BOSTON EDISON COMPANY
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SENIOR VICE PRESIDENT
NUCLEAR

Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing
Office Of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

September 24, 1984
BECo #84-162

Subject: Environmental Qualification Of Safety-Related Electrical Equipment at Pilgrim Nuclear Power Station

References:
1) Telephone conversation between Paul Leech and P. Shemanski of NRC and BECo on 8/14/84
2) BECo Letter No. 84-119 dated August 3, 1984, W. D. Harrington to D. B. Vassallo
3) BECo Letter No. 84-099 dated July 9, 1984, W. D. Harrington to D. B. Vassallo

Dear Sir:

Reference (2) and (3) provided you with BECo resolution of Franklin TER equipment items and those equipment items that have been added to BECo Equipment Qualification program since the issuance of TER, respectively. For those equipment items for which the documentation for environmental qualification was not yet established at the time Reference (2) & (3) were prepared and submitted, BECo provided you with a justification for continued operation (JCO) as enclosures to the submittals. BECo also provided you with matrix of Equipment Identification No's (ID's), Type and Manufacture/Model No. and how their qualification concerns were resolved.

Based on the preliminary review of BECo Submittals conducted by your staff BECo was requested per telecon on 8/14/84 that all JCO's submitted be reformated to include Equipment Type, Manufacturer and Model No. Your staff also conveyed to us that the JCO's generally comply with the Staff guidelines and requirements.

Enclosure to this letter provides you with all JCO's reformated as requested as well as certain new JCO's for equipment which BECo had not included in Reference 2 and 3. These JCO's are identified by an asterix against the equipment identification No. The new JCO's have resulted from our continuing evaluation of equipment for environmental qualification.

We would be pleased to answer any questions you may have regarding the enclosed information.

DESIGNATED ORIGINAL
Certified By PHL

Very truly yours,
W D Harrington
W. D. Harrington

Enclosure (1) Justification For Continued Operation

TAV/mm

A045 Limited to Dist
50-293

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO220-2
TER No. 1 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ensor Date: 9/19/84

Approval: R E Grazio Date: 9/20/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

MO220-2 operates the outboard isolation valve for the MSIV drains. The valve is located outside containment in the steam tunnel and is normally closed during plant operation except during steam line warmup or while equalizing the pressure differentials across closed MSIVs in preparation for opening. The valve is automatically closed if low-low reactor vessel level, high steam line radiation, high main steam line space temperature, high steam line flow, low steam line pressure at the turbine inlets or high reactor vessel water level is sensed. The valve could be exposed to a harsh steam and radiation environment during a PBOC-7, 8 or 9, (steam line break in steam tunnel), or to a harsh radiation environment during any other PBOC or a PBIC.

Systematic Analysis

During a PBIC or PBOC, this valve's design function is to close to provide containment isolation and prevent the release of excessive amounts of radioactive material from the drywell. In most cases, the valve would already be shut and would simply have to remain shut (i.e., not perform an "active" function). There is no credible cause for a subsequent spurious opening caused by the harsh environment since all potential sensitive control components are located in panels 903, 904 and 941 in the control and cable spreading rooms. In the rare event of a PBIC or a PBOC other than a PBOC-7, 8, or 9, during steam line warm up or while bypassing the MSIVs for opening, the valve would have sufficient time to close prior to encountering a harsh environment.

During a PBOC-7, 8, or 9, MO220-2 is required to close to provide containment isolation preventing release of excessive amounts of radioactive material from the drywell, and to terminate the transient if the break is in the drain line. In the event that the break is in an unisolated main steam line then 220-1 and 220-2 would normally be closed and would remain closed as previously discussed. If the break were in the drain line, MO220-1 would not be immediately affected by the harsh environment and would be capable of closing.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO220-2
TER No. 1 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eaton Date: 9/19/84

Approval: K L Graise Date: 9/20/84

Technical Analysis

MO220-2 is equippped with a Peerless DC motor utilizing Class "B" insulation for which limited qualification documentation is available. Limitorque qualification test report B0003 documents the testing of an actuator of similar design (but with a Peerless AC motor with Class "B" insulation rather than a DC motor) in a steam and radiation environment to 250°F, 25 psig and 2×10^7 rads. The test profiles envelope the service profiles for all postulated transients except for temperature during the first minute of a PBOC-8 (main steam line break in the steam tunnel). However, the thermal inertia of the operator in a super heated steam environment, as documented in Limitorque Test Report B0027, will result in temperatures within the vital portions of the actuator and motor which are enveloped by the qualification test. The results of Limitorque Report B0003 therefore justify the capability of Class B insulation to withstand the service environment. Limitorque Qualification Test Report B0009 documents the testing of an actuator of similar design (but with a Peerless DC motor with Class "H" rather than Class "B" insulation) in a steam and radiation environment which envelopes the service environment for all postulated transients affecting MO220-2. The results of Limitorque Test Report B0009 demonstrate the capability of the commutator and brushes of a Peerless Motor to withstand the service environment. Based on these considerations, the operability of MO220-2 is adequately assured and continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M04002
TER No. 2

Sheet 1 of 1

Preparer: W S Clamy Date: 8/24/84

Independent Review: M R Ensor Date: 8/24/84

Approval: R C Mecredy Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

M04002 is the operator for the Class C Containment Isolation Valve in the Reactor Building Closed Cooling Water (RBCCW) Return Line from the drywell HVAC coolers. This valve, which is located in the torus compartment, is normally open and can be manually closed to prevent the release of excessive amounts of radioactive material from the drywell.

M04002 would be exposed to a harsh radiation environment during a PBIC/LOCA. However, the LOCA would have to be of sufficient magnitude and in the proper location to result in a missile or jet impingement sufficient to sever the RBCCW piping within the containment. The failure of the RBCCW piping would be almost immediately indicated in the control room by a variety of off normal alarms for the RBCCW System. The operators could be expected to diagnose this condition and remotely close M04002 from the control room in a relatively short period of time. M04002 is qualified for a radiation exposure of 2×10^7 rads as documented in Limitorque Qualification Report B0003 and would therefore remain operable for period in excess of 30 days based on projected radiation exposures. This would allow sufficient time for diagnosis and closure to occur.

