Generic Letter 82-33

BOSTON EDISON

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Summary of Compliance with Regulatory Guide 1.97,
Revision 3 Concerning Emergency Response Capability (TAC 51119)

To assist the NRC in its review of compliance with Regulatory Guide 1.97, Revision 3, Boston Edison Company is providing the attached summary of compliance for the Pilgrim Nuclear Power Station. This summary restates compliance information previously submitted to the NRC, provides new information for specific variables, and identifies open items requiring additional work. All new information in this summary of compliance is identified with revision bars to aid the reviewer.

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DMV/amm/3764

Attachment: Summary of Compliance with Regulatory Guide 1.97, Revision 3 for the Pilgrim Nuclear Power Station

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SUMMARY OF COMPLIANCE WITH REGULATORY GUIDE 1.97, REVISION 3 FOR THE PILGRIM NUCLEAR POWER STATION

I. SUMMARY

A summary of compliance of the post-accident monitoring instrumentation at the Pilgrim Nuclear Power Station (PNPS) to the design and qualification criteria of Regulatory Guide 1.97, Revision 3 is provided in Table 1. Compliance information for individual primary containment isolation valves is provided in Table 2. Justifications are provided in Section II for all deviations identified on these tables. All open items requiring additional work are identified on these tables with an "O" and are described in more detail in Section III.

References are provided for all compliance information that has previously been submitted to the NRC. All new information in this summary of compliance is identified with revision bars.

II. JUSTIFICATIONS FOR DEVIATIONS

A. Drywell Atmosphere Temperature (Type A, Category 1 and Type D, Category 2)

The drywell atmosphere temperature instrumentation at PNPS deviates from the Regulatory Guide 1.97 recommended range of 40 to 440°F.

Although the drywell atmosphere temperature range of 0 to 400°F at PNPS does not correspond exactly with the Regulatory Guide 1.97 recommended range, it does provide sufficient range for monitoring the anticipated design temperature of 281°F, as described in the Final Safety Analysis Report (FSAR). The environmental qualification bounding drywell temperature for a steam line break inside containment of 330°F and the identified peak temperature of approximately 340°F described in the Emergency Operating Procedures are also adequately covered by the 0 to 400°F range. For this reason, the instrument range at PNPS is acceptable (Reference 3).

B. Containment and Drywell Hydrogen Concentration (Type A, Category 1 and Type C, Category 1)

This variable deviates from the Regulatory Guide 1.97 recommended range of 0 to 30 percent hydrogen concentration.

The instrumentation provided at PNPS to measure the concentration of hydrogen in the containment has a range of 0 to 10 percent. This instrumentation was installed at PNPS to meet the requirements of NUREG-0737, Item II.F.1.6, Containment Hydrogen Monitor. As stated in Reference 2, the NRC concluded that the instrumentation provided at PNPS was acceptable as part of their review of NUREG-0737, Item II.F.1.6. Accordingly, the provided instrument range is acceptable.

C. Coolant Level in Reactor Vessel (Type A, Category 1 and Type B, Category 1)

The instrumentation at PNPS to indicate the coolant level in the reactor vessel deviates from the Regulatory Guide 1.97 recommended range of the bottom of the core support plate to the lesser of the top of the vessel or the centerline of the main steamline. At PNPS, the Regulatory Guide 1.97 recommended range would be from 186 to 604 inches above the bottom of the vessel. However, the instrumentation provided at PNPS uses two overlapping sets of Category 1 instrumentation to cover the range of 205 to 532 inches.

The instrument range provided at PNPS gives the operator the reactor vessel level indication needed to perform safety functions under both accident and post-accident conditions. These safety functions include the automatic and manual actions that may be required to restore and maintain reactor vessel water level and to provide core cooling. Level indication below active fuel and greater than the high level trip setpoint of ECCS, as recommended by Regulatory Guide 1.97, does not contribute to information about the accomplishment of plant safety functions for following the course of an accident.

The PNPS reactor vessel water level range is sufficient to keep instruments on scale, utilizing overlapping ranges, at all times when information is required about the accomplishment of plant safety functions for following the course of an accident. The existing level indication range at PNPS meets the intent of the recommendations of Regulatory Guide 1.97 (Reference 3).

D. Neutron Flux - APRM, SRM (Type B, Category 1)

Boston Edison has endorsed the BWR Owners' Group's position that a fully-qualified, Class 1E post-accident neutron monitoring system is not required. The justification for this position is provided in the Licensing Topical Report NEDO-31558, March 1988, "Position on NRC Regulatory Guide 1.97, Revision 3, Requirements for Post-Accident Neutron Monitoring System." The NRC has not yet completed their review of this BWR Owners' Group position on neutron flux monitoring and this item remains open (Reference 5).

E. BWR Core Temperature (Type B, Category None and Type C, Category None)

BWR core temperature thermocouples are not provided at PNPS, which deviates from the Regulatory Guide 1.97 recommendation.

BWR core thermocouples would not provide an appropriate diverse indication of water level in the reactor vessel. Specifically, the thermocouples would not respond for at least 10 minutes following the uncovering of the core during a small break LOCA. During this period, the reactor operator would receive conflicting information from existing reactor vessel water level indication. Boston Edison concludes that in-core thermocouples would not provide the diverse indication of reactor vessel water level described by Regulatory Guide 1.97 and they will not be installed at PNPS.

F. Drywell Sump Level (Type B, Category 3) and Drywell Drain Sumps Level (Type C, Category 3)

Regulatory Guide 1.97 recommends Category 1 instrumentation for these variables. The instrumentation provided at PNPS for these variables is Category 3.

The drywell sumps at PNPS are automatically isolated at the primary containment penetration should an accident signal occur. For small leaks to the drywell sump, the instrumentation is not expected to experience harsh environments during operation. For larger leaks, the drywell sumps fill promptly and the sump drain lines isolate due to the increase in drywell pressure, which negates the drywell sump level and drywell drain sumps level instrumentation. In addition, this instrumentation neither automatically initiates nor alerts the operator to initiate operation of a safety-related system in a post-accident situation. Boston Edison concludes that the Category 3 instrumentation provided at PNPS will provide appropriate monitoring of the parameters of concern. The NRC concurred with this conclusion in Reference 2.

