes	PIC-C10
76	2	18	PS-2150B	Pressure switch for PT-2150B	2165-S-0544, Rev. 20	RAB	305	S,R		N/A	N/A	Yes	PIC-C9
77	1	18	PS-2170	Pressure switch for PT-2170	2165-S-0544, Rev. 20	RAB	305	S,R		N/A	N/A	Yes	PIC-C10
78	2	18	A1-R13	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
79	1	18	A1-R14	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
80	2	18	A21-R15	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
81	1	18	A21-R17	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
82	1	18	A1-R28	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
83	2	18	A1-R29	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
84	1	18	A1-R27	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
85	1	18	A1-R33	Instrument rack fror safe shutdown instrumen	Equipment Rack	RAB	261	S		N/A	N/A	No	

System Analyst: [signature]

Residual Heat Removal System

31-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	5	1A-SA	RHR motor driven pump 1A-SA	2165-S-1324, Rev. 9	RAB	190	S,R		OFF	ON	Yes	1A2-SA;DP-1A-SA; CC
2	1	R	1RH-19	Manual valve	2165-S-1324, Rev. 9	RAB	190	None		OP	OP	No	
3	1	21	1A-SA	RHR heat exchanger 1A-SA	2165-S-1324, Rev. 9	RAB	236	S		N/A	N/A	No	
4	1	8b	1RH-30	Air operated valve	2165-S-1324, Rev. 9	RAB	236	S,R		OP	OP	No	
5	1	R	1RH-34	Check valve	2165-S-1324, Rev. 9	RAB	236	None		CL	CL/OP	No	
6	1	18	1FT-605A	Flow transmitter 1FT- 605A	2165-S-1324, Rev. 9	RAB	236	None	24	N/A	N/A	Yes	PIC-C7
7	2	5	1B-SB	RHR motor driven pump 1B-SB	2165-S-1324, Rev. 9	RAB	190	S,R		OFF	ON	Yes	1B2-SB;DP-1B-SB; CC
8	2	R	1RH-57	Manual valve	2165-S-1324, Rev. 9	CB	216	None		OP	OP	No	
9	2	21	1B-SB	RHR heat exchanger 1B-SB	2165-S-1324, Rev. 9	RAB	236	S		N/A	N/A	No	
10	2	8b	1RH-66	Air operated valve	2165-S-1324, Rev. 9	CB	216	S,R		OP	OP	No	
11	2	R	1RH-70	Check valve	2165-S-1324, Rev. 9	CB	216	None		CL	CL/OP	No	
12	2	18	1FT-605B	Flow transmitter 1FT- 605B	2165-S-1324, Rev. 9	RAB	236	None	24	N/A	N/A	Yes	PIC-19
13	2	8a	1SI-323	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	236	S,R		OP	OP	No	
14	2	R	1SI-321	Check valve	2165-S-1310, Rev. 10	RAB	190	None		CL	CL/OP	No	
15	1	8a	1SI-322	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	236	S,R		OP	OP	No	
16	1	R	1SI-320	Check valve	2165-S-1310, Rev. 10	RAB	190	None		CL	CL/OP	No	
17	2	8a	1SI-311	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	190	S,R	7	CL	OP	Yes	1B21-SB; K740B&K739
18	2	8a	1SI-301	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	190	S,R	7	CL	OP	Yes	1B21-SB; K740B&K741
19	1	8a	1SI-310	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	190	S,R	7	CL	OP	Yes	1A21-SA; K740A&K739
20	1	8a	1SI-300	Electric motor operated valve	2165-S-1310, Rev. 10	RAB	190	S,R	7	CL	OP	Yes	1A21-SA; K740A&K741
21	1,2	18	1TE-606A	Temperature elements TE-606A	2165-S-1324, Rev. 9	RAB	236	S,R	8	N/A	N/A	Yes	PIC-C7
22	1	18	1TE-604A	Temperature elements TE-604A	2165-S-1324, Rev. 9	RAB	236	S,R	8	N/A	N/A	Yes	PIC-C7
23	2	18	1TE-604B	Temperature elements TE-604B	2165-S-1324, Rev. 9	RAB	236	S,R	8	N/A	N/A	Yes	PIC-C8
24	1,2	18	1TE-606B	Temperature elements TE-606B	2165-S-1324, Rev. 9	RAB	236	S,R	8	N/A	N/A	Yes	PIC-C8
25	1	18	TI-5551A	Local temperature instrument TI-5551A	2165-S-1324, Rev. 9	RAB	236	S	23	N/A	N/A	No	
26	2	18	TI-5551B	Local temperature instrument TI-5551B	2165-S-1324, Rev. 9	RAB	236	S	23	N/A	N/A	No	
27	1	18	A1-R6	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	

System Analyst: [signature]

Chemical Volume and Control System/S1

21-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1,2	5	1A-SA	CSIP motor-driven pump 1A-SA	2165-S-1305, Rev. 12	RAB	236	S,R		OFF	ON	Yes	1A-SA;DP-1A-SA;AHU-
2	1,2	R	1CS-178	Check valve	2165-S-1305, Rev. 12	RAB	236	None		CL	CL/OP	No	
3	1,2	R	1CS-183	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
4	1,2	R	1CS-173	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
5	1,2	R	1CS-187	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
6	1,2	5	1B-SB	CSIP motor-driven pump 1B-SB	2165-S-1305, Rev. 12	RAB	236	S,R		OFF	ON	Yes	1B-SA;DP-1B-SB;AHU-
7	1,2	R	1CS-192	Check valve	2165-S-1305, Rev. 12	RAB	236	None		CL	CL/OP	No	
8	1,2	R	1CS-197	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
9	1	R	1CS-167	Check valve	2165-S-1305, Rev. 12	RAB	261	None		CL	CL/OP	No	
10	1	8a	1CS-166	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	261	S,R		OP	OP	No	
11	1	8a	1CS-165	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	261	S,R		OP	OP	No	
12	1	21	1X-SN	Volume control tank	2165-S-1305, Rev. 12	RAB	236	S		N/A	N/A	No	
13	2	8a	1CS-291	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		CL	OP	Yes	1A35-SA;K602A
14	2	8a	1CS-292	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		CL	OP	Yes	1B35-SB;K602B
15	2	R	1CS-294	Check valve	2165-S-1305, Rev. 12	RAB	236	None		CL	CL/OP	No	
16	1	8a	1CS-171	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
17	1	8a	1CS-169	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
18	1	8a	1CS-168	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
19	1	8a	1CS-170	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
20	1	8a	1CS-235	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
21	1	R	1CS-234	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
22	1	7	1CS-231	Electro-hydraulic valve	2165-S-1305, Rev. 12	RAB	261	S,R		OP	OP	No	
23	1	R	1CS-228	Manual valve	2165-S-1305, Rev. 12	RAB	236	None		OP	OP	No	
24	1	18	1FT-122	Flow transmitter 1FT-122	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
25	1,2	8a	1CS-217	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
26	1,2	8a	1CS-219	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
27	1,2	8a	1CS-218	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
28	1,2	8a	1CS-220	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		OP	OP	No	
29	1	8a	1CS-238	Electric motor operated valve	2165-S-1303, Rev. 9	RAB	236	S,R		OP	OP	No	
30	1	R	1CS-477	Check valve	2165-S-1303, Rev. 9	CB	236	None		CL	CL/OP	No	
31	1	21	1X-SN	Regenerative heat exchanger	2165-S-1303, Rev. 9	CB	236	S		N/A	N/A	No	
32	1	7	1CS-492	Air operated valve	2165-S-1303, Rev. 9	CB	236	S,R		AIR	OP	No	
33	1	R	1CS-497	Check valve	2165-S-1303, Rev. 9	CB	257	None		CL	Cl/OP	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
34	1	R	1CS-500	Check valve	2165-S-1303, Rev. 9	CB	258	None		CL	CL/OP	No	
35	2	21	1X-SN	Refueling water storage tank	2165-S-0550, Rev. 12	TANK	261	S		N/A	N/A	No	
36	1,2	18	1FT-943	Flow transmitter 1FT-943	2165-S-1308, Rev. 8	RAB	236	None	24	N/A	N/A	Yes	DC-1A-SA
37	1,2	8a	1SI-1	Electric motor operated valve	2165-S-1308, Rev. 8	RAB	216	S,R		CL	OP	Yes	1A31-SA;K601A
38	1,2	8a	1SI-2	Electric motor operated valve	2165-S-1308, Rev. 8	RAB	216	S,R		CL	OP	Yes	1B-31-SB;K601B
39	1,2	21	1X-SAB	Boron injection tank	2165-S-1308, Rev. 8	RAB	216	S		OP	OP	No	
40	1,2	8a	1SI-3	Electric motor operated valve	2165-S-1308, Rev. 8	RAB	216	S,R		CL	OP	Yes	1A31-SA;K603A
41	1,2	8a	1SI-4	Electric motor operated valve	2165-S-1308, Rev. 8	RAB	216	S,R		CL	OP	Yes	1B31-SB;K603B
42	1,2	R	1SI-5	Manual valve	2165-S-1308, Rev. 8	CB	216	None		CL	CL/OP	No	
43	1,2	R	1SI-6	Manual valve	2165-S-1308, Rev. 8	CB	216	None		OP	OP	No	
44	1,2	R	1SI-7	Manual valve	2165-S-1308, Rev. 8	CB	216	None		OP	OP	No	
45	1,2	R	1SI-8	Check valve	2165-S-1308, Rev. 8	CB	216	None		CL	CL/OP	No	
46	1,2	R	1SI-9	Check valve	2165-S-1308, Rev. 8	CB	216	None		OP	OP	No	
47	1,2	R	1SI-10	Check valve	2165-S-1308, Rev. 8	CB	216	None		OP	OP	No	
48	1,2	R	1SI-81	Check valve	2165-S-1308, Rev. 8	CB	236	None		OP	OP	No	
49	1,2	R	1SI-82	Check valve	2165-S-1308, Rev. 8	CB	236	None		CL	CL/OP	No	
50	1,2	R	1SI-83	Check valve	2165-S-1308, Rev. 8	CB	236	None		CL	CL/OP	No	
51	1,2	18	1FT-940	Flow transmitter 1FT-940	2165-S-1308, Rev. 8	RAB	236	None		N/A	N/A	Yes	DC-1B-SB
52	1,2	18	1LT-990	Level transmitter 1LT-990	2165-S-0550, Rev. 12	TANK	261	S,R	4	N/A	N/A	Yes	PIC-C1
53	1,2	18	1LT-991	Level transmitter 1LT-991	2165-S-0550, Rev. 12	TANK	261	S,R	4	N/A	N/A	Yes	PIC-C2
54	1,2	18	1LT-992	Level transmitter 1LT-992	2165-S-0550, Rev. 12	TANK	261	S,R	4	N/A	N/A	Yes	PIC-C3
55	1,2	18	1LT-993	Level transmitter 1LT-993	2165-S-0550, Rev. 12	TANK	261	S,R	4	N/A	N/A	Yes	PIC-C4
56	1	8a	RH-25	Electric motor operated valve	2165-S-1324, Rev. 9	RAB	236	S,R	5	CL	OP	Yes	1A35-SA
57	2	8a	RH-63	Electric motor operated valve	2165-S-1324, Rev. 9	RAB	236	S,R	5	CL	OP	Yes	1B35-SB
58	1,2	18	LT-115	Level transmitter LT-115	2165-S-1305, Rev. 12	RAB	236	S,R	6	N/A	N/A	Yes	PIC-C5
59	1,2	18	LT-112	Level transmitter LT-112	2165-S-1305, Rev. 12	RAB	236	S,R	6	N/A	N/A	Yes	PIC-C8
60	1,2	18	A1-R7	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	
61	1	18	PIC-CAB-1	Protection cabinet I	1364-46574S01	RAB	305	S,R		N/A	N/A	Yes	IDP-1A-SI
62	2	18	PIC-CAB-2	Protection cabinet II	1364-46575S01	RAB	305	S,R		N/A	N/A	Yes	IDP-1B-SII
63	1	18	PIC-CAB-3	Protection cabinet III	1364-46576S01	RAB	305	S,R		N/A	N/A	Yes	IDP-1A-SIII
64	2	18	PIC-CAB-4	Protection cabinet IV	1364-46577S01	RAB	305	S,R		N/A	N/A	Yes	IDP-1B-SIV

System Analyst: [signature]

Reactor Coolant System

21 Aug 94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	8a	1RC-113	Electric motor operated valve	2165-S-1301, Rev. 6	CB	286	S,R		OP	OP	Yes	1A-24
2	1	8b	1RC-114	Solenoid operated valve	2165-S-1301, Rev. 6	CB	286	S,R	9	CL	OP	Yes	DP-1A-SA
3	2	8a	1RC-115	Electric motor operated valve	2165-S-1301, Rev. 6	CB	286	S,R		OP	OP	Yes	1B-24
4	2	8b	1RC-116	Solenoid operated valve	2165-S-1301, Rev. 6	CB	286	S,R	9	CL	OP	Yes	DP-1A-1
5	3	8a	1RC-117	Electric motor operated valve	2165-S-1301, Rev. 6	CB	286	S,R		OP	OP	Yes	1B24
6	3	8b	1RC-118	Solenoid operated valve	2165-S-1301, Rev. 6	CB	286	S,R	9	CL	OP	Yes	DP-1B-SB
7	1	R	1RC-123	Safety relief valve	2165-S-1301, Rev. 6	CB	307	S		CL	CL/OP	No	
8	2	R	1RC-125	Safety relief valve	2165-S-1301, Rev. 6	CB	307	S		CL	CL/OP	No	
9	3	R	1RC-127	Safety relief valve	2165-S-1301, Rev. 6	CB	307	S		CL	CL/OP	No	
10	1	18	1PT-444	Pressure transmitter PT-444	2165-S-1301, Rev. 6	CB	236	S,R		N/A	N/A	Yes	DP-1A-S1
11	1	18	1PT-445	Pressure transmitter PT-445	2165-S-1301, Rev. 6	CB	236	S,R		N/A	N/A	Yes	DP-1A-S1
12	1	18	1PT-455	Pressure transmitter PT-455	2165-S-1301, Rev. 6	CB	236	S,R		N/A	N/A	Yes	DP-1A-S1
13	2	18	1PT-456	Pressure transmitter PT-456	2165-S-1301, Rev. 6	CB	236	S,R		N/A	N/A	Yes	DP-1B-S2
14	3	18	1PT-457	Pressure transmitter PT-457	2165-S-1301, Rev. 6	CB	236	S,R		N/A	N/A	Yes	DP-1A-S3
15	1	18	1PT-402	Pressure transmitter PT-402	2165-S-1344, Rev. 4	RAB	236	S,R		N/A	N/A	Yes	DP-1A-S1
16	2	18	1PT-403	Pressure transmitter PT-403	2165-S-1344, Rev. 4	RAB	236	S,R		N/A	N/A	Yes	DP-1A-S1
17	1	18	1TE-410	Cold level temperature element TE-410	2165-S-1300, Rev. 17	CB	255	S,R	10	N/A	N/A	Yes	DP-1B-S2
18	2	18	1TE-420	Cold level temperature element TE-420	2165-S-1300, Rev. 17	CB	255	S,R	10	N/A	N/A	Yes	DP-1B-S2
19	3	18	1TE-430	Cold level temperature element TE-430	2165-S-1300, Rev. 17	CB	255	S,R	10	N/A	N/A	Yes	DP-1B-S2
20	1	18	1PT-474	Steam generator pressure transmitter PT-474	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1B-S2
21	1	18	1PT-475	Steam generator pressure transmitter PT-475	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
22	1	18	1PT-476	Steam generator pressure transmitter PT-476	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
23	2	18	1PT-484	Steam generator pressure transmitter PT-484	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1B-S2
24	2	18	1PT-485	Steam generator pressure transmitter PT-485	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
25	2	18	1PT-486	Steam generator pressure transmitter PT-486	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
26	3	18	1PT-494	Steam generator pressure transmitter PT-494	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1B-S2
27	3	18	1PT-495	Steam generator pressure transmitter PT-495	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
28	3	18	1PT-496	Steam generator pressure transmitter PT-496	2165-S-0542, Rev. 19	RAB	261	S,R		N/A	N/A	Yes	DP-1A-S3
29	1	21	1A-SA	Nitrogen/Air accum. tank 1A-SA for PORV	2165-S-1309, Rev. 15	CB	286	S		N/A	N/A	No	
30	2	21	1B-NNS	Nitrogen/Air accum. tank 1B-NNS for PORV	2165-S-1309, Rev. 15	CB	286	S		N/A	N/A	No	
31	3	21	1C-SB	Nitrogen/Air accum. tank 1C-SB for PORV	2165-S-1309, Rev. 15	CB	286	S		N/A	N/A	No	
32	1	8b	1RC-114:002	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1B
33	1	8b	1RC-114:003	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1B