M04002 would be exposed to a harsh environment during a PBOC-5 (HPCI Break in the Torus Compartment). Although not required, M04002 would remain in the open position to provide drywell cooling and would not be actively required to function. All potentially sensitive control components are located in a mild environment and would not be affected by the PBOC.

Based on this discussion, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-63
TER No. 3 Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: J L Rogers Date: 8/24/84

Approval: S E Merrill Date: 8/24/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-5

M01001-63 is the operator for the inboard isolation valve for RHR head spray during shutdown cooling (SDC) operation. This valve can be opened during SDC to maintain saturated conditions in the reactor vessel head during reactor cooldown in order to permit a more rapid/accelerated flooding of the vessel. However, the valve is normally shut during SDC and power operations. The valve is located in containment zone 1.30 elevation 84'. The valve can be operated remotely from the control room and will automatically close in the event that low reactor vessel level, high drywell pressure or high reactor vessel pressure is sensed.

The only safety function which this valve operator performs that can be challenged by a harsh environment is that of providing containment isolation during a PBIC or a PBOC. However, the valve need not provide an "active function" since it need only remain in the normally closed position. There is no credible means for this valve to subsequently fail open as a result of the harsh environment since all potentially sensitive control circuitry is located in panels 903 and 941 in the control and cable spreading rooms.

In the rare event that a PBIC or PBOC did occur with SDC in operation, the valve would be called upon to close. However, the environment to which it was exposed would be considerably less harsh than that associated with a similar transient starting from power operation. In this event, it is believed that this valve would be able to close well before its operability would be challenged. In addition, redundancy is provided by closure of the inboard check valve (1001-64) and the outboard isolation valve (1001-60).

Since capability has been shown for the performance of the required safety function(s) and since the valve would not be required to change states at any subsequent time, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-4
TER No. 4a

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Rogers Date: 8/29/84

Approval: R S Hayes Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2-60

MO2301-4 operates the inboard isolation valve in the steam supply line to the HPCI turbine. The valve is mounted within the drywell and is actuated open in the event that reactor vessel low-low water level or high drywell pressure is sensed. The valve is over-ridden closed in the event that a HPCI steam line break is identified by high HPCI steam line space temperature or high HPCI steam line flow. The valve is normally open during operation. Potentially sensitive control circuitry for this valve is mounted in panels 903, 939 and 941 in the control room and cable spreading room and would not be subject to a harsh environment.

FSAR section 6.5.1.2.2, Safety Evaluation for the HPCIS, describes the HPCI system as one "designed to provide adequate reactor core cooling for small breaks." On this premise, a detailed analysis concluded that the "core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." During such events, MO2301-4 fulfills a safety function of opening/remaining open to supply steam to the HPCI turbine and therefore facilitate HPCI operation. However, since no core damage results from those events for which HPCIS operation is essential, those components such as MO2301-4 that are considered essential for HPCIS operation will not be exposed to radiation in excess of that experienced during normal operation. In the event that the small break PBIC exposes MO2301-4 to a harsh steam environment there is a small chance that MO2301-4 could be rendered inoperable prior to opening. However, ADS/LPCI and ADS/CS would be available for redundant protection. MO2301-4 therefore need not be demonstrated to be operable for PBIC.

In the event of a PBOC in the HPCI steam lines, 2301-4 and its paired outboard isolation valve (2301-5) are required to close to prevent the excessive loss of reactor coolant and the release of radioactive material. However, there would be sufficient time delay before the PBOC caused an environment within containment sufficient to challenge the operability of MO2301-4 thus allowing automatic closure of 2301-4 to occur due to high HPCI space temperature or high HPCI steam line flow.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-4
TER No. 4a

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Rogers Date: 8/29/84

Approval: [illegible] Date: 8/30/84

During any other PBOC, HPCI would be required to operate for core cooling following isolation of the leak. PNPS FSAR analyses indicates that fuel failure would not occur during any PBOC and M02301-4 would not be exposed to a harsh environment. Therefore, the valve would remain in the desired normally open position since potentially sensitive control components would not be affected by the harsh environment.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01301-16
TER No. 4b Sheet 1 of 1

Preparer: W A Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R E Shaw Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-10

M01301-16 operates the inboard isolation valve in the steam supply to the RCIC turbine. The valve is located within containment at elevation 41 and is normally open during plant operation. The valve is opened automatically if a reactor vessel low low level is sensed and will be automatically overridden closed in the event that a RCIC steam line leak is sensed by indications of either high RCIC steam space temperature or high RCIC steam flow. The valve serves a dual safety role of supplying steam to the RCIC pump turbine following a Control Rod Drop (the only accident for which RCIC operation is credited) or to provide containment isolation and terminate a PBOC-4 (RCIC Steam Line Break in the RCIC Valve Station) or a PBOC-6 (RCIC Steam Line Break in the RCIC Pump Room). The valve operator is equpped with a Reliance electric motor which was rewound with Class "H" insulation material by the GE Apparatus Service Shop in Medford, MA 8/2/80. A comparison of the GE Class "H" rewind materials with the Reliance Class "HR" OEM materials showed the rewind materials to be similar or equivilent. M01301-16 is therefore similar to the motor operator whose qualification testing was documented in Limitorque Test Report 600376A.