G. Primary Containment Isolation Valve Positions (Type B, Category 1)

1. Channel Redundancy Deviations

MO 1201-80, Reactor Water Cleanup (RWCU) Return
MO 1301-49, Reactor Core Isolation Cooling (RCIC) Pump Discharge
MO 2301-8, High Pressure Coolant Injection (HPCI) Pump Discharge
AO 5033A, Normal Nitrogen Makeup to Drywell
AO 5033C, Normal Nitrogen Makeup to Torus
AO 5040A, Torus Vacuum Breaker Isolation Valve
AO 5040B, Torus Vacuum Breaker Isolation Valve
CV 5046, Air Supply to the Drywell to Torus Vacuum Breakers

Each of these primary containment isolation valves are located on Class A or B lines which require two isolation valves in series. Check valves, which close on reverse flow, are used in conjunction with the above valves to isolate the lines. Because Regulatory Guide 1.97 specifically excludes check valves from any position indicating requirements, redundant valve position indication will not be provided for these lines.

MO 4002, Reactor Building Closed Cooling Water (RBCCW) Return

This primary containment isolation valve is located on a closed cooling water line penetrating the primary containment. It requires only one isolation valve. Position indication for the single primary containment isolation valve MO 4002 is provided in the control room. Boston Edison concludes that single control room indication of primary containment isolation valve position is acceptable for this line.

2. Valves Excluded from Regulatory Guide 1.97 Program

a. Disarmed Valves

MO 1001-60 and MO 1001-63, Residual Heat Removal (RHR) Head Spray

These valves have been electrically disarmed in the closed position and do not require valve position indication in the control room to verify primary containment isolation. For this reason, these valves are excluded from the Regulatory Guide 1.97 program.

b. Control Rod Drive (CRD) Directional Control Valves

FCV 302-120 and -123, CRD Insert
SV 302-121 and -122, CRD Withdraw

These 580 directional control valves, when energized and opened in coordinated pairs, facilitate rod movement either in the insert or withdrawal modes. These valves are normally closed, except during rod movement in normal operation. No position indication is provided for these valves in the control room and they do not receive an automatic primary containment isolation signal (Reference 1).

Because these valves are not used to achieve a scram and are not used in a post-accident situation, no position indication is required. These valves are excluded from the Regulatory Guide 1.97 program. The NRC concurred with this position in Reference 2.

c. Lines That Terminate Below Suppression Pool

MO 1001-36A and B, RHR Test Return
MO 1001-18A and B, RHR Minimum Flow
MO 1301-25, RCIC Pump Suction from Torus
MO 2301-36, HPCI Pump Suction from Torus
MO 1001-7A through -7D, RHR Pump Suction
MO 1400-3A and B, Core Spray Suction

These primary containment isolation valves are located on lines that terminate below the water level of the suppression pool during both normal and accident conditions. No path for gaseous leakage from the containment exists. The position indication of these valves provides no additional information to the operator on the accomplishment of containment isolation. Therefore, these valves are excluded from the Regulatory Guide 1.97 program.

d. Residual Heat Removal (RHR) Discharge to Radwaste

MO 1001-21 and MO 1001-32

These valves are located upstream of the primary containment isolation valves on the RHR injection line and, therefore, are not relied upon to perform primary containment isolation. However, these valves do receive a primary containment isolation signal to ensure proper valve positioning. These valves are not containment isolation valves and they are excluded from the Regulatory Guide 1.97 program.

3. Transversing Incore Probe (TIP) Shear and Ball Valves

736A, 736B, 736C, 736D
737A, 737B, 737C, 737D

Regulatory Guide 1.97 recommends Category 1 instrumentation for the position indication of these primary containment isolation valves. Category 3 position indication is provided for these valves at PNPS.

The TIP primary containment isolation design is commensurate with the importance to safety of isolating that system, and has been previously reviewed and accepted by the NRC on numerous dockets. The TIP guide tubes are normally closed by the TIP ball valves. A TIP scan requires insertion of the TIP probes into the reactor vessel for a period of approximately four hours per month. Over a one-year period, this amounts to less than 2% of the time the plant is operational. In the event of a LOCA, the TIP system design will reliably provide automatic isolation of any open TIP guide tubes by providing automatic retraction of the TIP cable followed by automatic closure of the TIP ball valves. Only in the case that the ball valve fails to automatically close, the shear valve is manually actuated by detonation squibs. However, because the TIP system electrical circuits are not safety grade and not separated, failure to isolate TIP guide tubes could be postulated.

The most likely sequence of events leading to fission product release through the TIP guide tubes has a probability of occurrence of about 5 X $10E^{-13}$ per reactor year. Using extremely conservative Regulatory Guide 1.3 source term assumptions and conservative PNPS-unique parameters, the offsite thyroid and whole body doses for this limiting event are below 10CFR100 limits. The extremely low probability of a fission product release, the minimal offsite radiological consequences of the TIP containment isolation failure, and the prohibitive costs involved in upgrading the position indicating circuits for the isolating TIP shear and ball valves support the Boston Edison decision not to upgrade the Category 3 equipment provided for this variable.

H. Radioactivity Concentration in Circulating Primary Coolant (Type C, Category 3)

The classification of this variable at PNPS as Category 3 deviates from the Regulatory Guide 1.97 recommendation of Category 1.

Instrumentation to monitor radioactivity concentration in circulating primary coolant is designated as Category 3 because no planned operator actions are identified and no operator actions are anticipated based on this variable. The existing Category 3 instrumentation provided by the post-accident sampling system (PASS) adequately measures radioactivity concentration in the coolant to indicate fuel cladding failure. In Reference 2, the NRC concluded that the alternative instrumentation provided by PASS was acceptable to monitor this variable.

I. Suppression Chamber Spray Flow (Type D, Category 2) and Drywell Spray Flow (Type D, Category 2)

Regulatory Guide 1.97 recommends dedicated, Category 2 flow indication be provided on both the suppression chamber and drywell spray lines. At PNPS, Category 2 flow indication is provided on the residual heat removal (RHR) injection line which feeds the LPCI, suppression chamber spray, drywell spray, and the suppression chamber cooling lines. PNPS deviates from the Regulatory Guide 1.97 recommendation because dedicated flow indication is not provided on each spray line.

Operation of the suppression chamber and drywell sprays at PNPS requires the operator to manually open valves which divert RHR system flow to the sprays. These valves are normally closed and each is provided with Category 1 valve position indication in the control room. The knowledge of valve positions, coupled with RHR flow indication, assures the operator that flow is being diverted as desired to the suppression chamber spray and the drywell spray.