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Position	Required Support Systems or Components
34	2	8b	1SI-413	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1A
35	2	8b	1SI-414	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1A
36	3	8b	1RC-118:002	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1A
37	3	8b	1RC-118:003	Solenoid valve for PORV	2165-S-1309, Rev. 15	CB	315	S,R		CL	CL/OP	Yes	Transfer panel 1A
38	1	18	A1-R22	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
39	1	18	A1-R23	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
40	1	18	A1-R24	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
41	1	18	A1-R45A	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
42	2	18	A1-R45B	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	261	S		N/A	N/A	No	
43	1	18	C1-R6	Containment instrument rack for safe shut. in	Equipment Rack	CB	236	S		N/A	N/A	No	
44	1	18	C1-R8	Containment instrument rack for safe shut. in	Equipment Rack	CB	236	S		N/A	N/A	No	
45	1	18	C1-R17	Containment instrument rack for safe shut. in	Equipment Rack	CB	236	S		N/A	N/A	No	
46	1	18	C1-R9	Containment instrument rack for safe shut. in	Equipment Rack	CB	236	S		N/A	N/A	No	
47	3	R	1RC-182	Manual valve	2165-S-1309, Rev. 15	CB	286	None		OP	OP	No	
48	2	R	1RC-181	Manual valve	2165-S-1309, Rev. 15	CB	286	None		OP	OP	No	
49	1	R	1RC-180	Manual valve	2165-S-1309, Rev. 15	CB	286	None		OP	OP	No	

System Analyst:

Emergency Boration System

21-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	21	1X-SN	Boric acid tank	2165-S-1307, Rev. 5	RAB	261	S		N/A	N/A	No	
2	1	R	1CS-513	Manual valve	2165-S-1307, Rev. 5	RAB	261	None		OP	OP	No	
3	1	R	1CS-530	Manual valve	2165-S-1307, Rev. 5	RAB	236	None		OP	OP	No	
4	1	5	1A-SA	Boric acid transfer pump 1A-SA	2165-S-1307, Rev. 5	RAB	236	S,R		OFF	ON	Yes	1A35-SA
5	1	R	1CS-536	Check valve	2165-S-1307, Rev. 5	RAB	236	None		CL	CL/OP	No	
6	1	R	1CS-535	Manual valve	2165-S-1307, Rev. 5	RAB	236	None		OP	OP	No	
7	1	R	1CS-540	Manual valve	2165-S-1307, Rev. 5	RAB	236	None		OP	OP	No	
8	1	5	1B-SB	Boric acid transfer pump 1B-SB	2165-S-1307, Rev. 5	RAB	236	S,R		OFF	ON	Yes	1B35-SB
9	1	R	1CS-546	Check valve	2165-S-1307, Rev. 5	RAB	236	None		CL	CL/OP	No	
10	1	R	1CS-549	Manual valve	2165-S-1307, Rev. 5	RAB	236	None		OP	OP	No	
11	1	7	1CS-559	Pneumatic valve	2165-S-1307, Rev. 5	RAB	261	S,R		OP	OP	No	
12	1	7	1CS-563	Pneumatic valve	2165-S-1307, Rev. 5	RAB	261	S,R		OP	OP	No	
13	1	•	1X-SN	Boric acid filter	2165-S-1307, Rev. 5	RAB	261	S		N/A	N/A	No	
14	1	8a	1CS-278	Electric motor operated valve	2165-S-1305, Rev. 12	RAB	236	S,R		CL	OP	Yes	1B35-SB
15	1	R	1CS-279	Check valve	2165-S-1305, Rev. 12	RAB	236	None		CL	CL/OP	No	
16	1	18	1FT-110	Flow transmitter	2165-S-1305, Rev. 12	RAB	236	S,R		N/A	N/A	Yes	• PIC-C6
17	1	20	LT-106	Boric acid tank level transmitter	2165-S-1307, Rev. 5	RAB	261	S,R		N/A	N/A	Yes	IDP-1A-SI
18	2	20	LT-161	Boric acid tank level transmitter	2165-S-1307, Rev. 5	RAB	261	S,R		N/A	N/A	Yes	IDP-1B-SII

System Analyst: RBSmmett

Main Steam System

21 Aug 94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	8a	1MS-58	Electric-hydraulic valve	2165-S-0542, Rev. 19	MST	261	S,R		CL	CL/OP	Yes	PP-1A312SA
2	2	8a	1MS-60	Electric-hydraulic valve	2165-S-0542, Rev. 19	MST	261	S,R		CL	CL/OP	Yes	PP-1B312SB
3	3	8a	1MS-62	Electric-hydraulic valve	2165-S-0542, Rev. 19	MST	261	S,R		CL	CL/OP	Yes	IDP-1A-SB
4	1	R	1MS-59	Manual valve	2165-S-0542, Rev. 19	MST	261	None		OP	OP	No	
5	2	R	1MS-61	Manual valve	2165-S-0542, Rev. 19	MST	261	None		OP	OP	No	
6	3	R	1MS-63	Manual valve	2165-S-0542, Rev. 19	MST	261	None		OP	OP	No	
7	1	*	1A-SN	Steam Generator	2165-S-0542, Rev. 19	CB	236	S		N/A	N/A	No	
8	2	*	1B-SN	Steam Generator	2165-S-0542, Rev. 19	CB	236	S		N/A	N/A	No	
9	3	*	1C-SN	Steam Generator	2165-S-0542, Rev. 19	CB	236	S		N/A	N/A	No	
10	1	5	2MS-P165A-1	Relief valve oil pump A	2166-B-401/sh 1252, Re	MST	261	S,R		OFF	ON	Yes	1A31-SA
11	2	5	2MS-P195B-1	Relief valve oil pump B	2166-B-401/sh 1253, Re	MST	261	S,R		OFF	ON	Yes	1B31-SB
12	3	5	2MS-P205A-1	Relief valve oil pump C	2166-B-401/sh 1257, Re	MST	261	S,R		OFF	ON	Yes	1A31-SA

Systems Analysis: [signature]

Component Cooling Water System

21 Aug 94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	5	1A-SA	Component cooling water pump 1A-SA	2165-S-1319, Rev. 13	RAB	236	S,R	11	ON	ON	Yes	1A-SA; DP-1A-SA; 2-8/
2	1	R	1CC-33	Check valve	2165-S-1319, Rev. 13	RAB	236	None		OP	CL/OP	No	
3	1	R	1CC-36	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
4	1	R	1CC-88	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
5	1	21	1A-SA	Component cooling water heat exchanger	2165-S-1319, Rev. 13	RAB	236	S		N/A	N/A	No	
6	1	R	1CC-95	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
7	1	18	1FT-652	Flow transmitter FT-652	2165-S-1319, Rev. 13	RAB	236	None	24	N/A	N/A	Yes	PIC-C7
8	1	R	1CC-27	Manual valve	2165-S-1319, Rev. 13	RAB	236	S,R		OFF	ON	Yes	1B-SB; DP-1B-SB; 2-8/
9	2	5	1B-SB	Component cooling water pump 1B-SB	2165-S-1319, Rev. 13	RAB	236	None		OP	CL/OP	No	
10	2	R	1CC-50	Check valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
11	2	R	1CC-53	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
12	2	R	1CC-102	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
13	2	21	1B-SB	Component cooling water heat exchanger	2165-S-1319, Rev. 13	RAB	236	S		N/A	N/A	No	
14	2	R	1CC-109	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
15	2	18	1FT-653	Flow transmitter FT-653	2165-S-1319, Rev. 13	RAB	236	None	24	N/A	N/A	Yes	PIC-C8
16	2	R	1CC-44	Manual valve	2165-S-1319, Rev. 13	RAB	236	None		OP	OP	No	
17	2	R	1CC-152	Manual valve	2165-S-1320, Rev. 3	RAB	190	None		OP	OP	No	
18	2	21	1B-SB	RHR pump 1B-SB cooler	2165-S-1320, Rev. 3	RAB	236	S		N/A	N/A	No	
19	2	R	1CC-155	Manual valve	2165-S-1320, Rev. 3	RAB	190	None		OP	OP	No	
20	2	R	1CC-156	Manual valve	2165-S-1320, Rev. 3	RAB	236	None		OP	OP	No	
21	2	21	1B-SB	RHR heat exchanger 1B-SB	2165-S-1320, Rev. 3	RAB	236	S		N/A	N/A	No	
22	2	R	1CC-166	Manual valve	2165-S-1320, Rev. 3	RAB	236	None		OP	OP	No	
23	2	8a	1CC-167	Electric motor operated valve	2165-S-1320, Rev. 3	RAB	236	S,R		CL	OP	Yes	1B35-SB
24	2	18	1TIS-658B	RHR heat exchanger 1B-SB temp. switch	2165-S-1320, Rev. 3	RAB	236	None	24	N/A	N/A	Yes	PP-1E121
25	2	18	1FT-689	RHR heat exchanger 1B-SB flow transmitter	2165-S-1320, Rev. 3	RAB	236	None	24	N/A	N/A	Yes	PIC-C8
26	1	R	1CC-132	Manual valve	2165-S-1320, Rev. 3	RAB	190	None		OP	OP	No	
27	1	21	1A-SA	RHR pump 1A-SA cooler	2165-S-1320, Rev. 3	RAB	236	S		N/A	N/A	No	
28	1	R	1CC-135	Manual valve	2165-S-1320, Rev. 3	RAB	190	None		OP	OP	No	
29	1	R	1CC-136	Manual valve	2165-S-1320, Rev. 3	RAB	236	None		OP	OP	No	
30	1	21	1A-SA	RHR heat exchanger 1A-SA	2165-S-1320, Rev. 3	RAB	236	S		N/A	N/A	No	
31	1	R	1CC-146	Manual valve	2165-S-1320, Rev. 3	RAB	236	None		OP	OP	No	
32	1	8a	1CC-147	Electric motor operated valve	2165-S-1320, Rev. 3	RAB	236	S,R		CL	OP	Yes	1A35-SA
33	1	18	1TIS-658A	RHR heat exchanger 1A-SA temp. switch	2165-S-1320, Rev. 3	RAB	236	None	24	N/A	N/A	Yes	PP-1D121

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
34	1	18	1FT-688	RHR heat exchanger 1A-SA flow transmitter	2165-S-1320, Rev. 3	RAB	236	None	24	N/A	N/A	Yes	PIC-C7
35	1	21	1X-SAB	Component cooling water surge tank	2165-S-1319, Rev. 13	RAB	305	S		N/A	N/A	No	
36	1	R	1CC-13	Manual valve	2165-S-1319, Rev. 13	RAB	305	None		OP	OP	No	
37	1	R	1CC-12	Manual valve	2165-S-1319, Rev. 13	RAB	305	None		OP	OP	No	
38	1	18	A1-R30	Instrument rack for safe shutdown instrument	Equipment Rack	RAB	236	S		N/A	N/A	No	

System Analyst:

Service Water System

21-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	*	BAY	Emergency service water intake structure	2165-S-0547, Rev. 22	SW	262	S		N/A	N/A	No	
2	1	R	1SW-1	Manual valve	2165-S-0547, Rev. 22	SW	235	None		OP	OP	No	
3	1	R	1SW-3	Manual valve	2165-S-0547, Rev. 22	SW	242	None		OP	OP	No	
4	1	6	1A-SA	ESW vertical suction pump 1A-SA	2165-S-0547, Rev. 22	SW	262	S,R		OFF	ON	Yes	1A-SA; DP-1A; 2-6/SA
5	1	*	1A	Expansion joint 1A	2165-S-0547, Rev. 22	SW	262	S		N/A	N/A	No	
6	1	R	1SW-9	Check valve	2165-S-0547, Rev. 22	SW	249	None		N/A	N/A	No	
7	1	*	1A-SA	ESW Strainer 1A-SA	2165-S-0547, Rev. 22	SW	262	S	17	N/A	N/A	No	
8	1	R	1SW-25	Manual valve	2165-S-0547, Rev. 22	SW	242	None		OP	OP	No	
9	1	*	2A	Expansion joint 2A	2165-S-0547, Rev. 22	SW	262	S		N/A	N/A	No	
10	1	R	1SW-33	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
11	1	8a	1SW-39	Electric motor operated valve	2165-S-0547, Rev. 22	TANK	236	S,R	18	OP	CL	Yes	1A35-SA; K609A
12	1	R	1SW-2	Manual valve	2165-S-0547, Rev. 22	YARD	250	None		OP	OP	No	
13	1	R	1SW-4	Manual valve	2165-S-0547, Rev. 22	SW	242	None		OP	OP	No	
14	1	6	1B-SB	ESW vertical suction pump 1B-SB	2165-S-0547, Rev. 22	SW	262	S,R		OFF	ON	Yes	1A-SA; DP-1A; 2-6/SB
15	1	*	1B	Expansion joint 1B	2165-S-0547, Rev. 22	SW	262	S		N/A	N/A	No	
16	1	R	1SW-10	Check valve	2165-S-0547, Rev. 22	YARD	250	None		N/A	N/A	No	
17	1	*	1B-SB	ESW Strainer 1B-SB	2165-S-0547, Rev. 22	SW	262	S	17	N/A	N/A	No	
18	1	R	1SW-26	Manual valve	2165-S-0547, Rev. 22	SW	242	None		OP	OP	No	
19	1	*	2B	Expansion joint 2B	2165-S-0547, Rev. 22	SW	262	S		N/A	N/A	No	
20	1	R	1SW-34	Manual valve	2165-S-0547, Rev. 22	TANK	236	None		OP	OP	No	
21	1	8a	1SW-40	Electric motor operated valve	2165-S-0547, Rev. 22	TANK	236	S,R	18	OP	CL	Yes	1B35-SB; K609B
22	1	8a	1SW-270	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	19	CL	OP	Yes	1A35-SA; K608A
23	1	8a	1SW-271	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	19	CL	OP	Yes	1B35-SB;K608B
24	1	8a	1SW-275	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	19	OP	CL	Yes	1A35-SA;K608A
25	1	8a	1SW-276	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	19	OP	CL	Yes	1B35-SB; K608B
26	1	8a	1SW-274	Electric motor operated valve	2165-S-0547, Rev. 22	RAB	236	S,R	19	OP	CL	Yes	1A35-SA; K608A
27	1	R	1SW-50	Check valve	2165-S-0547, Rev. 22	TANK	236	None		OP	CL	No	
28	1	R	1SW-140	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
29	1	R	1SW-142	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
30	1	R	1SW-148	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
31	1	R	1SW-149	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
32	1	R	1SW-141	Check valve	2165-S-0547, Rev. 22	RAB	236	None		CL	CL/OP	No	
33	1	R	1SW-143	Check valve	2165-S-0547, Rev. 22	RAB	236	None		CL	CL/OP	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
34	1	21	1A-SA	Charging pump oil cooler	2165-S-0547, Rev. 22	RAB	236	None	20	N/A	N/A	No	
35	2	R	1SW-164	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
36	2	R	1SW-162	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
37	2	R	1SW-170	Manual valve	2165-S-0547, Rev. 22	TANK	236	None		OP	OP	No	
38	2	R	1SW-172	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
39	2	R	1SW-165	Check valve	2165-S-0547, Rev. 22	RAB	236	None		CL	CL/OP	No	
40	2	R	1SW-163	Check valve	2165-S-0547, Rev. 22	RAB	236	None		CL	CL/OP	No	
41	2	21	1B-SB	Charging pump oil cooler	2165-S-0547, Rev. 22	RAB	236	None	20	N/A	N/A	No	
42	1	R	1SW-57	Manual valve	2165-S-0547, Rev. 22	RAB	261	None		OP	OP	No	
43	1	8a	1SW-1055	Electric motor operated valve	2165-S-998S02, Rev. 12	RAB	261	S,R	21	OP	OP	No	
44	1	R	1SW-73	Manual valve	2165-S-0547, Rev. 22	RAB	261	None		OP	OP	No	
45	2	R	1SW-135	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
46	2	8a	1SW-1208	Electric motor operated valve	2168-G-499S02, Rev. 19	RAB	261	S,R	21	OP	OP	No	
47	2	R	1SW-136	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
48	1	R	1SW-58	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
49	1	R	1SW-70	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
50	2	R	1SW-256	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
51	2	R	1SW-266	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
52	1	R	1SW-175	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
53	1	R	1SW-754	Manual valve	2165-S-633S02, Rev. 8	DG	261	None		OP	OP	No	
54	1	R	1SW-770	Manual valve	2165-S-633S02, Rev. 8	DG	261	None		OP	OP	No	
55	1	R	1SW-207	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
56	2	R	1SW-176	Manual valve	2165-S-0547, Rev. 22	RAB	236	None		OP	OP	No	
57	2	R	1SW-773	Manual valve	2165-S-633S02, Rev. 8	DG	261	None		OP	OP	No	
58	2	R	1SW-789	Manual valve	2165-S-633S02, Rev. 8	DG	261	None		OP	OP	No	
59	2	R	1SW-208	Manual valve	2165-S-0547, Rev. 22	TANK	236	None		OP	OP	No	

System Analyst: [signature]

Essential Chilled Water System

21-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power, Required to Function	Required Support Systems or Components
1	1	11	1A-SA	Water chiller unit (WC-2)	2165-S-998S02, Rev. 12	RAB	261	S	11	ON	ON	Yes	1A-SA; DP-1A-SA; SW;
2	1	R	1CH-35	Manual valve	2165-S-998S02, Rev. 12	RAB	261	None		OP	OP	No	
3	1	R	1CH-23	Manual valve	2165-S-998S02, Rev. 12	RAB	261	None		OP	OP	No	
4	1	5	1A-SA-P4	Chiller water pump P4 1A-SA	2165-S-998S02, Rev. 12	RAB	261	S,R	11	ON	ON	Yes	1A2-SA; DP-1A-SA; 2-1
5	1	R	1CH-12	Manual valve	2165-S-998S02, Rev. 12	RAB	261	None		OP	OP	No	
6	1	R	1CH-252	Manual valve	2165-S-998S03, Rev. 7	RAB	236	None		OP	OP	No	
7	1	R	1CH-254	Manual valve	2165-S-998S03, Rev. 7	RAB	236	None		OP	OP	No	
8	1	8b	1CH-251	Air operated valve	2165-S-998S03, Rev. 7	RAB	236	S	12	OP	OP	No	
9	1	10	1A-SA-9	Air handling unit 9 1A-SA	2165-S-998S03, Rev. 7	RAB	236	S	11	ON	ON	Yes	1A35-SA; 94-6/SA
10	1	R	1CH-255	Manual valve	2165-S-998S03, Rev. 7	RAB	236	None		OP	OP	No	
11	1	R	1CH-256	Manual valve	2165-S-998S03, Rev. 7	RAB	236	None		OP	OP	No	
12	1	R	1CH-253	Manual valve	2165-S-998S03, Rev. 7	RAB	236	None		OP	OP	No	
13	1	R	1CH-613	Manual valve	2165-S-999S03, Rev. 6	RAB	236	None		OP	OP	No	
14	1	8b	1CH-616	Air operated valve	2165-S-999S03, Rev. 6	RAB	236	S	12	OP	OP	No	
15	1	10	1B-SB-9	Air handling unit 9 1B-SB	2165-S-999S03, Rev. 6	RAB	236	S		OFF	ON	Yes	1B31-SB; 94-6/SB
16	1	R	1CH-624	Manual valve	2165-S-999S03, Rev. 6	RAB	236	None		OP	OP	No	
17	1	R	1CH-620	Manual valve	2165-S-999S03, Rev. 6	RAB	236	None		OP	OP	No	
18	1	11	1B-SB	Water chiller unit (WC-2)	2168-G-499S02, Rev. 19	RAB	261	S		OFF	ON	Yes	1B-SB, DP-1B-SB; SW;
19	1	R	1CH-79	Manual valve	2168-G-499S02, Rev. 19	RAB	261	None		OP	OP	No	
20	1	R	1CH-67	Manual valve	2168-G-499S02, Rev. 19	RAB	261	None		OP	OP	No	
21	1	5	1B-SB-P4	Chiller water pump P4 1B-SB	2168-G-499S02, Rev. 19	RAB	261	S,R		OFF	ON	Yes	1B2-SB; DP-1B-SB; 2-1
22	1	R	1CH-56	Manual valve	2168-G-499S02, Rev. 19	RAB	261	None		OP	OP	No	
23	1	R	1CH-612	Manual valve	2165-S-999S03, Rev. 6	RAB	236	None		OP	OP	No	
24	1	18	1FS-9429A1	Chiller flow switch FS-9429A1	2165-S-998S02, Rev. 12	RAB	305	S,R		N/A	N/A	Yes	PIC-C13
25	2	18	1FS-9429B1	Chiller flow switch FS-9429B1	2168-G-499S02, Rev. 19	RAB	286	S,R		N/A	N/A	Yes	PIC-C14
26	2	10	1B-SB-15	Air handling unit 15 1B-SB	2165-S-999S03, Rev. 6	RAB	305	S		OFF	ON	Yes	1B31-SB; 94-6/SB
27	2	8b	1CH-703	Air operated valve	2165-S-999S03, Rev. 6	RAB	305	S,R	12	OP	OP	No	
28	1	10	1A-SA-16	Air handling unit 16 1A-SA	2165-S-998S03, Rev. 7	RAB	305	S	11	ON	ON	Yes	1A35-SA; 94-6/SA
29	1	8b	1CH-343	Air operated valve	2165-S-998S03, Rev. 7	RAB	305	S,R	12	OP	OP	No	
30	1	18	FT-9429A	Chiller low flow transmitter FT-9429A	2165-S-998S02, Rev. 12	RAB	305	S,R		N/A	N/A	Yes	PIC-C13
31	1	18	FT-9429B	Chiller low flow transmitter FT-9429B	2168-G-499S02, Rev. 19	RAB	305	S,R		N/A	N/A	Yes	PIC-C14
32	1	18	PIC-CAB-9	Panel for safe-shutdown instrumentation	1364-47236S01	RAB	305	S		N/A	N/A	Yes	IDP-1A-SII
33	1	18	PIC-CAB-10	Panel for safe-shutdown instrumentation	1364-47241S01	RAB	305	S		N/A	N/A	Yes	IDP-1B-SII

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
34	2	18	PIC-CAB-13	Panel for safe-shutdown instrumentation	1364-47243S01	RAB	305	S		N/A	N/A	Yes	IDP-1A-SIII
35	2	18	PIC-CAB-14	Panel for safe-shutdown instrumentation	1364-47238S01	RAB	305	S		N/A	N/A	Yes	IDP-1B-SIV
36	2	18	PIC-CAB-18	Panel for safe-shutdown instrumentation	1364-92080S01	RAB	286	S,R		N/A	N/A	Yes	IDP-1B-SII
37	2	R	1CH-619	Manual valve	2165-S-999S03, Rev. 6	RAB	236	None		OP	OP	No	
38	1	R	1CH-345	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
39	1	R	1CH-350	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
40	1	R	1CH-347	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
41	1	R	1CH-349	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
42	1	R	1CH-346	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
43	1	R	1CH-348	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
44	1	R	1CH-344	Manual valve	2165-S-998S03, Rev. 7	RAB	305	None		OP	OP	No	
45	2	R	1CH-711	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
46	2	R	1CH-715	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
47	2	R	1CH-717	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
48	2	R	1CH-706	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
49	2	R	1CH-708	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
50	2	R	1CH-700	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	
51	2	R	1CH-699	Manual valve	2165-S-999S03, Rev. 6	RAB	305	None		OP	OP	No	

System Analyst: Rkhmmtt

DC Power System/120 Vital AC

31-Aug-94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	15	1A-SA	Vital batteries in rack (1A-SA)	2166-G-042S01, Rev. 14	RAB	286	S		N/A	N/A	No	
2	1	16	1A-SA	Solid state battery charger (1A-SA)	2166-G-042S01, Rev. 14	RAB	286	S,R		N/A	N/A	Yes	1A21-SA
3	1	14	DP1A-SA	Distribution panel for vital DC 1A-SA	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
4	1	14	DP1A1-SA	Distribution panel for vital DC 1A1-SA	2166-G-042S01, Rev. 14	DG	261	S,R	13	N/A	N/A	No	
5	1	14	DP1A2-SA	Distribution panel for vital DC 1A2-SA	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
6	2	15	1B-SB	Vital batteries in rack (1B-SB)	2166-G-042S01, Rev. 14	RAB	286	S		N/A	N/A	No	
7	2	16	1B-SB	Solid state battery charger (1B-SB)	2166-G-042S01, Rev. 14	RAB	286	S,R		N/A	N/A	Yes	1B21-SB
8	2	14	DP1B-SB	Distribution panel for vital DC 1B-SB	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
9	2	14	DP1B1-SB	Distribution panel for vital DC 1B1-SB	2166-G-042S01, Rev. 14	DG	261	S,R	13	N/A	N/A	No	
10	2	14	DP1B2-SB	Distribution panel for vital DC 1B2-SB	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
11	1	16	CH I	7.5 kVA inverter channel I	2166-G-042S01, Rev. 14	RAB	305	S,R		N/A	N/A	Yes	1A21-A; DP1A-A
12	2	16	CH II	7.5 kVA inverter channel II	2166-G-042S01, Rev. 14	RAB	305	S,R		N/A	N/A	Yes	1A31-A; DP1A-B
13	1	16	CH III	7.5 kVA inverter channel III	2166-G-042S01, Rev. 14	RAB	305	S,R		N/A	N/A	Yes	1B21-A; DP1B-A
14	2	16	CH IV	7.5 kVA inverter channel IV	2166-G-042S01, Rev. 14	RAB	305	S,R		N/A	N/A	Yes	1B31-A; DP1B-B
15	1	14	IDP-1A-SI	120 Vac instrument panel channel I	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
16	2	14	IDP-1B-SII	120 Vac instrument panel channel II	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
17	1	14	IDP-1A-SIII	120 Vac instrument panel channel III	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
18	2	14	IDP-1B-SIV	120 Vac instrument panel channel IV	2166-G-042S01, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	

System Analyst: R. Schmitt

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Appendix B
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AC Power System