During a PBOC-4 or a PBOC-6, M01301-16 would be exposed to increased radiation as a result of fuel failure while being required to shut to provide containment isolation and terminate the transient. However, the radiation exposures experienced by M01301-16 for any PBOC are enveloped by the qualification testing documented in Limitorque Report 600376A. In addtion, redundant isolation would be provided in all cases except a PBOC-4 by the outboard isolation valve operated by M01301-17.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO220-1
TER No. 4c

Sheet 1 of 1

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ewing Date: 9/19/84

Approval: K L Graves Date: 9/20/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

MO220-1 operates the inboard isolation valve for the MSIV drains. The valve is located within containment (zone 1.30 at elevation 18') and is normally closed during plant operation except during steam line warmup or while equalizing the pressure differentials across closed MSIVs in preparation for opening. The valve is automatically closed if low-low reactor vessel level, high steam line radiation, high main steam line space temperature, high steam line flow, low steam line pressure at the turbine inlets or high reactor vessel water level is sensed. The valve could be exposed to a harsh steam and radiation environment during a PBIC or to a harsh radiation environment following a PBOC. The design function of MO220-1 is to close to provide containment isolation and prevent the release of excessive amounts of radioactive material from the drywell. The actuator is presently equipped with a stock replacement Reliance Electric motor with Class "RH" insulation. Limitorque Qualification Test Report B0058 and Appendix B document the qualification testing of a similar actuator with a Reliance Electric motor utilizing Class RH insulation. The qualification profile envelopes the service profile for all parameters for any postulated transient affecting MO220-1. MO220-1 is therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal strips were used for power cable termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-50
TER No. 5

Sheet 1 of 2

Preparer: W S Canny Date: 8/24/84

Independent Review: M R Ei Date: 8/24/84

Approval: R C Canny Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2-40 (w/brake)

M01001-50 operates the inboard isolation valve in the RHR pump shutdown cooling (SDC) suction supply line for the recirculation system. This valve is located within containment at elevation 50' (zone 1.3). The valve serves a containment isolation function during a PBIC or PBOC. The valve also serves to allow return flow from the recirculation system to the RHR pumps during SDC operation. The valve has a 30 day mission length.

Communications with the vendor have documented that the operator, motor and brake installed on 1001-50 are similar and/or equivalent to equipment tested in Limitorque Reports 600198 and 600376A. Continued operation can therefore be justified on the following basis:

o Qualification Method

This component is qualified per Limitorque Test Reports 600198 and 600376A. The qualification method used in report 600198 is in accordance with the DOR guidelines with the exception of radiation. Report 600376A, which is in accordance with the DOR guidelines, qualifies this component for radiation.

o Temperature and Pressure

Per Limitorque test report 600198 and communications from the Limitorque Corp. and Wyle Labs, this motor operator has been successfully tested to a temperature and pressure profile which envelops the service profile for all postulated transients.

o Qualification Time

Per Limitorque Test Report 600198, this component was tested for a period of 7 days, with a test profile more severe than the service profile. The service profile returns to normal conditions within approximately 6 days. However, a degradation equivalency analysis of both the motor and switch compartment components proved the 7 day test to be more severe than the 30

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO-1001-50
TER No. 5 Sheet 2 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ewa Date: 8/24/84

Approval: R C Mecredy Date: 8/27/84

day accident where the accident temperature is at or below 100°F for 692 hours. Based on this analysis, adequate margin exists to ensure that this component will continue to perform its intended function for the duration of its required mission length.

o Radiation

Per Limitorque Test Report 600376A, this type of motor operator has been successfully tested to a radiation exposure of 2×10^8 rads. Based on communications from Limitorque, Test Report 600376A is applicable to this operator for radiation qualification purposes. This test was performed in accordance with DOR Guidelines. The total integrated dose for this component is less than the qualified dose.

o Aging (160°F)

Component materials of the Limitorque actuators have been identified. Evaluation of these materials has been performed per DOR Guidelines and using Arrhenius Analysis Techniques. With the exception of the lubricants, the components of the actuators are considered insensitive to aging effects at a 160°F temperature. Lubricants were previously renewed by changeout.

o Drywell High Temperature (240°F)

The age sensitive components of the Limitorque actuators (the lubricants, seals, gaskets, and jumper wires) were previously inspected and replaced as necessary. The limit switches, torque switches, terminal blocks, and terminal strips were previously inspected and verified to be as tested. The Class H motors, per Limitorque requirements, was previously inspected and meggered for operation. The limit switch gear frames were previously inspected and verified to be as tested. The limit switch compartment cover was previously inspected and judged acceptable for operation by Limitorque.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01201-2
TER No. 5 Sheet 1 of 1

Preparer: W S Clamy Date: 8/24/84

Independent Review: M R Eisen Date: 8/24/84

Approval: W S Clamy Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-15

M01201-2 operates the 6" inboard isolation valve in the RWCU supply line from the reactor vessel. The valve is located within containment at elevation 48' and is normally open during plant operation. The valve is automatically closed if reactor vessel low level, SLCS initiation, high temperature in the RWCU space or high RWCU flow is sensed. M01201-2 can be exposed to a harsh environment during a PBIC or a PBOC. Since all potentially sensitive control components are located in mild environments spurious actuation of M01201-2 is not deemed credible.

During a PBIC, M01201-2 is exposed to a harsh steam and radiation environment. The valve's safety function during the transient would be to close for containment isolation and prevent the release of excessive amounts of radioactive material from the drywell. M01201-2 would also be exposed to a harsh radiation environment while being required to close during a PBOC for containment isolation and in the case of a PBOC-2B/2T to also terminate a leak from the RWCU System.

Limitorque has confirmed that this valve operator was built to the same specifications as operators tested and reported in Limitorque Qualification Test reports 600198 and 600376A. However, actuator replacement is planned for documentation purposes.

The qualification testing profiles documented in Limitorque reports 600198 and 600376A envelope the service profiles over the required mission length for all postulated transients. In addition, redundant isolation can also be shown in all cases by the series outboard valve 1201-5.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M0202-5A, M0202-5B
TER No. 6 Sheet 1 of 2

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: P E Yandow Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-3-100

M0202-5A/5B are the operators of the recirculation pump discharge isolation valves. These valves are normally open during power operation but the valve in the undamaged recirculation loop is automatically signaled shut for injection loop selection during a LPCI initiation. The valve operators include a motor and magnetic brake for which complete radiation qualification data is not available. Failure of these components could result in the valve not closing or only partially closing.