Additional verification that the suppression chamber and drywell sprays are operating as designed is indirectly provided by the Category 1 instrumentation indicating primary containment pressure. During accident conditions, the emergency operating procedures direct the control room operators to verify primary containment pressure to confirm the operation of the containment spray subsystems. Primary containment pressure indication tells the operator that the containment spray system spargers are operating within 3 to 5 minutes after system initiation. The containment spray system causes the primary containment pressure to decrease rapidly by approximately 16 psig, according to the calculated pressure responses of the containment.

The RHR flow and the injection valve position indications strictly provide the operator with the knowledge that there is flow and the spray path is open. The primary containment pressure indicators assure the operator that the subsystems are working as intended. Boston Edison concludes that the alternative instrumentation described above provides adequate indication of the suppression chamber and drywell spray flows.

J. Main Steamline Isolation Valve (MSIV) Leakage Control System Pressure (Type D, Category 2)

Regulatory Guide 1.97 recommends pressure indication be provided for the MSIV leakage control system. This Category 2, Type D variable is not applicable to PNPS because no designated leakage control system exists on the main steamline isolation valves (Reference 3).

K. Isolation Condenser System Shell-Side Water Level (Type D, Category 2) and Valve Position (Type D, Category 2)

No isolation condenser system is provided in the Mark I containment design at PNPS; therefore, these variables are not applicable to PNPS.

L. Low Pressure Coolant Injection (LPCI) System Flow (Type D, Category 2)

Regulatory Guide 1.97 recommends dedicated, Category 2 flow indication be provided for the LPCI system injection into the reactor vessel. At PNPS, Category 2 flow indication is provided on the residual heat removal (RHR) injection lines. PNPS deviates from the Regulatory Guide 1.97 recommendation because dedicated flow indication is not provided on the LPCI injection line.

Operation of the LPCI system is verified by RHR flow indication and LPCI injection valve position. The RHR flow indication has a range of 0 to 20,000 gpm. This is adequate to cover the required range of 0 to 110% of the PNPS LPCI system design flow, which is 0 to 15,840 gpm. The injection valves on the LPCI system flow path are provided with Category 1 valve position indication in the control room. The knowledge of valve positions, coupled with RHR flow indications, assures the operator that flow is being sent, as desired, to the LPCI system injection line.

Additional verification that the LPCI system injection is operating as designed is indirectly provided by the Category 1 instrumentation indicating reactor pressure vessel water level. During accident conditions, the emergency operating procedures (EOPs) direct the control room operators to verify reactor vessel water level to confirm the operation of the safety injection systems such as LPCI. Boston Edison concludes that the alternative instrumentation described above provides adequate indication of the LPCI system flow.

M. Standby Liquid Control System (SLCS) Flow (Type D, Category 3)

Regulatory Guide 1.97 recommends that Category 2 flow indication be provided for the SLCS injection into the reactor vessel. At PNPS, proper operation of the SLCS is monitored by the Category 3 variables SLCS pump discharge header pressure and SLCS storage tank level.

The current design basis for the SLCS recognizes that the system has an importance to safety that is less than the importance to safety of the reactor protection system and the engineered safeguards systems. Accordingly, the instrumentation provided to monitor the operation of the SLCS is considered to be Category 3 (Reference 1).

The indication of SLCS pump discharge header pressure assures the operator that the SLCS pumps are operating as designed. The instrumentation has a range of 0 to 2,000 psig, which sufficiently encompasses the system design pressure of 1500 psig. All valves located between the SLCS storage tank and the reactor pressure vessel are normally locked open, with the exception of check valves and the highly reliable squib valves. A reduction in the SLCS storage tank level indication assures the operator that the SLCS is actually pumping fluid into the reactor vessel. Boston Edison concludes that the alternative instrumentation described above provides adequate indication to monitor the operation of the SLCS (Reference 3).

N. Standby Liquid Control System (SLCS) Storage Tank Level (Type D, Category 3)

Regulatory Guide 1.97 recommends that Category 2 indication be provided for the SLCS storage tank level. At PNPS, Category 3 instrumentation is provided to monitor this variable.

The current design basis for the SLCS recognizes that the system has an importance to safety that is less than the importance to safety of the reactor protection system and the engineered safeguards systems. Accordingly, the instrumentation provided to monitor the operation of the SLCS is considered to be Category 3 (Reference 1).

Boston Edison provided additional justification for this position to the NRC in Reference 3. Since then, the scale on the SLCS storage tank level has been replaced as a result of an enhancement identified by the Detailed Control Room Design Review (DCRDR) Project. The scale for this indication is now calibrated to read from 0 to 4,750 gallons. This new scale meets the intent of the Regulatory Guide 1.97 recommended range of top to bottom of the tank.

O. Added Plant Variables (Type D, Category 3)

Regulatory Guide 1.97 provides a recommended minimum set of plant variables that should be monitored during and following an accident. At PNPS, this minimum set is supplemented by the following six plant variables. These variables provide important information to indicate the operation of individual safety systems and other systems important to safety. This Category 3 instrumentation provides indication in the control room for each plant variable. In the case of the additional drywell atmosphere temperature instrumentation, indication is provided in the control room on the EPIC computer.

- Bypass Valve Position
- Condenser Hotwell Level
- Condenser Vacuum
- Condensate Flow
- Recirculation Flow
- Drywell Atmosphere Temperature

P. Reactor Building or Secondary Containment Area Radiation (Type E, Category 2)

Boston Edison's position is that this Regulatory Guide 1.97 recommended variable is not required for the PNPS Mark I containment design.

The exposure rate in the secondary containment will be largely dependent on the radioactivity in the primary containment and the fluids flowing through the emergency core cooling system (ECCS) piping. Local radiation exposure rate monitors could only provide ambiguous indications because there are a large number of pipes in widely scattered locations. The noble gas effluent monitors will provide a more appropriate means of detecting any radioactivity release. For these reasons, area radiation indication in the secondary containment would not provide the operator with useful information and is not required at PNPS (Reference 3).

Q. Radiation Exposure Rate (Type E, Category 3)

Regulatory Guide 1.97 recommends a range of 10E-1 to 10E4 R/hr for instrumentation to monitor the radiation exposure rate in areas where access is required to service equipment important to safety. The installed instrumentation at PNPS has a range of 10E-5 to 10E-1 R/hr.