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System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	3	1A-SA	6.9KV switchgear 1A-SA	2166-G-030, Rev. 12	RAB	286	S,R		N/A	N/A	Yes	EDG 1A-SA
2	1	4	1A3-SA	Stepdown transformer 6.9KV to 480V	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
3	1	4	1A2-SA	Stepdown transformer 6.9KV to 480V	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
4	1	2	1A2-SA	Low voltage switchgear 1A2-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
5	1	2	1A3-SA	Low voltage switchgear 1A3-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
6	1	1	1A32-SA	Motor control center 1A32-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
7	1	1	1A23-SA	Motor control center 1A23-SA	2166-G-030, Rev. 12	DG	261	S,R	13	N/A	N/A	No	
8	1	1	1A21-SA	Motor control center 1A21-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
9	1	1	1A34-SA	Motor control center 1A34-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
10	1	1	1A35-SA	Motor control center 1A35-SA	2166-G-030, Rev. 12	RAB	261	S,R	13	N/A	N/A	No	
11	1	1	1A36-SA	Motor control center 1A36-SA	2166-G-030, Rev. 12	RAB	305	S,R	13	N/A	N/A	No	
12	1	1	1A31-SA	Motor control center 1A31-SA	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
13	1	14	PP-1A211-SA	208/120 distribution panel	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
14	1	14	PP-1A311-SA	208/120 distribution panel	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
15	1	4	PP-1A211-SA	Stepdown transformer	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
16	1	4	PP-1A311-SA	Stepdown transformer	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
17	1	3	1B-SB	6.9KV switchgear 1B-SB	2166-G-030, Rev. 12	RAB	286	S,R		N/A	N/A	Yes	EDG 1B-SB
18	1	4	1B3-SB	Stepdown transformer 6.9KV to 480V	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
19	1	4	1B2-SB	Stepdown transformer 6.9KV to 480V	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
20	1	2	1B2-SB	Low voltage switchgear 1B2-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
21	1	2	1B3-SB	Low voltage switchgear 1B3-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
22	1	1	1B32-SB	Motor control center 1B32-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
23	1	1	1B23-SB	Motor control center 1B23-SB	2166-G-030, Rev. 12	DG	261	S,R	13	N/A	N/A	No	
24	1	1	1B21-SB	Motor control center 1B21-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
25	1	1	1B34-SB	Motor control center 1B34-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
26	1	1	1B35-SB	Motor control center 1B35-SB	2166-G-030, Rev. 12	RAB	261	S,R	13	N/A	N/A	No	
27	1	1	1B36-SB	Motor control center 1B36-SB	2166-G-030, Rev. 12	RAB	305	S,R	13	N/A	N/A	No	
28	1	17	1A-SA	Diesel Generator 1A-SA	2166-G-030, Rev. 12	DG	263	S,R		OFF	ON	Yes	DP-1A1-SA
29	1	1	1B31-SB	Motor control center 1B31-SB	2166-G-030, Rev. 12	RAB	286	S,R	13	N/A	N/A	No	
30	1	14	PP-1B211-SB	208/120 distribution panel	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
31	1	14	PP-1B311-SB	208/120 distribution panel	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
32	1	4	PP-1B211-SB	Stepdown transformer	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	
33	1	4	PP-1B311-SB	Stepdown transformer	2166-G-042501, Rev. 14	RAB	286	S,R	13	N/A	N/A	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
34	1	17	1B-SB	Diesel Generator 1B-SB	2166-G-030, Rev. 8	DG	263	S,R		OFF	ON	Yes	DP-1B1-SB
35	1	9	1A-SA	Diesel Generator Fan E-86 (1A-SA)	2168-G-548, Rev. 9	DG	263	S,R		OFF	ON	Yes	1A23-SA; DP-1A-SA
36	1	9	1B-SA	Diesel Generator Fan E-86 (1B-SA)	2168-G-548, Rev. 9	DG	263	S,R		OFF	ON	Yes	1A23-SA; DP-1A-SA
37	1	9	1C-SB	Diesel Generator Fan E-86 (1C-SB)	2168-G-548, Rev. 9	DG	263	S,R		OFF	ON	Yes	1B23-SB; DP-1B-SB
38	1	9	1D-SB	Diesel Generator Fan E-86 (1D-SB)	2168-G-548, Rev. 9	DG	263	S,R		OFF	ON	Yes	1B23-SB; DP-1B-SB
39	1	18	TE 6903A	Temperature controller	2166-B-401 sh 3261, Re	DG	263	S,R		N/A	N/A	Yes	PIC-C13
40	1	18	TE 6903B	Temperature controller	2166-B-401 sh 3272, Re	DG	263	S,R		N/A	N/A	Yes	PIC-C14
41	1	21	1A	Main fuel oil storage tank 1A	2165-S-0563, Rev. 6	FO	242	S		N/A	N/A	No	
42	1	21	1B	Main fuel oil storage tank 1B	2165-S-0563, Rev. 6	FO	242	S		N/A	N/A	No	
43	1	R	1DFO-162	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
44	1	R	1DFO-164	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
45	1	5	1A-SA	Fuel oil transfer pump	2165-S-0563, Rev. 6	FO	242	S,R		OFF	ON	Yes	1A35-SA
46	1	R	1DFO-168	Check valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
47	1	R	1DFO-169	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
48	1	8b	1DFO-173	Solenoid operated valve	2165-S-633S03, Rev. 5	DG	263	S,R	14	N/A	N/A	No	
49	1	21	1A-SA	Diesel generator fuel oil day tank	2165-S-633S03, Rev. 5	DG	263	S		N/A	N/A	No	
50	1	R	1DFO-175	Manual valve	2165-S-633S03, Rev. 5	DG	263	None		N/A	N/A	No	
51	1	18	LS-2463A-SA	Day tank level switch L/II	2165-S-633S03, Rev. 5	DG	263	S,R	15	N/A	N/A	No	
52	1	18	LS-2464A-SA	Day tank level switch HH	2165-S-633S03, Rev. 5	DG	263	S,R	15	N/A	N/A	No	
53	1	21	1A-SA	Diesel generator 1A-SA jacket water cooler	2165-S-633S02, Rev. 8	DG	263	S		N/A	N/A	No	SW
54	1	21	1A-SA	Diesel generator 1A-SA lube oil cooler	2165-S-633S02, Rev. 8	DG	263	S		N/A	N/A	No	SW
55	1	R	1DFO-180	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
56	1	R	1DFO-182	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
57	1	5	1B-SB	Fuel oil transfer pump	2165-S-0563, Rev. 6	FO	242	S,R		OFF	ON	Yes	1B35-SB
58	1	R	1DFO-186	Check valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
59	1	R	1DFO-187	Manual valve	2165-S-0563, Rev. 6	FO	242	None		N/A	N/A	No	
60	1	21	1B-SB	Diesel generator 1B-SB lube oil cooler	2165-S-633S02, Rev. 8	DG	263	S		N/A	N/A	No	SW
61	1	8b	1DFO-191	Solenoid operated valve	2165-S-633S03, Rev. 5	DG	263	S,R	16	N/A	N/A	No	
62	1	21	1B-SB	Diesel generator fuel oil day tank	2165-S-633S03, Rev. 5	DG	263	S		N/A	N/A	No	
63	1	R	1DFO-193	Manual valve	2165-S-633S03, Rev. 5	DG	263	None		N/A	N/A	No	
64	1	18	LS-2463B-SB	Day tank level switch L/II	2165-S-633S03, Rev. 5	DG	263	S,R	15	N/A	N/A	No	
65	1	18	LS-2464B-SB	Day tank level switch HH	2165-S-633S03, Rev. 5	DG	263	S,R	15	N/A	N/A	No	
66	1	21	1B-SB	Diesel generator 1B-SB jacket water cooler	2165-S-633S02, Rev. 8	DG	263	S		N/A	N/A	No	SW
67	1	21	1A-SA	Diesel starting air tank 1A-SA	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
68	1	21	1B-SA	Diesel starting air tank 1B-SA	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
69	2	21	1C-SB	Diesel starting air tank 1C-SB	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
70	2	21	1D-SB	Diesel starting air tank 1D-SB	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
71	1	12	1A-NNS	Diesel starting air compressor 1A-NNS	2165-S-633S04, Rev. 13	DG	261	S,R		OFF	ON	Yes	1A23-SA
72	1	12	1B-NNS	Diesel starting air compressor 1B-NNS	2165-S-633S04, Rev. 13	DG	261	S,R		OFF	ON	Yes	1A23-SA
73	2	12	1C-NNS	Diesel starting air compressor 1C-NNS	2165-S-633S04, Rev. 13	DG	261	S,R		OFF	ON	Yes	1B23-SB
74	2	12	1D-NNS	Diesel starting air compressor 1D-NNS	2165-S-633S04, Rev. 13	DG	261	S,R		OFF	ON	Yes	1B23-SB
75	1	21	1A-NNS	Diesel starting air separator 1A-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
76	1	21	1B-NNS	Diesel starting air separator 1B-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
77	2	21	1C-NNS	Diesel starting air separator 1C-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
78	1	21	1D-NNS	Diesel starting air separator 1D-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
79	1	14	1A-SA	1DG-E036 DG A control panel	2166-B-401/sh 1995	DG	261	S,R	13	N/A	N/A	Yes	
80	1	14	1B-SB	1DG-E037 DG B control panel	2166-B-401/sh 2008	DG	261	S,R	13	N/A	N/A	Yes	
81	1	14	1A-SA	1DG-E034 DG A engine control panel	2166-B-401/sh 1998, Re	DG	261	S,R	13	N/A	N/A	Yes	
82	1	14	1B-SB	1DG-E035 DG B engine control panel	2166-B-401/sh 2009, Re	DG	261	S,R	13	N/A	N/A	Yes	
83	1	R	1EA-4	Check valve	2165-S-633S04, Rev. 13	DG	261	None		CL	OP	No	
84	1	R	1EA-5	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
85	1	R	1EA-12	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
86	1	8b	1EA-14	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
87	1	8b	1EA-15	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
88	1	R	1EA-19	Check valve	2165-S-633S04, Rev. 13	DG	261	None		CL	OP	No	
89	1	R	1EA-20	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
90	1	R	1EA-27	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
91	1	8b	1EA-29	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
92	1	8b	1EA-30	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
93	2	R	1EA-35	Check valve	2165-S-633S04, Rev. 13	DG	261	None		CL	OP	No	
94	2	R	1EA-36	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
95	2	R	1EA-43	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
96	2	8b	1EA-45	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
97	2	8b	1EA-46	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
98	2	R	1EA-50	Check valve	2165-S-633S04, Rev. 13	DG	261	None		CL	OP	No	
99	2	R	1EA-51	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
100	2	R	1EA-58	Manual valve	2165-S-633S04, Rev. 13	DG	261	None		OP	OP	No	
101	2	8b	1EA-60	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
102	2	8b	1EA-61	Solenoid valve	2165-S-633S04, Rev. 13	DG	261	None	23	CL	OP	No	
103	1	21	1A-NNS	Diesel starting air dryer 1A-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
104	1	21	1B-NNS	Diesel starting air dryer 1B-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
105	2	21	1C-NNS	Diesel starting air dryer 1C-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	
106	2	21	1D-NNS	Diesel starting air dryer 1D-NNS	2165-S-633S04, Rev. 13	DG	261	S		N/A	N/A	No	

System Analyst: R. Shummet

Relay Panel

21 Aug 94

System Line Number	System Train	Equipment Class	Equipment ID/Tag	Equipment Description	Reference Drawing, Revision	Building Location	Floor Elevation	Evaluation Type	Notes	Normal Equipment State	Desired Equipment State	Power Required to Function	Required Support Systems or Components
1	1	14	1B2	Isolation cabinet 1B2	2166-B-401-S1470	RAB	305	S,R	22	N/A	N/A	No	
2	1	14	1B1	Isolation cabinet 1B1	2166-B-401-S1470	RAB	305	S,R	22	N/A	N/A	No	
3	1	14	1A2	Isolation cabinet 1A2	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
4	1	14	1A1	Isolation cabinet 1A1	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
5	2	18	SSPST CAB B	Solid state protection test cabinet B	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
6	1	18	SSPS-CAB B	Solid state protection cabinet B	2166-B-401S0037	RAB	305	S,R	22	N/A	N/A	No	
7	1	18	SSPST CAB A	Solid state protection test cabinet A	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
8	2	14	2A1	Isolation cabinet 2A1	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
9	1	18	ARP-1A	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
10	1	18	ARP-19A	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
11	1	18	ARP-2A	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
12	1	18	ARP-3A	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
13	1	18	SSPS-CAB A	Solid state protection cabinet A	2165-S-0553S03	RAB	305	S,R	22	N/A	N/A	No	
14	1	18	ARP-4A	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
15	1	14	3A1	Isolation cabinet 3A1	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
16	2	18	ARP-19B	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
17	2	18	ARP-4B	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
18	2	18	ARP-3B	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
19	2	18	ARP-2B	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
20	2	18	ARP-1B	Auxiliary relay panel	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
21	1,2	18	MCB	Main control board	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
22	2	14	2B2	Isolation cabinet 2B2	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
23	1	14	3A2	Isolation cabinet 3A2	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
24	2	14	2B1	Isolation cabinet 2B1	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	
25	2	14	2A2	Isolation cabinet 2A2	2166-G-0324	RAB	305	S,R	22	N/A	N/A	No	

System Analyst: [signature]

Notes on SSEL Tables

1. Power not required since valves are designed to fail as is on a loss of power
2. Service water source required for long term AFW water source
3. Loss of function or power will result in pump trip
4. Level transmitters provide operators with RWST level information
5. Valves are manually operated for high head recirculation
6. Non-vital power supply. Loss of instrument results in swap to RWST.
7. Spurious opening of these valves could dump the RWST inventory into containment
8. Non-vital power supply. Local instrumentation available.
9. The solenoid control valves associated with the PORVs are included. Air supply is supplied by accumulators and no additional air supply is required.
10. Selected based on plant operations review
11. Train A is assumed to be operating but will need to restart following loss of offsite power.
12. Air-operated valves fail open to allow flow to cooler. Spurious operation of valve controller could close valve.
13. Power is required but is addressed by other components
14. Valve fails open on a loss of power and is normally open
15. Level switch power supply is addressed by other equipment
16. Valve fails open on a loss of power and is normally open
17. Strainer is assumed not to require power over 72 hours to maintain function
18. Although not required if both pumps start, isolation is assumed to be required
19. Although swapover to the auxiliary source is not strictly required, it is assumed to be necessary
20. Charging pump cooler is considered a part of the charging pump (rule of the box)
21. Spurious operation of valve could isolate air handling unit coolers
22. Panels contain essential relays
23. Considered a part of the diesel generator
24. Instrumentation for information only

RSC 95-01

Shearon Harris Nuclear Power Plant Success Path Logic Diagram and Supporting Information Development

Addendum 1 to Report RSC 94-01

Revision 0

February 1995

Principle Analyst

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AD.1 Background

The success path logic diagram and safe shutdown equipment list developed for Shearon Harris was reviewed . This addendum documents the resolution of peer review comments provided by VECTRA Technologies on revision 1 of the SSEL report[2]. The peer review generated 19 comments on the report with two of these requiring follow-up actions. The two comments are presented in this addendum along with their resolution.

AD.2 Resolution to Peer Review Comment #3

Peer review comment #3 states:

> "Table 1-1. The dependencies between HVAC systems and the systems they support is not clear (i.e., is HVAC required for any system or plant area other than the Control Room?). The table indicates that HVAC is required for the Control Room [CR] and Charging/Safety Injection (CSI). However, on page 3 of the document, no mention of CR or CSI HVAC is made under support systems evaluated by this report. This discrepancy should be cleaned up".

A review of the document (Reference 1) identified that the information on page 3 had omitted the need for control room HVAC. The requirement for CSI pump room cooling was included in the referenced material. The support system success path logic requires that HVAC be available to both the control room and to the Charging/Safety Injection pump rooms. In addition, HVAC cooling for the emergency diesel generators is also required. The support systems required in the SSEL are:

- Safety-related ac power (including the diesel generators
- Safety-related dc power (including 120 Vac)
- HVAC cooling for CSIPs, control room, and diesel generators
- Emergency service water
- Component cooling water
- Essential chilled water

AD.3 Resolution to Peer Review Comment #18

Peer review comment #18 states:

> A path for feeding the "C" steam generator from either of the motor driven auxiliary feedwater pumps appears to have been excluded from the shutdown path. Is there any reason for this?

An examination of the safe shutdown equipment listing (Appendix B, page B-1 through B-3, Reference 1), identified that this path was inadvertently omitted. The path, shown in Figure AD-1, provides auxiliary feedwater to the steam generators from either auxiliary feedwater motor-driven pump.