- Systematic Analysis

One of these two valves is signaled closed immediately following detection of a LOCA/PBIC from the other recirculation system loop. However, closure of the valves is only required in the event of a double ended rupture of the pump suction piping. The 10CFR50.46 ECCS Acceptance Criteria is satisfied providing that the recirculation pump discharge valve in the unaffected loop closes and the LPCI injection valve on the same recirculation loop opens. The pump discharge valve in the affected loop is left open to maximize reactor vessel blowdown and accelerate recirculation system depressurization to the LPCI threshold and therefore does not need to actively function. For a complete, guillotine rupture of the pump discharge piping, the two redundant low pressure core spray subsystems would provide sufficient emergency core cooling.

These valves are not expected to fail as a result of radiation damage. The incremental increase in accumulated radiation dose from a large break LOCA should not prevent valve closure, since the valve operates within the first minute of the accident.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M0202-5A, M0202-5B
Sheet 2 of 2
TER No. 6

Preparer: W A Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R E Grazio Date: 8/30/84

- Technical Analysis

Limitorque Qualification Report 600198 and Limitorque Qualification Report 600376A describe the separate testing of a similar valve operator as well as a similar motor and magnetic brake assembly. The testing involved an irradiation of 200 megarads and exposure to a harsh steam environment for thirty days at temperatures/pressures as high as 329°F/90 psig for the first hour without deleterious effects. The Dings Company, which manufactured the brakes for Reliance Electric, has verified that the brakes were constructed using Class "H" insulation. Wyle Labs has subsequently performed a material analysis which determined that the brake materials are similar or equivilent to those used in the motor and/or brake assemblies tested as documented in 600198/600376A. The total integrated design basis PBIC 30 day estimated integrated dose (6.6×10^7 Rads) is significantly less than the tested dose and the test temperature and pressure profile envelop the service profile for these components. An inspection of the switch compartment was previously performed to verify the condition of components and to replace those not meeting the standards for use within containment. All potentially age sensitive components of the operators have been evaluated using Arrhenius Analysis Techniques and with the exception of lubricants are considered to be insensitive to aging effects at 160°F. Lubricants were previously renewed by changeout. Wyle Labs has performed the necessary life/aging calculations to justify continued operation to the end of cycle 7.

Based on these consideration, continuation of operation is justified until such time as qualified replacements (which have been ordered) can be installed without impacting plant availability.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO/N-109, MO/N-113
TER No. 7, 8 Sheet 1 of 1

Preparer: NR Ervin Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Damper Actuator
MANUFACTURER: Honeywell
MODEL: M940A1067-1

These components are the outlet dampers for SGTS filter trains and are required to open upon a Standby Gas Treatment System initiation signal. The motor operators for the dampers were deenergized by removing the fuses and the dampers are positioned such that the required airflow of 4000 scfm is maintained. Therefore, failure of this item will not affect SGTS operation and continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-60
TER No. 9 Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: J L Rogers Date: 8/24/84

Approval: R C Mecredy Date: 8/24/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

M01001-60 operates the outboard block valve for reactor vessel head spray during shutdown cooling. This valve is normally closed but can be opened during shutdown cooling (SDC) to maintain saturated conditions in the reactor vessel head during reactor vessel cooldown and permit a more rapid/accelerated flooding of the vessel. The valve is located outside containment in the fuel pool cooling heat exchanger room (zone 1.13) and could be exposed to a harsh radiation environment during a PBIC or PBOC.

During the occurrence of a PBIC or PBOC with SDC not in service, this valve would remain in the normally closed position since potentially sensitive control components will not be affected by a harsh environment. Although the valve might not subsequently be capable of opening to accelerate vessel flooding during SDC initiation, it is not required to be open to achieve SDC.

During the occurrence of a PBIC or PBOC with SDC in service, this valve would be automatically signaled closed upon receipt of a LPCI initiation signal to isolate SDC from the reactor vessel. Based on the full power PBOC/PBIC integrated dose estimates, approximately 10 minutes would elapse prior to this valve being exposed to a harsh radiation environment thus allowing M01001-60 more than sufficient time to close. Although the valve would be inoperable for subsequent reinitiation of SDC, it is not required as discussed above.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-23A/23B, M01001-26A/26B
TER No. 11, 20 Sheet 1 of 1

Preparer: W S Clamp Date: 8/24/84

Independent Review: J R Rogers Date: 8/29/84

Approval: K E Grada Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-40

M01001-23A/23B and M01001-26A/26B operate the containment isolation valves for the containment spray portion of the RHR system. M01001-23A and M01001-26A are located outside containment in the RWCU heat exchanger room (zone 1.11A). M01001-23B and M01001-26B are also located outside containment at the RCIC Valve Station. These valves are all normally closed.

These valves are expected to be remotely opened by an operator in the control room during a small break steam leak within containment to prevent exceeding the drywell design temperature. Although the valves are normally closed, it is our engineering judgement that there would be sufficient time to open these valves and actuate containment drywell spray prior to these valves being exposed to a harsh radiation environment.

During a PBOC, these valves are exposed to either a harsh steam and radiation environment or to a harsh radiation environment alone. However, in all cases, these valves are required to remain in their normally closed position and are not required to actively function. Subsequent spurious actuation of the valves is not deemed credible since all potentially sensitive control components are located in mild environments.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1400-25A, MO1400-25B
TER No. 12, 10b Sheet 1 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ewa Date: 8/24/84

Approval: R F Casey Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-3-100

MO1400-25A/B are the operators for the downstream/isolation valves for the core spray lines. MO1400-25A is located in RWCU Heat Exchanger Compartment (Zone 1.11A) and MO1400-25B is located in an open area of the reactor building at elevation 51' (Zone 1.12). Both valves are normally closed but will automatically open once reactor vessel pressure has decreased to approximately 400 psig (following manual initiation or indication of low reactor vessel water level or high drywell pressure) to allow core spray to provide a core cooling safety function. The valves can be exposed to a harsh environment during a PBIC or a PBOC. The valves are equipped with a motor and electrical brake for which complete qualification data is not available.