Boston Edison will use the existing area radiation monitors and supplement them, on an as-needed basis, with portable radiation monitoring equipment that exists onsite. Because the portable radiation monitoring equipment is fully capable of covering the range of radiation exposure comparable to the emergency condition allowable exposure limits (25 R for health, safety, and property protection and 75 R for life saving), this alternative to hardware modifications meets the Regulatory Guide 1.97 recommendation to monitor access areas required to service equipment important to safety (Reference 3).

R. Particulates and Halogens (Type E, Category 3)

Regulatory Guide 1.97 recommends that a range of 10^{-3} μCi/cc to 10^{2} μCi/cc be provided for instrumentation to monitor airborne radioactive materials (particulates and halogens) released from the plant. As described below, this is accomplished at PNPS through the combined use of existing instrumentation (multi-channel analyzer systems and radiation monitor survey meters), procedures, and analytical tools in the form of nomograms. The combined ranges provided at PNPS to measure airborne radionuclide concentrations of particulates and halogens released from the plant is from 1×10^{-12} μCi/cc to 3.5×10^{4} μCi/cc, which encompasses the recommended range.

In an accident condition, the identified release points at PNPS for particulates and halogens are the main stack, the reactor building vent, and the turbine building. Releases from the main stack and reactor building vent are sampled through the use of a particulate filter and a charcoal-based iodine collection chamber, installed ahead of the routine effluent monitoring sample lines. For turbine building releases under accident conditions, particulates and halogens are sampled through the use of a portable air sample pump and filter (Reference 5).

Station procedures specify how samples of effluent particulates and halogens will be collected and analyzed under accident conditions from the main stack, reactor building vent, and turbine building. When the sample dose rate is $\leq$ 25 mR/hr, the sample is measured in the onsite radiochemistry lab using a multi-channel analyzer. When the sample dose rate is > 25 mR/hr but $\leq$ 550 mR/hr, the sample may be measured using the multi-channel analyzer if it is first cut down to a section that has a dose rate $\leq$ 25 mR/hr. When the sample dose rate is > 550 mR/hr, the sample cannot be analyzed until it has decayed sufficiently (Reference 5).

The range of detection of the multi-channel analyzer is from 1×10^{-12} μCi/cc to 6.4×10^{-3} μCi/cc. The estimated upper limit of concentration can vary depending on the radionuclide species present and the elapsed time after reactor shutdown.

In addition to the multi-channel analyzer, station procedures require the use of nomograms to estimate sample activity from the sample dose rate. When the sample dose rate falls in the range 10^{-2} mR/hr to 10^{4} R/hr, the nomograms are capable of estimating Iodine-131 inventory on the sample in the range 10^{-1} μCi to 10^{6} mCi (Reference 5). The resultant range of Iodine-131 equivalent effluent plant release concentrations estimated from the nomograms is from 3.5×10^{-6} μCi/cc to 3.5×10^{4} μCi/cc.

High range radiation survey instruments (Teletector or equivalent) are available to measure dose rates up to 10^3 R/hr. The radiation dose received by plant personnel in the collection, handling, transporting, and analyzing of effluent samples will not exceed the exposure limits of General Design Criterion 19 (Reference 5).

Boston Edison concludes that the overlapping ranges provided by the multi-channel analyzer and the nomograms sufficiently encompass the range recommended by Regulatory Guide 1.97.

S. Airborne Radiohalogens and Particulates (Type E, Category 3)

Regulatory Guide 1.97 recommends that a range of 10^{-9} μCi/cc to 10^{-3} μCi/cc be provided for instrumentation to measure samples taken in the field for airborne radionuclide concentrations of particulates and halogens in the environs. As described below, this is accomplished at PNPS through the combined use of existing instrumentation (multi-channel analyzer in the onsite radiochemistry lab, SAM-2 sodium iodide detector with a dual-channel analyzer in the field, and radiation monitor survey meters both on and offsite), procedures, and analytical tools in the form of nomograms. The combined range provided at PNPS to measure field samples for airborne radionuclide concentrations of particulates and halogens in the environs is from 1 X 10^{-12} μCi/cc to 6.4 X 10^{-3} μCi/cc, which sufficiently encompasses the recommended range.

Field samples of airborne radionuclide concentrations of particulates and halogens in the environs surrounding PNPS can be measured using a SAM-2 detector in the field, a multi-channel analyzer in the onsite radiochemistry lab, or nomograms to estimate Iodine-131 equivalence until the samples can be brought to the onsite lab for analysis by the multi-channel analyzer.

The range of detection for the SAM-2 sodium iodide detectors in the field is from 8 X 10^{-9} μCi/cc to 8 X 10^{-5} μCi/cc. No quantitative measurement of particulate filter paper sample activity is made in the field. However, estimates of Iodine-131 concentrations in the environs can be made in an expeditious manner using a nomogram. When the sample count rate falls in the range of 1 cpm to 10^7 cpm, the nomogram is capable of estimating Iodine-131 inventory on the sample in the range 10^{-6} μCi to 10^2 μCi. The resultant range of Iodine-131 equivalent concentration in the environs estimated from the nomogram is from 10^{-12} μCi/cc to 10^{-4} μCi/cc.

The nomogram is used for quick Iodine-131 airborne concentration estimates by field teams, after which the field samples are brought back to the onsite radiochemistry lab for analysis using the multi-channel analyzer for accurate assessment. The range of detection of the multi-channel analyzer is from 1 X 10^{-12} μCi/cc to 6.4 X 10^{-3} μCi/cc. The multi-channel analyzer system is only used to analyze samples whose contact gamma dose rate is $\leq$ 25 mR/hr, in accordance with station procedures. The radiation dose received by plant personnel in the collection, handling, transporting, and analyzing of field samples will not exceed the exposure limits of General Design Criterion 19.

Boston Edison concludes that the overlapping ranges provided by the SAM-2 detector, the multi-channel analyzer, and the nomograms sufficiently encompass the range recommended by Regulatory Guide 1.97.

T. Electrical Separation and Isolation

Regulatory Guide 1.97 requires that the redundant or diverse channels of Category 1 equipment be electrically independent and physically separated from each other and from equipment not classified important to safety up to, and including, any isolation device. Regulatory Guide 1.97 references Regulatory Guide 1.75, "Physical Independence of Electric Systems" as the standard for this requirement.

PNPS was designed and constructed to meet the proposed IEEE Standard "Criteria for Nuclear Power Plant Protection Systems," dated March 1968, which predates the issuance of Regulatory Guide 1.75.