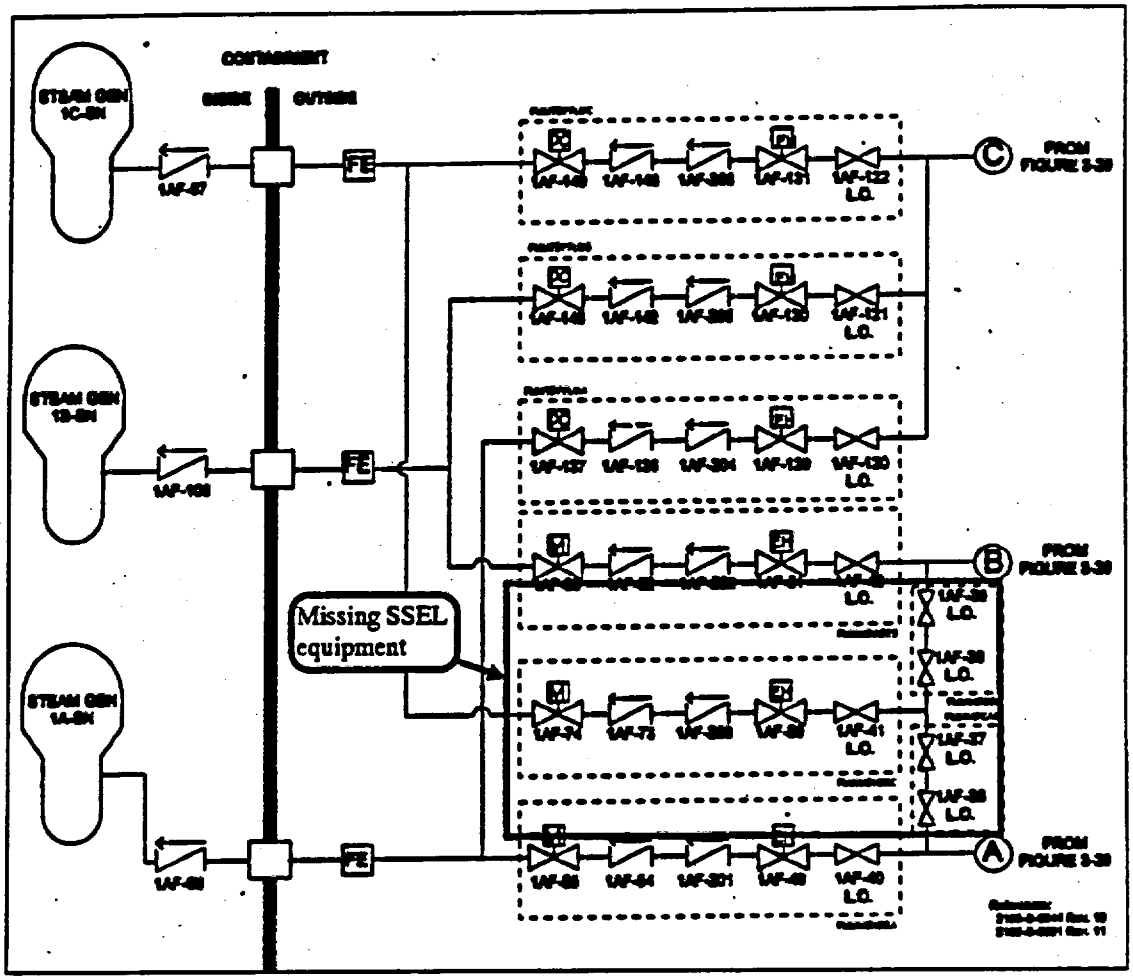

Figure AD-1. Simplified Illustration of the Auxiliary Feedwater System Discharge Piping (Reproduced from Reference 3)

The inclusion of this path requires the addition of the following components to the equipment list that will require examination:

- Motor-operated valve 1AF-74
- Electric-hydraulic valve 1AF-50

Additionally, other rugged valves are added to the equipment listing for completeness and do not require examination. These valves are:

- Check valves 1AF-73, 1AF-203
- Locked-open manual valves 1AF-41, 1AF-36, 1AF-37, 1AF-38, 1AF-39

The required information for the valves is provided in Table AD-1. This additional information is included in a revision to the SSEL database.

Table AD-1
SSEL Parameters for Identified Valves

Parameter	1AF-74	1AF-50	1AF-41[1]	1AF-73	1AF-203
System Line Number	86	87	88, 89, 90, 91, 92	93	94
System Train	1,2	1,2	1,2	1,2	1,2
Equipment Class	8a	7	R	R	R
Equipment Description	Electric motor operated valve	Electric hydraulic valve	Manual valve	Check valve	Check valve
Reference Drawing, Revision	2165-S-0544, Rev. 20	2165-S-0544, Rev. 20	2165-S-0544, Rev. 20	2165-S-0544, Rev. 20	2165-S-0544, Rev. 20
Building Location	RAB	RAB	RAB	RAB	RAB
Floor Elevation	261	261	261	261	261
Evaluation Type	S,R	S,R	None	None	None
Notes	1	1			
Normal Equipment State	OP	OP	OP	CL	CL
Desired Equipment State	OP	OP	OP	CL/OP	CL/OP
Power Required to Function	No	No	No	No	No
Required Support Systems or Components					

1. The entry for 1AF-41 is representative of all locked-open manual valves added to the SSEL in response to the peer review.

AD.4 References

1. Correspondence from Charbel M. Abou-Jaoude, VETRA Technologies to Mr. Ronald L. Knott, Carolina Power and Light Company dated December 30, 1994.

2. Summitt, Ricky, Shearon Harris Nuclear Power Plant Success Path Logic Diagram and Supporting Information Development, Revision 1, Ricky Summitt Consulting, RSC 94-01, August 1994.

3. Oliver, Rudy, et. al, Shearon Harris Nuclear Power Plant Individual Plant Examination, Carolina Power and Light Company, August 1993.

APPENDIX C

IN-STRUCTURE RESPONSE SPECTRA

EQE CALCULATION 52214-C-001, REVISION 0

EQE
ENGINEERING CONSULTANTS

CALCULATION COVER SHEET

Calculation No: 52214-C-001

Project: CP & L SHEARON HARRIS - SPECTRA

Calculation Title: CP & L SHEARON HARRIS: SCALING OF IN-STRUCTURE SPECTRA FOR SEISMIC IPEEE

References: SEE SECTION 4

Attachments: NONE

Total Number of Pages (Including Cover Sheet): 17

Revision Number	Approval Date	Description of Revision	Originator	Checker	Approver
0	8/6/93	ORIGINAL ISSUES	SL	LWT	[illegible]

12312-01/Coversht (7/91)

EQE ENGINEERING

SHEET NO. 2/1

JOB NO. 52214 JOB CP&L SHEARON HARRIS - SPECTRA BY SL DATE 7/25

CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D LVJT DATE 7/23

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SECTION 1. INTRODUCTION

To support the seismic IPEEE program at the Shearon Harris Nuclear Power Plant (SHNPP) of Carolina Power & Light Company (CPL), the licensing basis in-structure response spectra for structures housing the success path equipment are scaled to yield the median-centered spectra. The following structures are included in this study:

Reactor Auxiliary Building (RAB) - Common,
Reactor Auxiliary Building - Unit 1,
Containment Inner Structure (CIS), and
Diesel Generator Building (DG).

For the seismic IPEEE program, the Review Level Earthquake (RLE) is defined as the NUREG/CR-0098 [2] median spectral shape anchored to *0.30g*. The median structural damping is recommended to be *7%* for median-centered response analyses [3]. For the evaluation of components and subsystems, higher in-structure seismic demands (response spectra) are required to account for the increase of the RLE ground response spectrum over the Design Basis Earthquake (DBE) ground spectrum.

SHNPP is a relatively modern plant with all Seismic Category I structures founded on rock (shear wave velocity $V_S = 5600\ fps$) [4]. The major structures were modeled as sticks with lumped masses and stiffnesses in both the horizontal and vertical directions. For the above listed structures, torsional effects were considered insignificant, so the horizontal models did not include any torsional coupling [4]. In the vertical stick models, the slab flexibility was accounted for. In summary, structural modeling is in accordance with the current analysis practice. Soil springs were included in the original structure models. Damping value of *7%* was assumed for the structures and soil springs at the DBE excitation level.

For design analysis, the DBE ground spectra were the R.G.1.60 [1] spectra anchored to *0.15g* except for dams and dikes. The seismic motions were applied at foundation level. The floor response spectra were developed in accordance with R.G. 1.122 [7] with the peaks broadened *±15%*. Therefore, the original analysis models [4] used to generate the existing in-structure response spectra are qualitatively considered adequate, so are the response spectra [5].

EQE ENGINEERING

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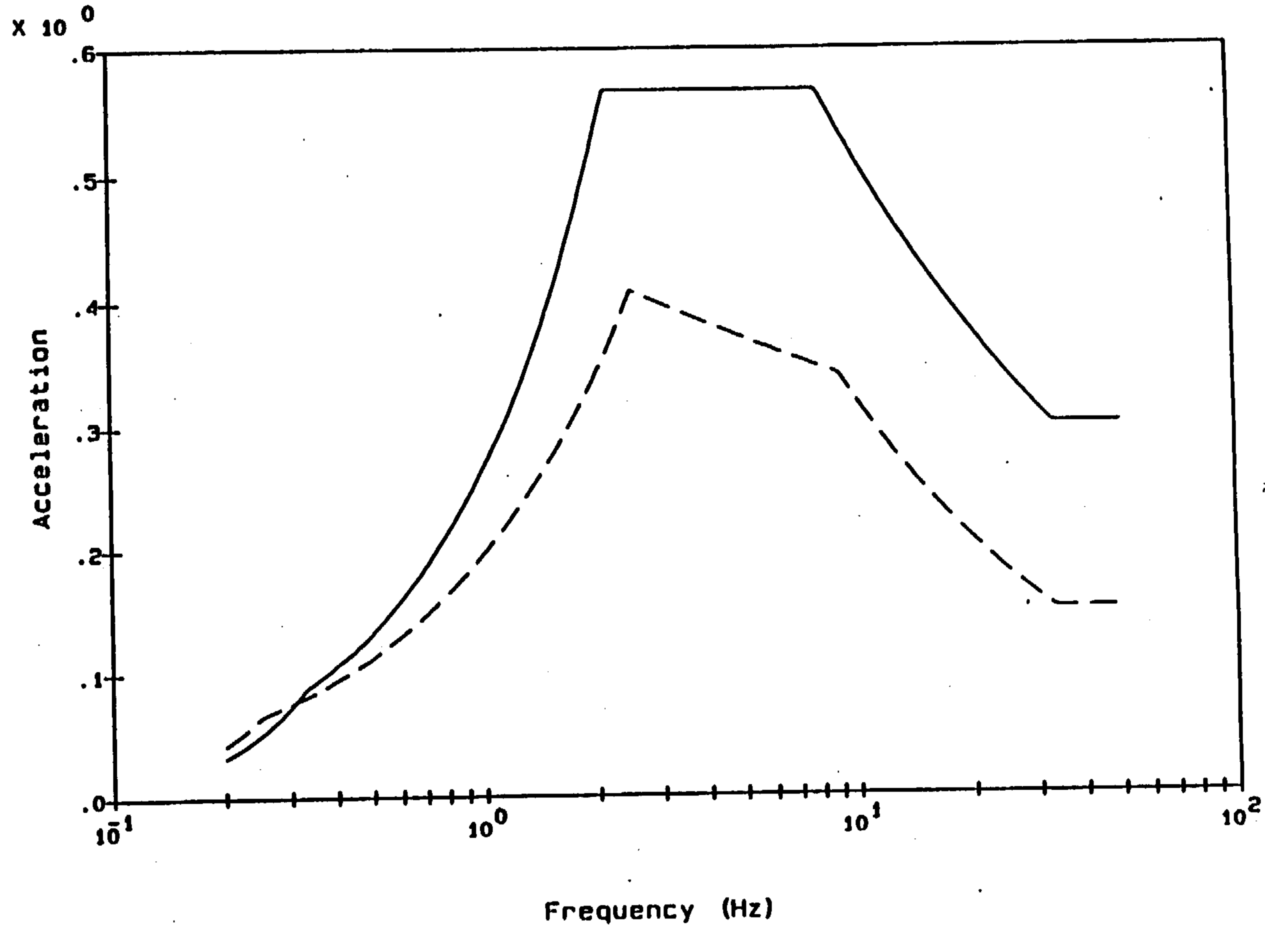
For comparison, the RLE and DBE ground spectrum, both at 7% damping, are overploted in Figures 1-1 and 1-2 for the horizontal and vertical directions, respectively. The RLE and DBE ground spectra are digitized in Tables 3-4 and 3-5.

The original analysis conforms to the Standand Review Plan (SRP), and the in-structure response spectra may be designated as "conservative design spectra" per GIP terminology [6]. The direct scaling approach recommended in NP-6041 [3] is considered appropriate for the rock founded structures. Therefore, the licensing basis floor response spectra are scaled to develop the realistic median-centered spectra for seismic margin purposes.



Legend:

Median CR0098, Rock ————

R.G.- 1.60 (DBE) — — — —

Notes:

Acceleration in g's

Spectral acceleration at D=0.07

Fig. 1-1 Comparison of SHNPP Horizontal Ground Spectra
DBE vs Review Level Earthquake Ground Spectrum

horiz.plt

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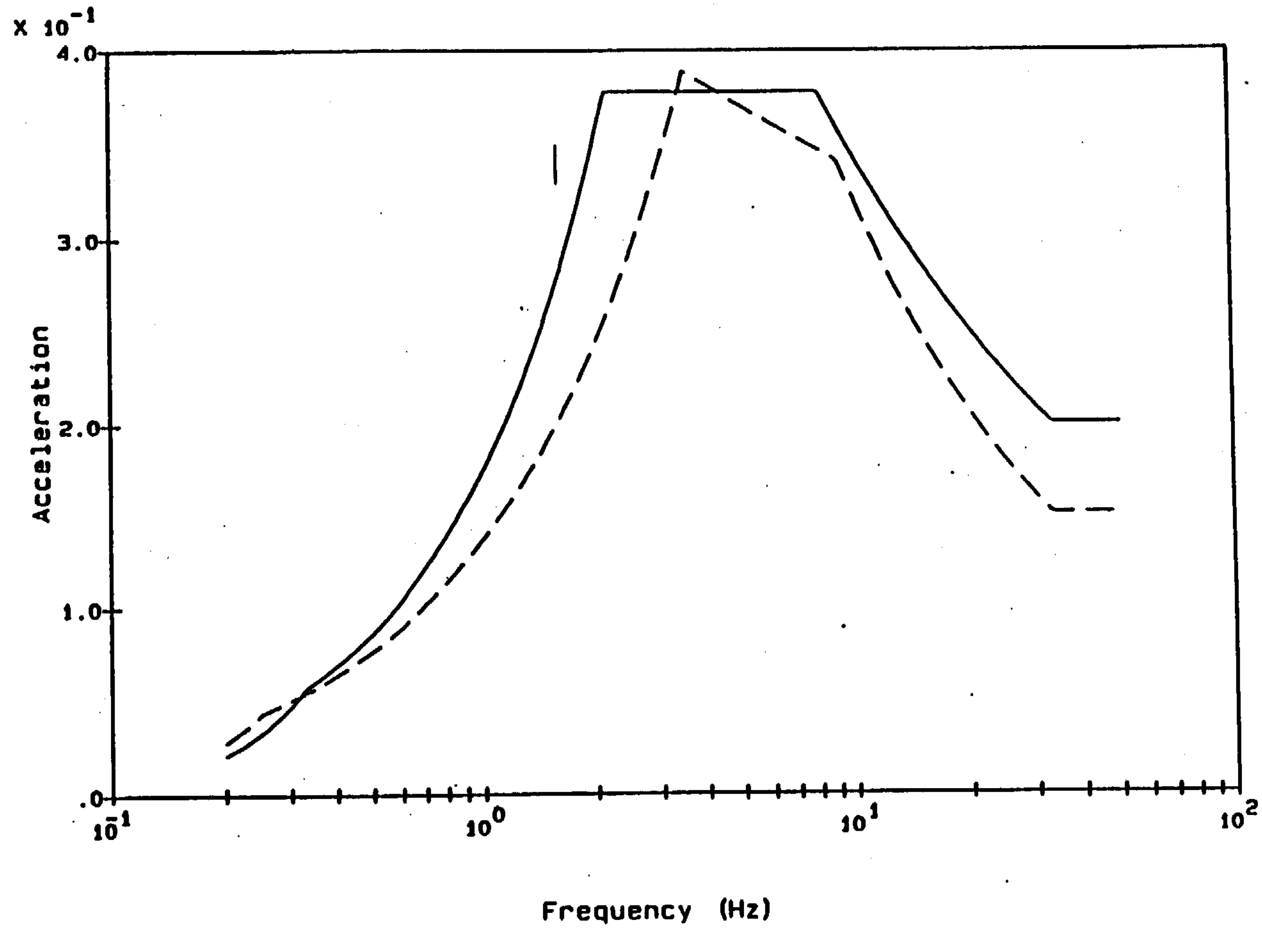

Legend:

Median CR0098, Rock ————

R.G.- 1.60 (DBE) — — — —

Notes:

Acceleration in g's

Spectral acceleration at D=0.07

Fig. 1-2 Comparison of SHNPP Vertical Ground Spectra
DBE vs Review Level Earthquake Ground Spectrum

vert.plt

SECTION 2. METHODOLOGY

This effort focuses on estimating realistic median-centered *5%* damped ZPA and spectral peaks, rather than the complete spectral shape. The median-centered in-structure spectral peaks and ZPA's applicable to a seismic margin assessment are developed by scaling the existing spectra to account for the increased seismic demand of the RLE over the DBE.