Over the full range of analyzed PBIC break sizes, reactor vessel pressure can be shown to decrease, either due to direct blowdown (large break) or ADS (small break) without assistance from HPCI/RCIC to 400 psig or less in 5 minutes or less. A design basis PBIC manifests a hazardous radiation environment in the area where MO1400-25A/B are located within approximately 7 minutes. However, since the valves are designed to operate in 10 seconds or less, completion of the open cycle prior to exposure is adequately assured. In addition, a similar motor and brake demonstrated the capability of withstanding a 200 megarad exposure (which is well in excess of the design PBIC exposure) without deleterious effect as documented in Franklin Report F-C4411. Once the valves had opened, they are expected to remain open and available for use in long term core cooling since all potentially sensitive control components are not expected to be affected.

Both MO1400-25A and MO1400-25B would be affected by a harsh steam and radiation environment caused by a PBOC-2T (RWCU line break in the RWCU Heat Exchanger Room). However, the A & B LPCI train would be available to fulfill the core cooling safety function.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01400-25A, M01400-25B
TER No. 12, 10b Sheet 2 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ellis Date: 8/24/84

Approval: Q A Clancy Date: 8/27/84

Both M01400-25A and M01400-25B would be exposed solely to harsh radiation environments during all other PBOCs. However, both valves would be capable of achieving their intended open positions prior to a harsh exposure level being reached. In addition, the capability of a similar motor/operator combination to remain operable for exposures up to 2×10^8 rads was documented in F-C3441 as previously discussed.

Since protection can be demonstrated in the event of all potential harsh environments challenging these valve operators, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01400-24A, M01400-24B
TER No. 13, 10a Sheet 1 of 1

Preparer: W J Cleary Date: 8/24/84

Independent Review: N R Ensin Date: 8/24/84

Approval: R C Mecredy Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-3-80

These valves are the "upstream" outboard isolation valves in the core spray (CS) supply lines. These valves are located outside the drywell in zones 1.11A (RWCU Heat Exchanger Room) and 1.12 (open area at elevation 51) respectively and could be exposed to a harsh environment during a PBOC or PBIC. The valves are normally open and are controlled by remote manual actuation from the control room or automatic open actuation in the event that low low reactor vessel level or high drywell pressure are sensed concurrent with low reactor pressure.

The core spray system provides protection (core cooling) for large or small breaks in the nuclear system when feedwater, control rod drive water, RCIS and HPCIS are unable to maintain reactor vessel water level and, in the case of small breaks, when the ADS has lowered reactor pressure below CS pump shutoff head. During such transients, the design function of these two valves is to open or remain open to permit injection of CS. However, the valves are not required to actively function (i.e., change position) during such transients, either PBIC or PBOC, since they are normally maintained in the open position. There are no credible mechanisms for inducing a spurious closure during a PBIC or PBOC since all potentially sensitive control circuitry is mounted in panels 902, 932 or 933 in the control and cable spreading rooms. In addition redundant protection is provided for large break PBIC/PBOC by LPCI and for small breaks by ADS/LPCI. Continued operation is therefore considered to be justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01201-5, M01201-80
TER No. 15, 14 Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R L Gray Date: 8/30/84

EQUIPMENT TYPE: DC/AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-15/SMB-0

M01201-5 operates the outboard isolation valve in the RWCU suction line from the reactor vessel. M01201-80 operates the isolation valve in the RWCU return line. Both valves are located outside containment in the RWCU heat exchanger room (zone 1.11A) and are normally open during reactor operation. Both valves are automatically signaled shut to terminate a RWCU linebreak upon detection of a high flow rate to RWCU or a high temperature in the RWCU spaces, or to provide containment isolation if low reactor vessel level is detected. These valves are exposed to a harsh steam and radiation environment during a PBOC-2T (RWCU line break in the RWCU heat exchanger room) and to a harsh radiation environment during a PBIC and all other PBOCs. In all cases, these valves are required to close and remain closed to either terminate the leak and/or establish primary containment. M01201-5 is being replaced with a qualified operator under the valve betterment program. Limitorque Report B0003 documents the qualification testing of a valve operator and motor similar to M01201-80 in a harsh steam and radiation environment that envelopes the service profile for both valve operators for all postulated transients including a PBOC-2T. M01201-80 is therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal strips were used for power cable termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-5
TER No. 16 Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: J L Rogers Date: 8/29/84

Approval: P L Grazio Date: 8/30/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-1-60

MO2301-5 operates the outboard isolation valve in the steam supply line to the HPCI turbine. The valve is located outside containment in the RHR/HPCI Valve Station (zone 1.10B) and is normally open. During a transient requiring HPCI operation, the valve's function is to open and remain open over a 5 hour mission time to supply steam to the HPCI pump turbine.

The FSAR Section 6.5.1.2.2 Safety Evaluation of the HPCI System, describes the system as one "designed to provide adequate reactor core cooling for small breaks." On this premise, a detailed analysis concluded that the "core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI system." Based on the prevention of core damage for those small break PB1C events requiring HPCI operation, those components that are essential to HPCIS operations, such as MO2301-5, will not be exposed to radiation during such transients in excess of levels occurring during normal operation.