The following separation criteria shall be used at PNPS, in accordance with Boston Edison Specification E-347, Section 5.4; Boston Edison Specification E-347A, Sections 5.2.3 and 5 2.4; and PNPS FSAR Section 8.9.3. These criteria are considered minimum requirements and design guidelines for use in the absence of a confirming design review to support less stringent requirements.

- Cable Tray

  Cable Spreading Room Area:

  The minimum separation distance between redundant Class 1E cable trays shall be 1 foot between trays separated horizontally and 3 feet between trays separated vertically. Where plant arrangement precludes maintaining the minimum separation distance between trays, barriers shall be provided between redundant circuits.

  General Plant Areas:

  The minimum separation distance between redundant Class 1E cable trays shall be 3 feet between trays separated horizontally and 5 feet between trays separated vertically. Where plant arrangement precludes maintaining the minimum separation distance between trays, barriers shall be provided between redundant circuits.

- Enclosed Raceway

  Cable Spreading Room and General Plant Areas:

  The minimum separation distance between redundant Class 1E enclosed raceways shall be 1 inch.

- Internal Wiring

  The minimum separation distance between control panel internal wiring for redundant monitoring channels shall be 6 inches. Where this separation cannot be maintained, a qualified barrier shall be provided as described in IEEE Standard 384-1974.

BECo intends to use the guidance provided in Regulatory Guide 1.75, where applicable, with the following exceptions:

- The cable spreading room area contains instrumentation and control cables along with a 480V load center and a 480V motor control center. The 480V cables are routed in conduit and cable trays and separation shall be maintained in accordance with the requirements of the cable spreading room area, as stated above.

- Raceway markings are located at various intervals to provide adequate raceway identification. Conduits are labeled where they pass through walls and floors, at the conduit destination and origin points, and at other locations along the conduit. The interval between labels may exceed the 15-foot recommendation of Regulatory Guide 1.75.

- Associated cables and raceways are not uniquely identified. Unique identification is not required to ensure electrical separation of redundant systems.

- Electrical isolation shall be accomplished by use of coordinated Class 1E fuses or breakers, in accordance with the proposed IEEE Standard, "Criteria for Nuclear Power Plant Protection Systems," dated March 1968 (Reference 1).

III. OPEN ITEMS

The open items indicated on Tables 1 and 2 require additional work to verify compliance with Regulatory Guide 1.97, Revision 3. Open items related to specific issues are discussed below.

A. Equipment Qualification

Additional work is required on the environmental qualification of the instrumentation and associated equipment listed as open on Tables 1 and 2. As discussed in Reference 5, the evaluation of the post-accident environment and basis for qualification for the instrumentation and associated equipment monitoring effluent radioactivity and status of standby power will be completed and submitted to the NRC under separate cover.

B. Seismic Qualification

As stated in Reference 1, Boston Edison deferred the review of the seismic qualification of accident monitoring instrumentation for Regulatory Guide 1.97 pending the resolution of Unresolved Safety Issue (USI) A-46. The generic letter stated equipment must either be qualified using seismic experience data in accordance with procedures developed by the Seismic Qualification Utility Group or by the analysis and testing methods of IEEE Standard 344-1975.

Subsequent to the generic letter, the Seismic Qualification Utility Group submitted a generic implementation procedure (GIP) for NRC approval. The GIP contains evaluation procedures and acceptance criteria for the use of seismic experience data in the resolution of USI A-46. The NRC issued its safety evaluation of the GIP in July, 1988. The GIP applies to plants with construction permits issued prior to 1972 (i.e., plants not originally licensed to IEEE Standard 344-1975 at startup). PNPS is in the group of plants covered by the GIP.

Related to this, IEEE Standard 344 was revised in 1987 to include provisions for the use of seismic experience data to qualify electrical equipment. The standard applies to all plants regardless of age. The NRC endorsed this standard in the latest revision to Regulatory Guide 1.100, "Seismic Qualification of Electric Equipment for Nuclear Power Plants."

In view of these developments, Boston Edison has initiated a program to verify the seismic qualification of Regulatory Guide 1.97 Category 1 equipment and the Category 2 equipment of safety-related systems. Equipment purchased and installed to the requirements of IEEE Standard 344-1975 will be deemed acceptable as is, provided the qualification documentation is readily available and auditable. For other equipment, the program will verify the seismic qualification per IEEE Standard 344-1987, Section 9, Experience, and the Seismic Qualification Utility Group Generic Implementation Procedure, Revision 1, dated November, 1988. Upon completion of this qualification program, a summary of the results will be submitted to the NRC.

C. Neutron Flux Monitoring

As discussed in Section II.D, Boston Edison endorses the BWR Owners' Group's position that a fully qualified, Class 1E post-accident neutron monitoring system is not appropriate. Compliance for this item remains open pending completion of the NRC's review of the BWR Owners' Group position.

D. Equipment Identification and Human Factors

In conjunction with the Boston Edison Detailed Control Room Design Review (DCRDR) Project, a human engineering review of Regulatory Guide 1.97-related devices on the main control room panels will be performed in accordance with NUREG-0700. The Regulatory Guide 1.97-related devices on the main control room panels will be marked or identified as such as part of the ongoing control room enhancements activity. These activities are further described in Boston Edison letters to the NRC, dated May 2, 1989 and July 24, 1989. The remaining Regulatory Guide 1.97-related devices outside the main control room panels will also be reviewed and marked in a similar manner. The DCRDR Project is included in the Boston Edison Long Term Program.

E. Channel Availability, Channel Redundancy, Quality Assurance, and Testing

Boston Edison is currently reviewing the compliance of the post-accident monitoring instrumentation at PNPS with the Regulatory Guide 1.97 recommendations for these design criteria. The results of our review will be submitted to the NRC upon completion.