The rationale and details of this approach are discussed in the EPRI NP-6041 report [3]. The NP-6041 report considers the CR-0098 median spectral shape and the R.G.1.60 ground response spectra to be similar in shape. Therefore, an acceptable method to scale the existing in-structure spectra for this rock site is to retain the original floor spectral shape, but scale the floor ZPA up for the RLE. For SHNPP the scale factor is obtained by comparing the *7%* damped RLE ground spectrum to the *7%* damped DBE ground spectrum. It is observed from the modal participation data and response spectra plots [4 & 5] that the in-structure responses for SHNPP structures have a dominant mode. Therefore the scale factor for a single mode structure can be estimated by direct comparison of the RLE ground spectrum to the DBE ground spectrum at the fundamental frequency of the structure.

The information available to EQE is the CPL SHNPP FSAR [4] containing the dynamic characteristics of three of the four structures of interest, and SHNPP *4%* and *7%* damped response spectrum plots [5]. Also available are the ASME Code Case N-411 spectra. These N-411 spectra have 5% damping below *10 Hz*, a linear reduction from *5%* to *2%* damping between *10 Hz* and *20 Hz*, and *2%* above *20 Hz*. The available N-411 spectra cover only the frequency range between *6 Hz* to *44 Hz*.

To estimate median-centered peak floor spectral acceleration with the preferred *5%* damping, the N-411 spectra were used for structures with fundamental frequencies above *6 Hz*, which include the RAB-Common, RAB-Unit 1, and CIS. For structures with dominant frequencies below *6 Hz* (i.e., the RAB-Unit 1 in the E-W direction), the information on spectral peaks were lost. Also N-411 spectra were not available for the Diesel Generator Building and for Elevations 226' and 206' in the N-S direction in the Reactor Auxiliary Building - Unit 1. In such cases, the more conservative *4%* damped response spectra were used to estimate the spectral peaks.

SECTION 3. RESULT PRESENTATION

The fundamental frequencies of the structures of interest are extracted from SHNPP FSAR [4], and they are listed in Table 3-1. Also shown in the tables are the corresponding digitized *7%* damped RLE and DBE ground spectral accelerations (see Tables 3-4 and 3-5). The scale factors for the structures in each direction are obtained from the ratios of the RLE and DBE accelerations. The in-structure spectral peaks and ZPA's for DBE are tabulated in Table 3-2. The scaled median-centered in-structure spectral accelerations corresponding to an RLE ground input are provided in Table 3-3.

The major sources of conservatism in this study include the following:

1) The estimated spectral peaks shown in Table 3-3 were effectively scaled from *5%* damped DBE floor spectra with some exceptions. Due to the unavailability of *5%* damped floor spectra, the spectral peaks for the following locations and directions were scaled from the *4%* damped floor spectra:

   - RAB-Unit 1 Elevations 226' and 206' in the N-S direction and all elevations in the E-W direction, and

   - All elevations of the DG building in the horizontal and vertical directions.

2) In the vertical direction, the RAB-Common, RAB-Unit 1, and CIS have fundamental frequencies in the *10* to *20 Hz* range. Since the peak vertical response shown in Table 3-3 for these structures were scaled from the N-411 floor spectra, the effective equipment damping is less than *5%* (i.e., the N-411 spectra have equipment damping varying linearly from *5%* to *2%* between *10* to *20 Hz*).

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TABLE 3-1 (a) SCALE FACTORS FOR REACTOR AUXILIARY BUILDING - COMMON AT SHNPP REVIEW LEVEL EARTHQUAKE OVER DBE

Direction	Fundmtl Frequency (Hz)	Partcptn Factor (%)	RLE Accel (g)	DBE Accel (g)	Scale Factor
N-S	8.029	59.206	0.567	0.346	1.64
E-W	7.605	56.798	0.567	0.348	1.63
Vert.	14.355	87.915	0.293	0.253	1.16

TABLE 3-1 (b) SCALE FACTORS FOR REACTOR AUXILIARY BUILDING - UNIT 1 AT SHNPP REVIEW LEVEL EARTHQUAKE OVER DBE

Direction	Fundmtl Frequency (Hz)	Partcptn Factor (%)	RLE Accel (g)	DBE Accel (g)	Scale Factor
N-S	7.577	50.755	0.567	0.349	1.62
E-W	5.800	46.595	0.567	0.362	1.56
Vert.	11.839	90.242	0:317	0.287	1.11

TABLE 3-1 (c) SCALE FACTORS FOR CONTAINMENT INTERIOR STRUCTURE AT SHNPP REVIEW LEVEL EARTHQUAKE OVER DBE

Direction	Fundmtl Frequency (Hz)	Partcptn Factor (%)	RLE Accel (g)	DBE Accel (g)	Scale Factor
N-S	8.781	29.121	0.547	0.342	1.60
E-W	9.853	35.861	0.520	0.321	1.62
Vert.	19.738	30.135	0.252	0.205	1.23

TABLE 3-1 (d) SCALE FACTORS FOR DIESEL GENERATOR BUILDING AT SHNPP REVIEW LEVEL EARTHQUAKE OVER DBE

Direction	Fundmtl Frequency (Hz)	Partcptn Factor (%)	RLE Accel (g)	DBE Accel (g)	Scale Factor
N-S	12.370 *	N/A	0.466	0.279	1.67
E-W	12.370 *	N/A	0.466	0.279	1.67
Vert. (Floor)	6.74 to 14.32 *	N/A	0.290	0.253	1.15
Vert.	23.070 *	N/A	0.235	0.186	1.27
Node 5 (Horiz)	Rigid *	N/A	0.300	0.150	2.00
Node 5 (Vert)	Rigid *	N/A	0.200	0.150	1.33

NOTE: * The Frequeny is estimated from In-Structure response spectra. Participation Factor not available.

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TABLE 3-2 (a) DBE RESPONSE SPECTRA FOR RAB-COMMON AT SHNPP

Elevation (ft)	N-S Peak (*) (g)	N-S ZPA (*) (g)	E-W Peak (*) (g)	E-W ZPA (*) (g)	Vert. (BD) (#) Peak (*) (g)	Vert. (BD) (#) ZPA (*) (g)	Vert. (D) (##) Peak (*) (g)	Vert. (D) (##) ZPA (*) (g)
324.00	3.167	0.654	2.785	0.560	2.840	0.713	1.889	0.475
305.00	2.766	0.562	2.515	0.478	3.119	0.657	1.791	0.441
286.00	2.231	0.451	2.108	0.404	2.744	0.607	1.612	0.389
261.00	1.403	0.343	1.462	0.335	2.537	0.544	1.287	0.325

TABLE 3-2 (b) DBE RESPONSE SPECTRA FOR RAB-UNIT 1 AT SHNPP

Elevation (ft)	N-S Peak (*) (g)	N-S ZPA (*) (g)	E-W Peak (**) (g)	E-W ZPA (**) (g)	Vert. (BD) (#) Peak (*) (g)	Vert. (BD) (#) ZPA (*) (g)	Vert. (D) (##) Peak (*) (g)	Vert. (D) (##) ZPA (*) (g)
324.00	2.959	0.587	3.218	0.553	2.579	0.710	1.905	0.484
305.00	2.645	0.565	2.889	0.486	3.078	0.891	1.875	0.474
286.00	2.143	0.476	2.317	0.392	2.935	0.832	1.757	0.438
261.00	1.477	0.343	1.573	0.313	2.486	0.689	1.576	0.389
236.00	0.812	0.231	0.951	0.232	3.290	0.720	1.355	0.345
226.00	0.724 **	0.199 **	0.688	0.190				
216.00	0.618	0.191	0.611	0.201	1.342	0.441	1.172	0.308
206.00	0.629 **	0.177 **	0.628	0.178				

TABLE 3-2 (c) DBE RESPONSE SPECTRA FOR CONTM/INT. AT SHNPP

Elevation (ft)	N-S Peak (*) (g)	N-S ZPA (*) (g)	E-W Peak (*) (g)	E-W ZPA (*) (g)	Vert. (BD) (#) Peak (*) (g)	Vert. (BD) (#) ZPA (*) (g)	Vert. (D) (##) Peak (*) (g)	Vert. (D) (##) ZPA (*) (g)
302.65	2.925	0.620	2.290	0.571			1.373	0.422
286.00	2.527	0.534	2.000	0.498	2.490	0.574	1.336	0.403
261.00	1.743	0.372	1.466	0.383	2.650	0.587	1.194	0.336
249.00	1.275	0.296	1.154	0.320			1.071	0.288
236.00	0.854	0.245	0.833	0.253	1.762	0.482	0.919	0.255

TABLE 3-2 (d) DBE RESPONSE SPECTRA FOR DG BLDG AT SHNPP

Elevation (ft)	N-S Peak (**) (g)	N-S ZPA (**) (g)	E-W Peak (**) (g)	E-W ZPA (**) (g)	Vert. (Floor) Peak (**) (g)	Vert. (Floor) ZPA (**) (g)	Vert. Peak (**) (g)	Vert. ZPA (**) (g)
323.875	2.303	0.427	2.448	0.514	2.890	0.497	0.696	0.299
310.875	2.172	0.408	2.150	0.434	1.890	0.554	0.682	0.294
291.000	1.714	0.348	1.651	0.378	2.340	0.512	0.635	0.275
280.000	1.368	0.291	1.270	0.335	2.788	0.510	0.619	0.261
264.000	0.710	0.231	0.698	0.216			0.600	0.228

NOTES:
* Spectral values are obtained from SHNPP N-411 spectra
** Spectral values are obtained from CP&L SHNPP spectra with 4% damping
\# Vert. (BD) shows the Responses between Column Lines B & D
\## Vert. (D) shows the Responses on Column Line D

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CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D LWT DATE 7/28

TABLE 3-3 (a) SCALED RESPONSE SPECTRA TO REVIEW LEVEL EARTHQUAKE FOR REACTOR AUXILIARY BUILDING - COMMON AT SHNPP

Elevation (ft)	N-S (N-411)			E-W (N-411)			Vertical (BD) - N-411			Vertical (D) - N-411		
	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)
324.00	1.64	5.190	1.072	1.63	4.536	0.912	1.16	3.288	0.826	1.16	2.187	0.550
305.00	1.64	4.533	0.921	1.63	4.096	0.779	1.16	3.611	0.761	1.16	2.074	0.511
286.00	1.64	3.656	0.739	1.63	3.433	0.658	1.16	3.177	0.703	1.16	1.866	0.450
261.00	1.64	2.299	0.562	1.63	2.381	0.546	1.16	2.937	0.630	1.16	1.490	0.376

TABLE 3-3 (b) SCALED RESPONSE SPECTRA TO REVIEW LEVEL EARTHQUAKE FOR REACTOR AUXILIARY BUILDING - UNIT 1 AT SHNPP

Elevation (ft)	N-S (N-411)			E-W (4%)			Vertical (BD) - N-411			Vertical (D) - N-411		
	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)
324.00	1.62	4.804	0.953	1.56	5.034	0.865	1.11	2.651	0.785	1.11	2.106	0.535
305.00	1.62	4.294	0.917	1.56	4.519	0.760	1.11	3.402	0.985	1.11	2.072	0.524
286.00	1.62	3.479	0.773	1.56	3.624	0.613	1.11	3.244	0.920	1.11	1.942	0.484
261.00	1.62	2.398	0.557	1.56	2.461	0.490	1.11	2.748	0.762	1.11	1.742	0.430
236.00	1.62	1.318	0.375	1.56	1.488	0.363	1.11	3.636	0.796	1.11	1.498	0.381
226.00	1.62	1.175	0.323	1.56	1.076	0.297						
216.00	1.62	1.003	0.310	1.56	0.956	0.314	1.11	1.483	0.487	1.11	1.295	0.340
206.00	1.62	1.021	0.287	1.56	0.982	0.278						

TABLE 3-3 (c) SCALED RESPONSE SPECTRA TO REVIEW LEVEL EARTHQUAKE FOR CONTAINMENT INTERIOR STRUCTURE AT SHNPP

Elevation (ft)	N-S (N-411)			E-W (N-411)			Vertical (BD) - N-411			Vertical (D) - N-411		
	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)
302.65	1.60	4.680	0.992	1.62	3.712	0.926				1.23	1.689	0.519
286.00	1.60	4.044	0.854	1.62	3.242	0.807	1.23	3.064	0.706	1.23	1.644	0.496
261.00	1.60	2.789	0.595	1.62	2.376	0.621	1.23	3.261	0.722	1.23	1.469	0.413
249.00	1.60	2.040	0.474	1.62	1.871	0.519				1.23	1.318	0.354
236.00	1.60	1.367	0.392	1.62	1.350	0.410	1.23	2.168	0.593	1.23	1.131	0.314

TABLE 3-3 (d) SCALED RESPONSE SPECTRA TO REVIEW LEVEL EARTHQUAKE FOR DIESEL GENERATOR BUILDING AT SHNPP

Elevation (ft)	N-S (4%)			E-W (4%)			Vertical (Floor) - 4%			Vertical - 4%		
	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)	Scale Factor	Peak (g)	ZPA (g)
323.875	1.67	3.849	0.714	1.67	4.092	0.859	1.15	3.313	0.570	1.27	0.881	0.378
310.875	1.67	3.630	0.682	1.67	3.594	0.725	1.15	2.167	0.635	1.27	0.863	0.372
291.000	1.67	2.865	0.582	1.67	2.760	0.632	1.15	2.683	0.587	1.27	0.804	0.348
280.000	1.67	2.287	0.486	1.67	2.123	0.560	1.15	3.196	0.585	1.27	0.784	0.330
Node 5	2.00	1.420	0.462	2.00	1.396	0.432				1.33	0.800	0.304