The only harsh environment to which MO2301-5 is exposed while being required to function is that caused by a PBOC-1 (HPCI Line Break in the HPCI Valve Station). The design function of MO2301-5 during this transient is to close to isolate the leak. However, the inboard isolation valve (MO2301-4) inside containment will be capable of closing prior to exposure to a harsh environment to provide isolation of the leak. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-29B
TER No. 17b Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ellis Date: 8/24/84

Approval: W S Clancy Date: 8/24/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-3-100

M01001-29B operates the downstream LPCI injection valve for the A Recirculation Loop. The valve is located outside containment in the HPCI Valve Station (zone 1.10B) and could be exposed to a harsh environment during a PBIC or a PBOC. The valve serves to allow or prohibit LPCI or shutdown cooling (SDC) flow to the B Loop and is normally open. However, M01001-29B will be automatically closed if a low reactor vessel level or high drywell pressure is sensed during SDC to isolate a possible leak from the RHR/SDC system. The valve can be overridden open using a pushbutton at the operator control switch at panel 903 in the control room following isolation reset. There is no credible cause for spurious operation of M01001-29B as a result of a harsh environment since all potentially sensitive control components are mounted in panels 903, 932 and 933 in the control and cable spreading rooms.

Limitorque Test Report B0003 documents qualification testing of a similar valve operator and motor for a harsh steam and radiation exposure (250°, 25 psig and 2×10^7 rads maximum). The qualification profile envelopes the service profile for all postulated transients affecting M01001-29B except a PBOC-1. PBOC-1 (HPCI steamline break in the HPCI valve station) exposes M01001-29B to a harsh super-heated steam and radiation environment. The PBOC-1 service profile for temperature (309.4°F maximum) exceeds the B0003 qualification profile (250°F maximum) for approximately 2 minutes. However, the thermal inertia of the valve operator in a super-heated steam environment, as documented in Limitorque Report B0027, would cause the vital portions of the valve operator and motor to lag sufficiently to be enveloped by the qualification profile. The qualification profiles for all other parameters envelope the corresponding PBOC-1 service profiles and M01001-29B will therefore remain operable.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-8
TER No. 18 Sheet 1 of 2

Preparer: WS Adams Date: 9/19/84

Independent Review: NR Ervin Date: 9/19/84

Approval: RE Grazio Date: 9/20/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-1-60

MO2301-8 serves two functions. For events requiring isolation of HPCI, MO2301-8 (a normally shut valve) serves a containment or pressure vessel isolation function. However, redundant containment and reactor vessel isolation is provided by valve 58B (feedwater line "B" check valve).

For events requiring HPCI operation, MO2301-8 opens to admit HPCI to the "B" feedwater line. The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-8
TER No. 18

Sheet 2 of 2

Preparer: W S Cowey Date: 9/14/84

Independent Review: MR Evans Date: 9/19/84

Approval: R E Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of M02301-8 are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, a harsh radiation exposure will not occur.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1301-17
TER No. 19 Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ellis Date: 8/24/84

Approval: R A Penny Date: 8/27/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

MO1301-17 operates the outboard isolation valve in the steam supply line to the RCIC pump turbine. The valve is located outside containment in the RCIC piping room (zone 1.10A) and could be exposed to a harsh operating environment during a PB1C or a PBOC. MO1301-17 is automatically signaled open if a low-low reactor vessel level is sensed and is signaled closed if a RC1C pipe break is signaled based on high RCIC turbine steam flow or high temperature in the RCIC space. The valve is normally in the open position.

During a PB1C, MO1001-17 would be automatically signaled open to admit steam to the RC1C turbine. However, RCIC operation is not credited in the analysis of this transient and therefore MO1301-17 need not be qualified to operate during this transient. It should be noted however, that MO1001-17 would be capable of opening prior to the development of a harsh radiation environment at the valve.

During a PBOC-4 (RCIC Steam Line Break in the RCIC Valve Station) or a PBOC-6 (RC1C steam line break in the RC1C Pump Compartment), MO1301-17 would be exposed to a harsh steam and radiation environment. During a PBOC-4 or PBOC-6, MO1301-17 is intended to automatically close based on indication of high steam flow to the RCIC turbine or high temperature in the RCIC space to terminate the accident. However, redundant protection would be provided by automatic closure of the paired inboard "in containment" valve (1301-16) in response to the same signals. Neither valve is required to provide a safety function for any other PBOC since RCIC is not credited for any PBOC.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-47
TER No. 21

Preparer: W S Clancy Date: 8/24/84

Independent Review: J K Rogers Date: 8/24/84

Approval: W S Clancy Date: 8/24/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2-40

M01001-47 operates the outboard isolation valve in the line running from the recirculation system to the suctions of the RHR pumps. This line is used to provide return flow from the reactor vessel during shutdown cooling (SDC) operation. This valve is therefore normally shut unless SDC is in service. The valve provides a dual safety function. During the initial stages of a PBIC or PBOC, the valve is automatically signalled closed to provide containment isolation based on an indication of low reactor vessel level or high drywell pressure. Following termination of the transient, this valve would be opened to facilitate long-term core cooling in the SDC mode of operation of the RHR system. Although the valve was assigned a 30-day mission length, the active function of opening to establish SDC is conservatively estimated to occur within 8-10 hours following the transient. There is no credible cause for spurious actuation of this valve since all potentially sensitive control components are not expected to be affected by the harsh environment. M01001-47 is equipped with a motor and brake for which only limited qualification documentation is available.