REFERENCES

1. Letter from W. D. Harrington (BECo) to D. B. Vassallo (NRC), dated November 1, 1984 (BECo 2.84.187), "Generic Letter 82-33: Regulatory Guide 1.97"

2. Letter from J. A. Zwolinski (NRC) to W. D. Harrington (BECo), dated December 12, 1985 (BECo 1.85.372), "Generic Letter 82-33; Regulatory Guide 1.97 Request for Additional Information"

3. Letter from J. M. Lydon (BECo) to NRC, dated February 10, 1987 (BECo 2.87.021), "Additional Information Concerning Regulatory Guide 1.97"

4. Letter from D. G. McDonald (NRC) to R. G. Bird (BECo), dated January 24, 1989 (BECo 1.89.044), "Emergency Response Capability, Conformance to Regulatory Guide 1.97, Revision 3, Request for Additional Information"

5. Letter from R. G. Bird (BECo) to NRC, dated April 11, 1989 (BECo 2.89.053), "Response to Request for Additional Information, Emergency Response Capability, Regulatory Guide 1.97, Revision 3 (TAC 51119)"

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE A CAT 1 DRYWELL ATMOSPHERE TEMPERATURE	RANGE deviation. See Section II.A	O	A	A	A	AWJ	A	A	O	O	A	A	O
TYPE A CAT 1 CONTAINMENT AND DRYWELL HYDROGEN CONCENTRATION	RANGE deviation. See Section II.B	A	A	A	O	AWJ	A	A	O	O	A	A	O
TYPE A CAT 1 CONTAINMENT AND DRYWELL OXYGEN CONCENTRATION		A	A	A	O	A	A	A	O	O	A	A	O
TYPE A CAT 1 PRIMARY CONTAINMENT PRESSURE - DRYWELL		A	A	A	O	A	A	A	O	O	A	A	O
TYPE A CAT 1 PRIMARY CONTAINMENT PRESSURE - SUPPRESSION POOL		A	A	A	O	A	O	A	O	O	O	A	O
TYPE A CAT 1 RCS PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE A CAT 1 COOLANT LEVEL IN REACTOR VESSEL	RANGE deviation. See Section II.C	A	O	A	O	AWJ	A	A	O	O	A	O	O
TYPE A CAT 1 SUPPRESSION POOL WATER LEVEL		A	A	A	O	A	A	A	O	O	A	A	O
TYPE A CAT 1 SUPPRESSION POOL WATER TEMPERATURE		A	A	A	O	A	A	A	O	O	A	A	O

A - Acceptable, meets the RG1.97 design and qualification criteria.
O - Open, see descriptions in Section III.
AWJ - Acceptable with justification.
NR - Not required, no specific provision required in RG1.97 Table 1.

[1] See Section II.T for Boston Edison's position on compliance with electrical separation and isolation design criteria.

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE B CAT 1 NEUTRON FLUX - APRM	Waiting for NRC review of BWROG position. See Section II.D	O	O	O	O	A	A	A	O	O	A	O	O
TYPE B CAT 1 NEUTRON FLUX - SRM	Waiting for NRC review of BWROG position. See Section II.D	O	O	O	O	A	A	A	O	O	A	O	O
TYPE B CAT 3 CONTROL ROD POSITION		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE B CAT 3 RCS SOLUBLE BORON CONCENTRATION		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE B CAT 1 COOLANT LEVEL IN REACTOR VESSEL	RANGE deviation. See Section II.C	A	O	A	O	AWJ	A	A	O	O	A	O	O
TYPE B CAT None BWR CORE TEMPERATURE	Not included in PNPS RG1.97 program. See Section II.E												
TYPE B CAT 1 RCS PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE B CAT 1 DRYWELL PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE B CAT 3 DRYWELL SUMP LEVEL	Downgraded variable from Cat 1 to Cat 3. See Section II.F	NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE B CAT 1 PRIMARY CONTAINMENT PRESSURE - DRYWELL		A	A	A	O	A	A	A	O	O	A	A	O
TYPE B CAT 1 PRIMARY CONTAINMENT PRESSURE - SUPPRESSION POOL		A	A	A	O	A	O	A	O	O	A	A	O

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE B **CAT** 1 PRIMARY CONTAINMENT ISOLATION VALVE POSITION	See Table 2 for PCIV compliance matrix and Section II.G for deviations.												
TYPE C **CAT** 3 RADIOACTIVITY CONCENTRATION IN CIRCULATING PRIMARY COOLANT	Downgraded variable from Cat 1 to Cat 3. See Section II.H	NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE C **CAT** 3 ANALYSIS OF PRIMARY COOLANT		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE C **CAT** None BWR CORE TEMPERATURE	Not included in PNPS RG1.97 program. See Section II.E												
TYPE C **CAT** 1 RCS PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE C **CAT** 3 PRIMARY CONTAINMENT AREA RADIATION		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE C **CAT** 3 DRYWELL DRAIN SUMPS LEVEL	Downgraded variable from Cat 1 to Cat 3. See Section II.F	NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE C **CAT** 1 SUPPRESSION POOL WATER LEVEL		A	A	A	O	A	A	A	O	O	A	A	O
TYPE C **CAT** 1 DRYWELL PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE C **CAT** 1 RCS PRESSURE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE C **CAT** 1 PRIMARY CONTAINMENT PRESSURE - DRYWELL		A	A	A	O	A	A	A	O	O	A	A	O

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE C **CAT** 1 PRIMARY CONTAINMENT PRESSURE - SUPPRESSION POOL		A	A	A	O	A	O	A	O	O	A	A	O
TYPE C **CAT** 1 CONTAINMENT AND DRYWELL HYDROGEN CONCENTRATION	RANGE deviation. See Section II.B	A	A	A	O	AWJ	A	A	O	O	A	A	O
TYPE C **CAT** 1 CONTAINMENT AND DRYWELL OXYGEN CONCENTRATION		A	A	A	O	A	A	A	O	O	A	A	O
TYPE C **CAT** 3 CONTAINMENT EFFLUENT RADIOACTIVITY - NOBLE GASES		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE C **CAT** 2 EFFLUENT RADIOACTIVITY - NOBLE GASES		O	NR	A	NR	A	NR	O	O	O	A	O	O
TYPE D **CAT** 3 MAIN FEEDWATER FLOW		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE D **CAT** 3 CONDENSATE STORAGE TANK LEVEL		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE D **CAT** 2 SUPPRESSION CHAMBER SPRAY FLOW	RHR system flow and RHR to suppression pool spray valve position used. See Section II.I												
TYPE D **CAT** 2 DRYWELL PRESSURE		A	A	A	NR	A	NR	A	NR	O	A	A	O
TYPE D **CAT** 2 SUPPRESSION POOL WATER LEVEL		A	A	A	NR	A	NR	A	NR	O	A	A	O