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Table 3-4 RLE: NUREG/CR-0098 Median Spectral Shape anchored to 0.3g

0098	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
1	0.20000	0.03219	0.03219	0.02103
2	0.20448	0.03365	0.03365	0.02197
3	0.20907	0.03519	0.03519	0.02296
4	0.21376	0.03679	0.03679	0.02400
5	0.21855	0.03846	0.03846	0.02508
6	0.22345	0.04022	0.04022	0.02621
7	0.22846	0.04205	0.04205	0.02739
8	0.23358	0.04396	0.04396	0.02863
9	0.23882	0.04596	0.04596	0.02992
10	0.24418	0.04806	0.04806	0.03126
11	0.24965	0.05025	0.05025	0.03267
12	0.25525	0.05253	0.05253	0.03415
13	0.26097	0.05493	0.05493	0.03569
14	0.26682	0.05743	0.05743	0.03729
15	0.27281	0.06004	0.06004	0.03897
16	0.27892	0.06278	0.06278	0.04073
17	0.28518	0.06564	0.06564	0.04257
18	0.29157	0.06863	0.06863	0.04449
19	0.29811	0.07175	0.07175	0.04649
20	0.30479	0.07502	0.07502	0.04859
21	0.31163	0.07844	0.07844	0.05078
22	0.31861	0.08201	0.08201	0.05306
23	0.32576	0.08574	0.08574	0.05546
24	0.33306	0.08881	0.08881	0.05743
25	0.34053	0.09080	0.09080	0.05874
26	0.34817	0.09283	0.09283	0.06007
27	0.35597	0.09490	0.09490	0.06144
28	0.36395	0.09702	0.09702	0.06283
29	0.37212	0.09919	0.09919	0.06426
30	0.38046	0.10141	0.10141	0.06572
31	0.38899	0.10367	0.10367	0.06721
32	0.39771	0.10599	0.10599	0.06874
33	0.40663	0.10836	0.10836	0.07030
34	0.41575	0.11078	0.11078	0.07190
35	0.42507	0.11325	0.11325	0.07353
36	0.43460	0.11578	0.11578	0.07520
37	0.44434	0.11837	0.11837	0.07691
38	0.45431	0.12102	0.12102	0.07866
39	0.46449	0.12372	0.12372	0.08044
40	0.47491	0.12648	0.12648	0.08227
41	0.48556	0.12931	0.12931	0.08414
42	0.49645	0.13220	0.13220	0.08605
43	0.50758	0.13515	0.13515	0.08801
44	0.51896	0.13817	0.13817	0.09001
45	0.53059	0.14126	0.14126	0.09205
46	0.54249	0.14442	0.14442	0.09414
47	0.55465	0.14764	0.14764	0.09628
48	0.56709	0.15094	0.15094	0.09847
49	0.57981	0.15431	0.15431	0.10070
50	0.59281	0.15776	0.15776	0.10299
51	0.60610	0.16129	0.16129	0.10533
52	0.61969	0.16489	0.16489	0.10772
53	0.63358	0.16858	0.16858	0.11017

Table 3-5 DBE: Reg. Guide 1.60 anchored to 0.15g

RG 160	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
1	0.20000	0.04160	0.04160	0.02764
2	0.20448	0.04349	0.04349	0.02889
3	0.20907	0.04546	0.04546	0.03020
4	0.21376	0.04752	0.04752	0.03157
5	0.21855	0.04967	0.04967	0.03301
6	0.22345	0.05193	0.05193	0.03450
7	0.22846	0.05428	0.05428	0.03607
8	0.23358	0.05674	0.05674	0.03771
9	0.23882	0.05932	0.05932	0.03942
10	0.24418	0.06201	0.06201	0.04121
11	0.24965	0.06482	0.06482	0.04308
12	0.25525	0.06609	0.06609	0.04395
13	0.26097	0.06727	0.06727	0.04477
14	0.26682	0.06847	0.06847	0.04561
15	0.27281	0.06969	0.06969	0.04646
16	0.27892	0.07093	0.07093	0.04732
17	0.28518	0.07220	0.07220	0.04821
18	0.29157	0.07349	0.07349	0.04910
19	0.29811	0.07480	0.07480	0.05002
20	0.30479	0.07613	0.07613	0.05095
21	0.31163	0.07749	0.07749	0.05190
22	0.31861	0.07887	0.07887	0.05287
23	0.32576	0.08028	0.08028	0.05385
24	0.33306	0.08171	0.08171	0.05486
25	0.34053	0.08317	0.08317	0.05588
26	0.34817	0.08466	0.08466	0.05692
27	0.35597	0.08617	0.08617	0.05798
28	0.36395	0.08771	0.08771	0.05906
29	0.37212	0.08927	0.08927	0.06016
30	0.38046	0.09087	0.09087	0.06129
31	0.38899	0.09249	0.09249	0.06243
32	0.39771	0.09414	0.09414	0.06359
33	0.40663	0.09582	0.09582	0.06478
34	0.41575	0.09753	0.09753	0.06598
35	0.42507	0.09927	0.09927	0.06721
36	0.43460	0.10104	0.10104	0.06847
37	0.44434	0.10284	0.10284	0.06974
38	0.45431	0.10468	0.10468	0.07104
39	0.46449	0.10655	0.10655	0.07237
40	0.47491	0.10845	0.10845	0.07371
41	0.48556	0.11038	0.11038	0.07509
42	0.49645	0.11235	0.11235	0.07649
43	0.50758	0.11436	0.11436	0.07791
44	0.51896	0.11640	0.11640	0.07937
45	0.53059	0.11848	0.11848	0.08084
46	0.54249	0.12059	0.12059	0.08235
47	0.55465	0.12274	0.12274	0.08389
48	0.56709	0.12493	0.12493	0.08545
49	0.57981	0.12716	0.12716	0.08704
50	0.59281	0.12943	0.12943	0.08866
51	0.60610	0.13174	0.13174	0.09032
52	0.61969	0.13409	0.13409	0.09200
53	0.63358	0.13649	0.13649	0.09372

JOB NO. 52214 JOB CP&L SHEARON HARRIS - SPECTRA BY SL DATE 7/26/9?
CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D DATE 7/28/9?

Table 3-4 RLE: NUREG/CR-0098 Median Spectral Shape anchored to 0.3g

0098	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
54	0.64779	0.17234	0.17234	0.11267
55	0.66232	0.17619	0.17619	0.11523
56	0.67717	0.18013	0.18013	0.11785
57	0.69235	0.18416	0.18416	0.12053
58	0.70787	0.18827	0.18827	0.12326
59	0.72375	0.19248	0.19248	0.12606
60	0.73997	0.19678	0.19678	0.12893
61	0.75657	0.20117	0.20117	0.13185
62	0.77353	0.20567	0.20567	0.13485
63	0.79087	0.21027	0.21027	0.13791
64	0.80861	0.21496	0.21496	0.14105
65	0.82674	0.21977	0.21977	0.14425
66	0.84528	0.22468	0.22468	0.14753
67	0.86423	0.22970	0.22970	0.15088
68	0.88361	0.23483	0.23483	0.15430
69	0.90342	0.24008	0.24008	0.15781
70	0.92368	0.24544	0.24544	0.16139
71	0.94439	0.25092	0.25092	0.16506
72	0.96556	0.25653	0.25653	0.16881
73	0.98721	0.26226	0.26226	0.17264
74	1.00935	0.26812	0.26812	0.17657
75	1.03198	0.27411	0.27411	0.18058
76	1.05512	0.28024	0.28024	0.18468
77	1.07878	0.28650	0.28650	0.18887
78	1.10296	0.29290	0.29290	0.19316
79	1.12770	0.29945	0.29945	0.19755
80	1.15298	0.30614	0.30614	0.20204
81	1.17883	0.31298	0.31298	0.20663
82	1.20527	0.31997	0.31997	0.21132
83	1.23229	0.32712	0.32712	0.21612
84	1.25992	0.33443	0.33443	0.22103
85	1.28817	0.34190	0.34190	0.22605
86	1.31705	0.34954	0.34954	0.23119
87	1.34659	0.35735	0.35735	0.23644
88	1.37678	0.36534	0.36534	0.24181
89	1.40765	0.37350	0.37350	0.24730
90	1.43921	0.38185	0.38185	0.25292
91	1.47148	0.39038	0.39038	0.25866
92	1.50448	0.39910	0.39910	0.26454
93	1.53821	0.40802	0.40802	0.27055
94	1.57270	0.41713	0.41713	0.27669
95	1.60796	0.42646	0.42646	0.28298
96	1.64402	0.43598	0.43598	0.28941
97	1.68088	0.44573	0.44573	0.29598
98	1.71857	0.45568	0.45568	0.30270
99	1.75710	0.46587	0.46587	0.30958
100	1.79650	0.47628	0.47628	0.31661
101	1.83678	0.48692	0.48692	0.32380
102	1.87797	0.49780	0.49780	0.33116
103	1.92008	0.50892	0.50892	0.33868
104	1.96313	0.52029	0.52029	0.34637
105	2.00715	0.53192	0.53192	0.35424
106	2.05215	0.54380	0.54380	0.36229

Table 3-5 DBE: Reg. Guide 1.60 anchored to 0.15g

RG 160	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
54	0.64779	0.13892	0.13892	0.09546
55	0.66232	0.14140	0.14140	0.09724
56	0.67717	0.14393	0.14393	0.09905
57	0.69235	0.14650	0.14650	0.10090
58	0.70787	0.14911	0.14911	0.10278
59	0.72375	0.15177	0.15177	0.10470
60	0.73997	0.15448	0.15448	0.10665
61	0.75657	0.15724	0.15724	0.10864
62	0.77353	0.16004	0.16004	0.11066
63	0.79087	0.16290	0.16290	0.11272
64	0.80861	0.16581	0.16581	0.11482
65	0.82674	0.16877	0.16877	0.11696
66	0.84528	0.17178	0.17178	0.11914
67	0.86423	0.17484	0.17484	0.12136
68	0.88361	0.17796	0.17796	0.12363
69	0.90342	0.18114	0.18114	0.12593
70	0.92368	0.18437	0.18437	0.12828
71	0.94439	0.18766	0.18766	0.13067
72	0.96556	0.19101	0.19101	0.13310
73	0.98721	0.19442	0.19442	0.13558
74	1.00935	0.19789	0.19789	0.13811
75	1.03198	0.20142	0.20142	0.14069
76	1.05512	0.20502	0.20502	0.14331
77	1.07878	0.20868	0.20868	0.14598
78	1.10296	0.21240	0.21240	0.14870
79	1.12770	0.21619	0.21619	0.15147
80	1.15298	0.22005	0.22005	0.15429
81	1.17883	0.22398	0.22398	0.15717
82	1.20527	0.22798	0.22798	0.16010
83	1.23229	0.23204	0.23204	0.16308
84	1.25992	0.23619	0.23619	0.16612
85	1.28817	0.24040	0.24040	0.16922
86	1.31705	0.24469	0.24469	0.17237
87	1.34659	0.24906	0.24906	0.17558
88	1.37678	0.25350	0.25350	0.17886
89	1.40765	0.25803	0.25803	0.18219
90	1.43921	0.26263	0.26263	0.18559
91	1.47148	0.26732	0.26732	0.18905
92	1.50448	0.27209	0.27209	0.19257
93	1.53821	0.27695	0.27695	0.19616
94	1.57270	0.28189	0.28189	0.19981
95	1.60796	0.28692	0.28692	0.20354
96	1.64402	0.29204	0.29204	0.20733
97	1.68088	0.29725	0.29725	0.21120
98	1.71857	0.30256	0.30256	0.21513
99	1.75710	0.30796	0.30796	0.21914
100	1.79650	0.31345	0.31345	0.22323
101	1.83678	0.31905	0.31905	0.22739
102	1.87797	0.32474	0.32474	0.23162
103	1.92008	0.33054	0.33054	0.23594
104	1.96313	0.33644	0.33644	0.24034
105	2.00715	0.34244	0.34244	0.24482
106	2.05215	0.34855	0.34855	0.24938

EQE ENGINEERING

SHEET NO 14/17

JOB NO. 52214 JOB CP&L SHEARON HARRIS - SPECTRA BY SL DATE 7/28/[illegible]

CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D LWT DATE 7/28/

Table 3-4 RLE: NUREG/CR-0098 Median Spectral Shape anchored to 0.3g

0098	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
107	2.09817	0.55595	0.55595	0.37052
108	2.14521	0.56700	0.56700	0.37800
109	2.19331	0.56700	0.56700	0.37800
110	2.24249	0.56700	0.56700	0.37800
111	2.29277	0.56700	0.56700	0.37800
112	2.34418	0.56700	0.56700	0.37800
113	2.39674	0.56700	0.56700	0.37800
114	2.45048	0.56700	0.56700	0.37800
115	2.50543	0.56700	0.56700	0.37800
116	2.56161	0.56700	0.56700	0.37800
117	2.61904	0.56700	0.56700	0.37800
118	2.67777	0.56700	0.56700	0.37800
119	2.73781	0.56700	0.56700	0.37800
120	2.79920	0.56700	0.56700	0.37800
121	2.86196	0.56700	0.56700	0.37800
122	2.92613	0.56700	0.56700	0.37800
123	2.99174	0.56700	0.56700	0.37800
124	3.05883	0.56700	0.56700	0.37800
125	3.12741	0.56700	0.56700	0.37800
126	3.19753	0.56700	0.56700	0.37800
127	3.26923	0.56700	0.56700	0.37800
128	3.34253	0.56700	0.56700	0.37800
129	3.41748	0.56700	0.56700	0.37800
130	3.49411	0.56700	0.56700	0.37800
131	3.57245	0.56700	0.56700	0.37800
132	3.65256	0.56700	0.56700	0.37800
133	3.73445	0.56700	0.56700	0.37800
134	3.81819	0.56700	0.56700	0.37800
135	3.90380	0.56700	0.56700	0.37800
136	3.99133	0.56700	0.56700	0.37800
137	4.08083	0.56700	0.56700	0.37800
138	4.17233	0.56700	0.56700	0.37800
139	4.26588	0.56700	0.56700	0.37800
140	4.36153	0.56700	0.56700	0.37800
141	4.45933	0.56700	0.56700	0.37800
142	4.55931	0.56700	0.56700	0.37800
143	4.66154	0.56700	0.56700	0.37800
144	4.76607	0.56700	0.56700	0.37800
145	4.87293	0.56700	0.56700	0.37800
146	4.98219	0.56700	0.56700	0.37800
147	5.09390	0.56700	0.56700	0.37800
148	5.20812	0.56700	0.56700	0.37800
149	5.32490	0.56700	0.56700	0.37800
150	5.44429	0.56700	0.56700	0.37800
151	5.56637	0.56700	0.56700	0.37800
152	5.69118	0.56700	0.56700	0.37800
153	5.81879	0.56700	0.56700	0.37800
154	5.94925	0.56700	0.56700	0.37800
155	6.08265	0.56700	0.56700	0.37800
156	6.21904	0.56700	0.56700	0.37800
157	6.35848	0.56700	0.56700	0.37800
158	6.50105	0.56700	0.56700	0.37800
159	6.64682	0.56700	0.56700	0.37800