M01001-47 is located outside containment at the RHR valve station (zone 1.9A). This area is exposed to a harsh radiation and steam environment during a PBOC-7 (main steam line break in the condenser bay), a PBOC-8 (main steam line break in the steam tunnel) or a PBOC-9 (RWCU break at the RHR valve station). The area would also be exposed to solely a harsh radiation environment during a PBIC or any other PBOC. However, by procedure SDC would normally be secured and the valve would merely need to remain in the normally closed position. As a result, the valve would not be required to actively function during the initial most challenging stages of a PBIC or any PBOC other than a PBOC-9. In the highly unlikely event that a RWCU line break occurred with SDC in service, (PBOC-9) M01001-47 would be actuated closed to provide containment isolation. However, the latent energy and radiation inventory present in the primary system and core when the break occurred would be significantly less than in the analyzed design PBOC-9 event due to the lower temperature/pressure and reactor non-criticality associated with SDC operation. As a result, the environment to which M01001-47 would be exposed during its 30-second closing cycle would be significantly less harsh

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-47
TER No. 21 Sheet 2 of 4

Preparer: W J Clancy Date: 8/24/84

Independent Review: J Rogers Date: 8/24/84

Approval: W J Clancy Date: 8/24/84

than in the analyzed case. Based on this, it is our engineering judgement that M01001-47 would be capable of closing without suffering any deleterious effects. In addition, redundant containment isolation would be provided by the inboard isolation valve (1001-50) which has been demonstrated to remain functional for this event.

The only other occasion wherein M01001-47 could be called upon to actively function during exposure to a harsh environment would be during the establishment of SDC approximately 8-10 hours following a PBIC or PBOC. The ability of M01001-47 to remain operable for this function can be demonstrated based on the following discussion.

Limitorque Qualification Test Report #B0003 documents the qualification testing of an actuator similar to M01001-47 except that it was equipped with a Peerless AC motor with class "B" insulation rather than a DC motor. The qualification test profile envelops the service profile for all postulated transients affecting M01001-47. The results of this report can therefore be used to demonstrate the capability of class "B" insulation to withstand the service exposure estimated for M01001-47.

Limitorque Qualification Report #B0009 documents the qualification testing of an actuator essentially similar to M01001-47 except that it was equipped with a Peerless DC motor with class "H" rather than class "B" insulation. The qualification test profile envelops the service profile for all postulated transients affecting M01001-47. The results of this report can therefore be used to demonstrate the capability of the Peerless DC commutator and brushes to withstand the estimated service exposure of M01001-47.

M01001-47 is also equipped with a Sterns magnetic brake manufactured with class "A" insulation. Wyle Labs has performed a materials analysis of the brake and has determined that the brake should remain functional if operated under the conditions expected at the RHR valve station during the 8-10 hour post accident time frame wherein establishment of SDC is anticipated. This determination is based on the ambient conditions at the time of actuator operation being bounded by the design ratings of the limiting materials and the moisture resistant nature of the brake housing.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-47
TER No. 21 Sheet 3 of 4

Preparer: W L Clarry Date: 8/24/84

Independent Review: J Hogan Date: 8/24/84

Approval: R Sweeney Date: 8/24/84

Wyle has further determined that all of the brake materials except the Phenolic case on the coil selection switch (which has a threshold of 3.4×10^5 rads) will withstand the estimated exposure of approximately 10^6 rads, 8-10 hours following a PBIC/PBOC with core damage. However, based on a 25% damage level of 10^7 rads for this material, and the design of the switch, it is our engineering judgement that this will not impair the operability of the brake. In the unlikely event that the brake did fail and "lock up", Limitorque has indicated that they believe the valve operator would continue to operate (but at a slower speed) since the brakes are generally designed for the normal running torque, which is approximately 20% of the stall torque of the motor.

There is a potential that M01001-47 could be temporarily submerged during a feedwater line break in the steam tunnel. However, the transient is not deemed credible to occur under conditions wherein SDC would be in operation. Therefore, M01001-47 will be in its normally closed position during the submergence and will not be called upon to actively function until 8-10 hours after the temporary submergence has been alleviated. In addition, the ability of a somewhat similar operator to actively function while submerged was inadvertently demonstrated when the test chamber accidentally flooded during qualification testing documented in Limitorque Test Report 600376A. It is therefore our engineering judgement that this temporary submergence will not impair the ability of M01001-47 to subsequently operate to facilitate establishment of shutdown cooling.

Wyle Labs has also completed two additional expected life analyses. The first analysis indicated that the most limiting brake materials have an expected life of 120 years based on conditions at the time of expected operation. The second analysis determined that the qualification testing documented in Limitorque Reports B0003/B0009 is more severe than the accident environment to which M01001-47 is exposed.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-47
TER No. 21

Preparer: W S Clancy Date: 8/24/84

Independent Review: J Rogers Date: 8/24/84

Approval: R A Penny Date: 8/24/84

Based on these considerations, it is our engineering judgement that M01001-47 will remain operable to fulfill its required functions for all postulated transients resulting in a harsh environment. In the highly unlikely event that M01001-47 did not remain operable and prevented the establishment of SDC, the RCIC, HPCI or core spray systems could be utilized for coolant makeup while steaming to the torus through the relief valve(s) or pump turbines to stabilize plant conditions until such time as M01001-47 could be manually open. Based on all these considerations, continued operations is justified until a qualified replacement, which has been ordered, can be installed without impacting plant availability.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1001-28A, MO1001-28B
TER No. 22a, 17a

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Mozzi Date: 8/29/84

Approval: R F Grazio Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-5-300

MO1001-28A/28B operate the LPCI loop injection throttle globe valves. MO1001-28A is located outside containment in the RHR Valve Room (zone 1.9A) and MO1001-28B is located outside containment in the RHR/HPCI Piping Room (zone 1.10B). Both valves are required to be operable (to open if demanded) for LPCI during a PBIC/PBOC or to be open for initiation of the RHR System in the Shutdown Cooling Mode following termination of several transients. Operation of these valves could be required during exposure to a hazardous environment as a result of a PBIC or a PBOC. Limitorque report B0003 summarizes qualification testing of similar valve operators and motors to a harsh steam and radiation environment (250°F, 25 psig and 2×10^7 rad maximum).