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE D CAT 2 SUPPRESSION POOL WATER TEMPERATURE		A	A	A	NR	A	NR	A	NR	O	A	A	O
TYPE D CAT 2 DRYWELL ATMOSPHERE TEMPERATURE	RANGE deviation. See Section II.A	O	A	A	NR	AWJ	NR	A	NR	O	A	A	O
TYPE D CAT 2 DRYWELL SPRAY FLOW	RHR system flow and RHR to drywell spray valve position used. See Section II.I												
TYPE D CAT 2 MSIV'S LEAKAGE CONTROL SYSTEM PRESSURE	Not included in the PNPS Mark I design. See Section II.J												
TYPE D CAT 2 PRIMARY SYSTEM SAFETY RELIEF VALVE POSITIONS		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D CAT 2 ISOLATION CONDENSER SYSTEM SHELL-SIDE WATER LEVEL	Not included in the PNPS Mark I design. See Section II.K												
TYPE D CAT 2 ISOLATION CONDENSER SYSTEM VALVE POSITION	Not included in the PNPS Mark I design. See Section II.K												
TYPE D CAT 2 RCIC FLOW		O	O	A	NR	A	NR	A	NR	O	A	O	O
TYPE D CAT 2 HPCI FLOW		A	O	A	NR	A	NR	A	NR	O	A	O	O
TYPE D CAT 2 CORE SPRAY SYSTEM FLOW		O	O	A	NR	A	NR	O	NR	O	A	O	O

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE D **CAT** 2 LPCI SYSTEM FLOW	RHR system flow and LPCI injection valve position used. See Section II.L												
TYPE D **CAT** 3 SLCS FLOW	Downgraded variable from Cat 2 to Cat 3. SLCS pump discharge pressure is used. See Section II.M	NR	NR	NR	NR	A	NR	NR	NR	O	A	O	O
TYPE D **CAT** 3 SLCS STORAGE TANK LEVEL	Downgraded variable from Cat 2 to Cat 3. See Section II.N	NR	NR	NR	NR	A	NR	NR	NR	O	A	O	O
TYPE D **CAT** 2 RHR SYSTEM FLOW		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D **CAT** 2 RHR HEAT EXCHANGER OUTLET TEMPERATURE		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D **CAT** 2 COOLING WATER TEMPERATURE TO ESF SYSTEM COMPONENTS		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D **CAT** 2 COOLING WATER FLOW TO ESF SYSTEM COMPONENTS		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D **CAT** 3 HIGH RADIOACTIVITY LIQUID TANK LEVEL		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE D **CAT** 2 EMERGENCY VENTILATION DAMPER POSITION		O	NR	A	NR	A	NR	O	NR	O	A	O	O

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE D CAT 2 STATUS OF STANDBY POWER AND OTHER SOURCES OF ENERGY IMPORTANT TO SAFETY		O	O	A	NR	A	NR	O	NR	O	A	O	O
TYPE D CAT 3 BYPASS VALVE POSITION	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE D CAT 3 CONDENSER HOTWELL LEVEL	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE D CAT 3 CONDENSER VACUUM	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE D CAT 3 CONDENSATE FLOW	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE D CAT 3 RECIRCULATION FLOW	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE D CAT 3 DRYWELL ATMOSPHERE TEMPERATURE	Added plant specific variable for more information. See Section II.O	NR	NR	NR	NR	NR	NR	NR	NR	O	A	A	O
TYPE E CAT 1 PRIMARY CONTAINMENT AREA RADIATION - HIGH RANGE		A	A	A	O	A	A	A	O	O	A	A	O
TYPE E CAT 2 REACTOR BUILDING OR SECONDARY CONTAINMENT AREA RADIATION	Not required at PNPS. See Section II.P												

TABLE 1 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX

Variable	Deviations	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
TYPE E CAT 3 RADIATION EXPOSURE RATE	RANGE deviation. See Section II.Q	NR	NR	NR	NR	AWJ	NR	NR	NR	O	A	A	O
TYPE E CAT 2 NOBLE GASES AND VENT FLOW RATES (COMMON PLANT VENT)		O	NR	A	NR	A	NR	O	NR	O	O	O	O
TYPE E CAT 3 PARTICULATES AND HALOGENS	See Section II.R for additional information on range.	NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 AIRBORNE RADIOHALOGENS AND PARTICULATES	See Section II.S for additional information on range.	NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 PLANT ENVIRONS RADIATION (PORTABLE)		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 PLANT ENVIRONS RADIOACTIVITY (PORTABLE)		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 METEOROLOGY		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 PRIMARY COOLANT AND SUMP		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O
TYPE E CAT 3 CONTAINMENT AIR		NR	NR	NR	NR	A	NR	NR	NR	O	A	A	O

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
AO203-1A AO203-2A MSIV LINE "A"		A	O	A	O	A	A	O	O	O	A	A	O
AO203-1B AO203-2B MSIV LINE "B"		A	O	A	O	A	A	O	O	O	A	A	O
AO203-1C AO203-2C MSIV LINE "C"		A	O	A	O	A	A	O	O	O	A	A	O
AO203-1D AO203-2D MSIV LINE "D"		A	O	A	O	A	A	O	O	O	A	A	O
MO220-1 MO220-2 MAIN STEAM DRAIN		O	O	A	O	A	A	O	O	O	A	A	O
MO1201-80 (Check valve 6-58A) RWCU RETURN	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	A	O
MO1301-49 (Check valve 1301-50) RCIC PUMP DISCHARGE	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
MO2301-8 (Check valve 2301-7) HPCI PUMP DISCHARGE	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
MO1001-47 MO1001-50 RHR S/D COOLING		O	O	A	O	A	A	O	O	O	A	O	O
MO1201-2 MO1201-5 RWCU SUCTION		O	O	A	O	A	A	O	O	O	A	A	O
SV5065-31B SV5065-35B H2 /O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O

A - Acceptable, meets the RG1.97 design and qualification criteria.
O - Open, see descriptions in Section III.
AWJ - Acceptable with justification.
NR - Not required, no specific provision required in RG1.97 Table 1.

[1] See Section II.T for Boston Edison's position on compliance with electrical separation and isolation design criteria.