Table 3-5 DBE: Reg. Guide 1.60 anchored to 0.15g

RG 160	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
107	2.09817	0.35477	0.35477	0.25403
108	2.14521	0.36111	0.36111	0.25876
109	2.19331	0.36755	0.36755	0.26359
110	2.24249	0.37411	0.37411	0.26850
111	2.29277	0.38079	0.38079	0.27350
112	2.34418	0.38758	0.38758	0.27860
113	2.39674	0.39450	0.39450	0.28379
114	2.45048	0.40154	0.40154	0.28908
115	2.50543	0.40788	0.40788	0.29447
116	2.56161	0.40661	0.40661	0.29996
117	2.61904	0.40535	0.40535	0.30555
118	2.67777	0.40409	0.40409	0.31124
119	2.73781	0.40284	0.40284	0.31705
120	2.79920	0.40159	0.40159	0.32295
121	2.86196	0.40035	0.40035	0.32897
122	2.92613	0.39911	0.39911	0.33511
123	2.99174	0.39787	0.39787	0.34135
124	3.05883	0.39663	0.39663	0.34771
125	3.12741	0.39540	0.39540	0.35419
126	3.19753	0.39418	0.39418	0.36080
127	3.26923	0.39296	0.39296	0.36752
128	3.34253	0.39174	0.39174	0.37437
129	3.41748	0.39052	0.39052	0.38135
130	3.49411	0.38931	0.38931	0.38845
131	3.57245	0.38811	0.38811	0.38789
132	3.65256	0.38690	0.38690	0.38669
133	3.73445	0.38570	0.38570	0.38550
134	3.81819	0.38451	0.38451	0.38431
135	3.90380	0.38331	0.38331	0.38312
136	3.99133	0.38213	0.38213	0.38194
137	4.08083	0.38094	0.38094	0.38076
138	4.17233	0.37976	0.37976	0.37958
139	4.26588	0.37858	0.37858	0.37841
140	4.36153	0.37741	0.37741	0.37724
141	4.45933	0.37624	0.37624	0.37608
142	4.55931	0.37507	0.37507	0.37492
143	4.66154	0.37391	0.37391	0.37376
144	4.76607	0.37275	0.37275	0.37261
145	4.87293	0.37159	0.37159	0.37146
146	4.98219	0.37044	0.37044	0.37031
147	5.09390	0.36929	0.36929	0.36917
148	5.20812	0.36815	0.36815	0.36803
149	5.32490	0.36701	0.36701	0.36689
150	5.44429	0.36587	0.36587	0.36576
151	5.56637	0.36473	0.36473	0.36463
152	5.69118	0.36360	0.36360	0.36350
153	5.81879	0.36248	0.36248	0.36238
154	5.94925	0.36135	0.36135	0.36126
155	6.08265	0.36023	0.36023	0.36015
156	6.21904	0.35912	0.35912	0.35904
157	6.35848	0.35800	0.35800	0.35793
158	6.50105	0.35689	0.35689	0.35682
159	6.64682	0.35579	0.35579	0.35572

EQE

EQE ENGINEERING

SHEET NO 157

JOB NO. 52214 JOB CP&L SHEARON HARRIS - SPECTRA BY SL DATE 7/25

CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D LWT DATE 3/2

Table 3-4 RLE: NUREG/CR-0098 Median Spectral Shape anchored to 0.3g

0098	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
160	6.79586	0.56700	0.56700	0.37800
161	6.94823	0.56700	0.56700	0.37800
162	7.10403	0.56700	0.56700	0.37800
163	7.26332	0.56700	0.56700	0.37800
164	7.42618	0.56700	0.56700	0.37800
165	7.59269	0.56700	0.56700	0.37800
166	7.76293	0.56700	0.56700	0.37800
167	7.93699	0.56700	0.56700	0.37800
168	8.11496	0.56338	0.56338	0.37559
169	8.29691	0.55779	0.55779	0.37166
170	8.48295	0.55226	0.55226	0.36818
171	8.67315	0.54679	0.54679	0.36453
172	8.86763	0.54137	0.54137	0.36091
173	9.06646	0.53601	0.53601	0.35734
174	9.26975	0.53069	0.53069	0.35379
175	9.47759	0.52543	0.52543	0.35029
176	9.69010	0.52022	0.52022	0.34682
177	9.90738	0.51507	0.51507	0.34338
178	10.12952	0.50996	0.50996	0.33998
179	10.35665	0.50491	0.50491	0.33661
180	10.58887	0.49990	0.49990	0.33327
181	10.82629	0.49495	0.49495	0.32997
182	11.06905	0.49004	0.49004	0.32669
183	11.31724	0.48519	0.48519	0.32346
184	11.57100	0.48038	0.48038	0.32025
185	11.83045	0.47561	0.47561	0.31708
186	12.09571	0.47090	0.47090	0.31393
187	12.36693	0.46623	0.46623	0.31082
188	12.64422	0.46161	0.46161	0.30774
189	12.92774	0.45704	0.45704	0.30469
190	13.21760	0.45251	0.45251	0.30167
191	13.51397	0.44802	0.44802	0.29868
192	13.81699	0.44358	0.44358	0.29572
193	14.12680	0.43918	0.43918	0.29279
194	14.44355	0.43483	0.43483	0.28989
195	14.76741	0.43052	0.43052	0.28701
196	15.09853	0.42625	0.42625	0.28417
197	15.43707	0.42203	0.42203	0.28135
198	15.78321	0.41785	0.41785	0.27856
199	16.13711	0.41370	0.41370	0.27580
200	16.49894	0.40960	0.40960	0.27307
201	16.86888	0.40554	0.40554	0.27036
202	17.24712	0.40152	0.40152	0.26768
203	17.63384	0.39754	0.39754	0.26503
204	18.02923	0.39360	0.39360	0.26240
205	18.43349	0.38970	0.38970	0.25980
206	18.84681	0.38584	0.38584	0.25723
207	19.26940	0.38201	0.38201	0.25468
208	19.70147	0.37823	0.37823	0.25215
209	20.14322	0.37448	0.37448	0.24965
210	20.59488	0.37077	0.37077	0.24718
211	21.05666	0.36709	0.36709	0.24473
212	21.52880	0.36345	0.36345	0.24230

Table 3-5 DBE: Reg. Guide 1.60 anchored to 0.15g

RG 160	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
160	6.79586	0.35468	0.35468	0.35462
161	6.94823	0.35358	0.35358	0.35353
162	7.10403	0.35249	0.35249	0.35244
163	7.26332	0.35139	0.35139	0.35135
164	7.42618	0.35030	0.35030	0.35026
165	7.59269	0.34922	0.34922	0.34918
166	7.76293	0.34813	0.34813	0.34810
167	7.93699	0.34706	0.34706	0.34703
168	8.11496	0.34598	0.34598	0.34596
169	8.29691	0.34491	0.34491	0.34489
170	8.48295	0.34384	0.34384	0.34382
171	8.67315	0.34277	0.34277	0.34276
172	8.86763	0.34171	0.34171	0.34171
173	9.06646	0.33942	0.33942	0.33942
174	9.26975	0.33469	0.33469	0.33469
175	9.47759	0.33004	0.33004	0.33004
176	9.69010	0.32544	0.32544	0.32544
177	9.90738	0.32091	0.32091	0.32091
178	10.12952	0.31645	0.31645	0.31645
179	10.35665	0.31204	0.31204	0.31204
180	10.58887	0.30770	0.30770	0.30770
181	10.82629	0.30342	0.30342	0.30342
182	11.06905	0.29919	0.29919	0.29919
183	11.31724	0.29503	0.29503	0.29503
184	11.57100	0.29092	0.29092	0.29092
185	11.83045	0.28687	0.28687	0.28687
186	12.09571	0.28288	0.28288	0.28288
187	12.36693	0.27894	0.27894	0.27894
188	12.64422	0.27506	0.27506	0.27506
189	12.92774	0.27123	0.27123	0.27123
190	13.21760	0.26746	0.26746	0.26746
191	13.51397	0.26373	0.26373	0.26373
192	13.81699	0.26006	0.26006	0.26006
193	14.12680	0.25644	0.25644	0.25644
194	14.44355	0.25287	0.25287	0.25287
195	14.76741	0.24936	0.24936	0.24936
196	15.09853	0.24588	0.24588	0.24588
197	15.43707	0.24246	0.24246	0.24246
198	15.78321	0.23909	0.23909	0.23909
199	16.13711	0.23576	0.23576	0.23576
200	16.49894	0.23248	0.23248	0.23248
201	16.86888	0.22924	0.22924	0.22924
202	17.24712	0.22605	0.22605	0.22605
203	17.63384	0.22291	0.22291	0.22291
204	18.02923	0.21980	0.21980	0.21980
205	18.43349	0.21674	0.21674	0.21674
206	18.84681	0.21373	0.21373	0.21373
207	19.26940	0.21075	0.21075	0.21075
208	19.70147	0.20782	0.20782	0.20782
209	20.14322	0.20493	0.20493	0.20493
210	20.59488	0.20207	0.20207	0.20207
211	21.05666	0.19926	0.19926	0.19926
212	21.52880	0.19649	0.19649	0.19649

JOB NO. 52214 JOB CP&L SHEARON HARRIS - SPECTRA BY SL DATE 7/28/...
CALC. NO. C-001 SUBJECT SPECTRA SCALING CHK'D UWT DATE 7/28/...

Table 3-4 RLE: NUREG/CR-0098 Median Spectral Shape anchored to 0.3g

0098	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
213	22.01153	0.35985	0.35985	0.23990
214	22.50508	0.35628	0.35628	0.23752
215	23.00969	0.35275	0.35275	0.23517
216	23.52562	0.34926	0.34926	0.23284
217	24.05312	0.34579	0.34579	0.23053
218	24.59245	0.34237	0.34237	0.22824
219	25.14387	0.33897	0.33897	0.22598
220	25.70765	0.33561	0.33561	0.22374
221	26.28408	0.33229	0.33229	0.22152
222	26.87343	0.32899	0.32899	0.21933
223	27.47599	0.32573	0.32573	0.21716
224	28.09207	0.32250	0.32250	0.21500
225	28.72196	0.31931	0.31931	0.21287
226	29.36597	0.31614	0.31614	0.21076
227	30.02442	0.31301	0.31301	0.20867
228	30.69764	0.30991	0.30991	0.20660
229	31.38595	0.30683	0.30683	0.20456
230	32.08970	0.30379	0.30379	0.20253
231	32.80923	0.30078	0.30078	0.20052
232	33.54488	0.30000	0.30000	0.20000
233	34.29704	0.30000	0.30000	0.20000
234	35.06606	0.30000	0.30000	0.20000
235	35.85232	0.30000	0.30000	0.20000
236	36.65621	0.30000	0.30000	0.20000
237	37.47813	0.30000	0.30000	0.20000
238	38.31848	0.30000	0.30000	0.20000
239	39.17767	0.30000	0.30000	0.20000
240	40.05612	0.30000	0.30000	0.20000
241	40.95427	0.30000	0.30000	0.20000
242	41.87256	0.30000	0.30000	0.20000
243	42.81144	0.30000	0.30000	0.20000
244	43.77137	0.30000	0.30000	0.20000
245	44.75283	0.30000	0.30000	0.20000
246	45.75629	0.30000	0.30000	0.20000
247	46.78225	0.30000	0.30000	0.20000
248	47.83122	0.30000	0.30000	0.20000
249	48.90371	0.30000	0.30000	0.20000
250	50.00024	0.30000	0.30000	0.20000

Table 3-5 DBE: Reg. Guide 1.60 anchored to 0.15g

RG 160	Freq (Hz)	Horiz Accel (g)	Horiz Accel (g)	Vertl Accel (g)
213	22.01153	0.19375	0.19375	0.19375
214	22.50508	0.19106	0.19106	0.19106
215	23.00969	0.18840	0.18840	0.18840
216	23.52562	0.18578	0.18578	0.18578
217	24.05312	0.18319	0.18319	0.18319
218	24.59245	0.18064	0.18064	0.18064
219	25.14387	0.17813	0.17813	0.17813
220	25.70765	0.17565	0.17565	0.17565
221	26.28408	0.17320	0.17320	0.17320
222	26.87343	0.17079	0.17079	0.17079
223	27.47599	0.16841	0.16841	0.16841
224	28.09207	0.16607	0.16607	0.16607
225	28.72196	0.16376	0.16376	0.16376
226	29.36597	0.16148	0.16148	0.16148
227	30.02442	0.15923	0.15923	0.15923
228	30.69764	0.15702	0.15702	0.15702
229	31.38595	0.15483	0.15483	0.15483
230	32.08970	0.15268	0.15268	0.15268
231	32.80923	0.15055	0.15055	0.15055
232	33.54488	0.15000	0.15000	0.15000
233	34.29704	0.15000	0.15000	0.15000
234	35.06606	0.15000	0.15000	0.15000
235	35.85232	0.15000	0.15000	0.15000
236	36.65621	0.15000	0.15000	0.15000
237	37.47813	0.15000	0.15000	0.15000
238	38.31848	0.15000	0.15000	0.15000
239	39.17767	0.15000	0.15000	0.15000
240	40.05612	0.15000	0.15000	0.15000
241	40.95427	0.15000	0.15000	0.15000
242	41.87256	0.15000	0.15000	0.15000
243	42.81144	0.15000	0.15000	0.15000
244	43.77137	0.15000	0.15000	0.15000
245	44.75283	0.15000	0.15000	0.15000
246	45.75629	0.15000	0.15000	0.15000
247	46.78225	0.15000	0.15000	0.15000
248	47.83122	0.15000	0.15000	0.15000
249	48.90371	0.15000	0.15000	0.15000
250	50.00024	0.15000	0.15000	0.15000

EQE

EQE ENGINEERING

SHEET NO. 17

JOB NO. 52214	JOB CP&L SHEARON HARRIS - SPECTRA	BY SL	DATE 7/2
CALC. NO. C-001	SUBJECT SPECTRA SCALING	CHK'D LWT	DATE 7/2

SECTION 4. REFERENCES

1. US Atomic Energy Commission, "Design Response Spectra for Seismic Design of Nuclear Power Plants," Regulatory Guide 1.60, Rev. 1, 1973.
2. Newmark, N.M. and W.J. Hall, "Development of Criteria for Seismic Review of Selected Nuclear Power Plants," NUREG/CR-0098, May 1978.
3. EPRI, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin," EPRI NP-6041-SL, Revision 1, August 1991.
4. Shearon Harris Nuclear Power Plant FSAR, Amendment No. 37.
5. Ebasco Calc. # CPL-HNP1-C-001, Rev. 0.
6. SQUG, "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment," Rev. 2, February 1992.
7. US Nuclear Regulatory Commission, "Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components," Regulatory Guide 1.122, Rev. 1, February 1978.