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
MO1400-24A MO1400-25A CORE SPRAY TO REACTOR		O	O	A	O	A	A	O	O	O	A	A	O
MO1400-24B MO1400-25B CORE SPRAY TO REACTOR		O	O	A	O	A	A	O	O	O	A	O	O
MO1001-60 MO1001-63 RHR HEAD SPRAY	Disarmed valves. Not part of RG1.97 program. See Section II.G.2.a												
AO7017A AO7017B R/W COLLECTION AND D/W FLOOR SUMP		O	O	O	O	A	A	O	O	O	A	O	O
AO7011A AO7011B R/W COLLECTION AND D/W FLOOR SUMP		O	O	O	O	A	A	O	O	O	A	O	O
MO4002 RBCCW RETURN	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
AO5043A AO5043B DRYWELL 2" EXHAUST BYPASS		O	O	A	O	A	A	O	O	O	A	O	O
AO5044A AO5044B DRYWELL PURGE EXHAUST		O	O	A	O	A	A	O	O	O	A	O	O
SV5081A SV5081B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
SV5082A SV5082B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation 1	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
AO5033B AO5035A DRYWELL/ TORUS PURGE		O	O	A	O	A	A	O	O	O	A	O	O
AO5035A AO5035B DW/ PURGE MAKEUP		O	C	A	O	A	A	O	O	O	A	O	O
SV5085A SV5085B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
SV5086A SV5086B POST ACCIDENT PURGE AND VENT		O	O	A	C	A	A	O	O	O	A	O	O
AO5033A (Check valve 9-CK-340) NORMAL N2 MAKEUP TO DRYWELL	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
SV5065-33A SV5065-37A H2/O2 ANALYZER AND PASS SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
CV5065-91 CV5065-92 C-19 O2 ANALYZER RETURN		O	O	A	O	A	A	O	O	O	A	A	O
737A, 737B, 737C, 737D TIP BALL VALVES	Downgraded variable from Cat 1 to Cat 3. See Section II.G.3.	NR	NR	NR	NR	A	NR	NR	NR	O	A	O	O
736A, 736B, 736C, 736D TIP SHEAR VALVES	Downgraded variable from Cat 1 to Cat 3. See Section II.G.3.	NR	NR	NR	NR	A	NR	NR	NR	O	A	O	O
FCV302-120 FCV302-123 CRD WITHDRAW	Not part of RG1.97 program. See Section II.G.2.b												

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
SV302-121 SV302-122 CRD WITHDRAW	Not part of RG1.97 program. See Section II.G.2.b												
MO1001-23A MO1001-26A RHR TO DRYWELL SPRAY		O	O	A	O	A	A	O	O	O	A	A	O
MO1001-23B MO1001-26B RHR TO DRYWELL SPRAY		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-63 SV5065-64 PAS RX SAMPLE		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-85 SV5065-86 PAS RX SAMPLE		O	O	A	O	A	A	O	O	O	A	O	O
AO220-44 AO220-45 REACTOR SAMPLE LINE		O	O	A	O	A	A	O	O	O	A	A	O
SV5065-24A SV5065-26A H2/O2 AND PASS GAS RETURN		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-13B SV5065-20B H2/O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
MO1001-28A MO1001-29A LPCI INJECTION		O	O	A	O	A	A	O	O	O	A	A	O
MO1001-28B MO1001-29B LPCI INJECTION		[illegible]	O	A	O	A	A	O	O	[illegible]	A	A	O
MO2301-4 MO2301-5 HPCI TURBINE STEAM SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
MO1301-16 MO1301-17 RCIC STEAM TO TURBINE		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-14A SV5065-21A H2/O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
AO5033B AO5036A DRYWELL/ TORUS PURGE		O	O	A	O	A	A	O	O	O	A	O	O
AO5036A AO5036B TORUS PURGE INLET		O	O	A	O	A	A	O	O	O	A	O	O
SV5087A SV5087B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
SV5088A SV5088B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
AO5033C (Check valve 9-CK-341) NORMAL N2 MAKEUP TO SUPPRESSION POOL	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
MO1001-36A MO1001-36B RHR TEST RETURNS	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												
MO1001-18A MO1001-18B RHR MINIMUM FLOW	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												
MO1001-34A MO1001-37A RHR TO SUPPRESSION POOL SPRAY		O	O	A	O	A	A	O	O	O	A	A	O

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
MO1001-34B MO1001-37B RHR TO SUPPRESSION POOL SPRAY		O	O	A	O	A	A	O	O	O	A	O	O
MO2301-33 MO2301-34 HPCI TURBINE EX VAC BRKR		O	O	A	O	A	A	O	O	O	A	O	O
CV90[illegible] CV90[illegible]B HPCI GLAND SEAL CONDENSER		O	O	O	O	O	O	O	O	O	O	O	O
MO1301-25 RCIC PUMP SUCTION FROM TORUS	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												
MO2301-36 HPCI PUMP SUCTION FROM TORUS	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												
MO1001-7A,7B,7C,7D RHR PUMP SUCTION	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												
AO5040A (Check valve X-212A) TORUS VACUUM BREAKERS ISOLATION	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
AO5041A AO5041B TORUS EXHAUST BYPASS		O	O	A	O	A	A	O	O	O	A	O	O
AO5042A AO5042B TORUS MAIN EXHAUST		O	O	A	O	A	A	O	O	O	A	A	O
AO5025 AO5042B DIRECT TORUS VENT ISOLATION		O	O	A	O	A	A	O	O	O	A	A	O

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation [1]	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
SV5083A SV5083B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
SV5084A SV5084B POST ACCIDENT PURGE AND VENT		O	O	A	O	A	A	O	O	O	A	O	O
AO5040B (Check valve X-212B) TORUS VACUUM BREAKERS ISOLATION	REDUNDANCY deviation. See Section II.G.1	O	O	A	O	A	AWJ	O	O	O	A	O	O
SV5065-15B SV5065-22B H2/O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
CV5046 (Check valve 31-CK-434) AIR TO DW TO TORUS VACUUM BREAKERS	REDUNDANCY deviation. See Section II.G.1	O	O	O	O	O	AWJ	O	O	O	O	O	O
SV5065-77 SV5065-78 PAS LIQUID RETURN		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-71 SV5065-72 PAS LIQUID RETURN		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-11A SV5065-18A H2/O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
SV5065-25B SV5065-27B H2/O2 ANALYZER SUPPLY		O	O	A	O	A	A	O	O	O	A	O	O
MO1400-3A MO1400-3B CORE SPRAY SUCTION	Terminate below suppression pool. Not part of RG1.97 program. See Section II.G.2.c												

TABLE 2 - PNPS REGULATORY GUIDE 1.97 COMPLIANCE MATRIX FOR PRIMARY CONTAINMENT ISOLATION VALVES

Valves	Deviation	EQ	Seismic Qual	Power Source	Separation/ Isolation 1	Range	Channel Redund	Channel Avail	Equip ID	Human Factors	Display	QA	Testing
MO1001-21 MO1001-32 RHR DISCHARGE TO RADWASTE	Not part of RG1.97 program. See Section II.G.2.d												