During a PBIC, the injection throttle valve for the intact recirculation loop would be required to open and then throttle LPCI for core cooling as well as to be open for shutdown cooling for long term core cooling following termination of this transient. The harsh environment exposure would be limited to the integrated radiation exposure over the 30 day mission length which is estimated as being 4.45×10^6 rads and 3.27×10^6 rads for MO1001-28A and MO1001-29B respectively. However, component operation will not be affected since both operators are qualified to a 2.0×10^7 rad exposure per Limitorque Report B0003.

During a PBOC-1 (HPCI Steam Line Break in the HPCI Valve Station) MO1001-28B would be exposed to a harsh super-heated steam and radiation environment. However, the service profile for temperature (309°F maximum) only exceeds the qualification profile (250°F) from B0003 for approximately 2 minutes. The thermal inertia of the operator in a superheated steam environment as documented in Limitorque Report B0027, would cause the temperature in the vital portions of the operator and motor to lag sufficiently to be enveloped by the qualification profile. In addition, both trains of core spray would be available as redundant satisfaction of the core cooling safety function during the transient. SDC could be initiated following termination of the transient using MO1001-28A (which would only be subject to a radiation exposure for which it is qualified) to facilitate SDC Discharge to the A Loop.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1001-28A, MO1001-28B
TER No. 22a, 17a Sheet 2 of 2

Preparer: W S Clancy Date: 8/29/84

Independent Review: J Mozzis Date: 8/29/84

Approval: K E Grays Date: 8/30/84

During a PBOC-7, 8, or 9, MO1001-28A could be exposed to a harsh superheated steam and radiation environment. However, the service profiles for PBOC-7 and PBOC-9 are enveloped by the qualification test profiles in B0003 and MO1001-28A is therefore qualified for these transients. During a PBOC-8 (main steamline break in the steam tunnel) the service profile for temperature (251.8°F maximum) only exceeds the qualification profile (250°F maximum) for a few seconds. The thermal inertia of the operator in a super-heated steam environment as documented in Limitorque Report B0027, would cause the temperature of the vital portions of the valve operator and motor to lag sufficiently to be enveloped by the qualification profile. The qualification profiles for all other variables envelope the associated service profiles and MO1001-28A will remain operable. In addition, LPCI and SDC could be initiated through MO1001-28B in all 3 cases since its harsh exposure would be limited to a radiation environment for which it is qualified in B0003.

It should also be noted that MO1001-28A might be subject to submergence following closure in response to a feedwater line break. However, it is our engineering judgment that this will not inhibit the ability of the operator to function based on the inadvertent submergence during testing of a similar operator as documented in Limitorque Qualification Testing Report 600376A.

Based on these considerations, continued operation is justified.

A.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1001-29A
TER No. 22b

Preparer: W S Cleary Date: 8/24/84

Independent Review: N R Eisner Date: 8/24/84

Approval: R A Penny Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-3-100

MO1001-29A operates the downstream LPCI injection valve for the A Loop. The valve is located outside containment at the RHR valve station (zone 1.9A) and could be exposed to a harsh environment during a PBIC, PBOC or a control rod drop. The valve serves to allow or prohibit LPCI or shutdown cooling (SDC) flow to the A Loop and is normally open. However, MO1001-29A will be automatically closed if a low reactor vessel level is sensed during SDC operation to isolate a possible leak from the RHR/SDC system. The valve can be overridden open using a pushbutton at the operator control switch at panel 903 in the control room. There is no credible cause for spurious operation of MO1001-29A as a result of a harsh environment since all potentially sensitive control components are mounted in panels 903, 932 and 933 in the control and cable spreading rooms.

MO1001-29A includes a Reliance Electric AC motor (utilizing class HR insulation) equipped with a Dings magnetic brake. The Dings Company has verified that the brake was built with insulation class "H" materials as specified by their customer, Reliance Electric. A comparison of the materials used in the brake with those used in the motor was performed by Wyle Labs. Wyle determined that the materials used in the brake are similar or equivalent to those used in the motor. It is therefore our engineering judgment that the results of qualification testing of Limitorque operators equipped with Reliance Class "HR" and Class "H" motors, as documented in Limitorque Qualification Test Reports 600198 and 600376A are applicable to MO1001-29A including the motor and brake. The temperature, pressure and humidity qualification testing profiles documented in Limitorque Report 600198 envelop the service profiles for MO1001-29A for all postulated transients. In addition, the seven day test profile has been shown to be more severe than the service profiles anticipated over the 30 day mission length of this component by degradation analysis. The test dose of 2.04E8 rads gamma as documented in Limitorque Test Report 600376A, more than adequately envelops the expected service exposure of 5.34E6 rads gamma for this component. The brake system which has not been irradiated is constructed of the same or equivalent materials as the motor and therefore,

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-29A
TER No. 22b

Sheet 2 of 2

Preparer: W S Canny Date: 8/24/84

Independent Review: NR Eisi Date: 8/24/84

Approval: W S Canny Date: 8/27/84

continued operation of the brake is justified by similarity. The brake discs, which are constructed of asbestos with a phenolic binder, have a radiation threshold of 1.8E7 rads which envelops the requirement. Beta will be reduced by the shielding effect of the equipment enclosure so that analysis concerns are only with the gamma dose.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-21, M01001-32
TER No. 24, 23 Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R L Grazio Date: 8/30/84

EQUIPMENT TYPE: DC/AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

M01001-21 and M01001-32 operate the series isolation/stop valves in the line for discharging from the RHR System to Radwaste. The valves are normally shut except while the RHR is in torus recirculation mode and draining is in progress. If the valves failed to shut during a LPCI initiation, a portion of the LPCI flow would be diverted to the Radwaste System. The valves could be exposed to a harsh environment during a PBIC or a PBOC. The valves are located outside containment in the CRD Pump Room Mezzanine (Zone 1.8).

Limitorque Qualification Test Report #B0003 documents the qualification testing of a valve operator and motor similar in design to M01001-32. The documented test profile envelops the M01001-32 service profile for all transients that are postulated to affect M01001-32. M01001-32 is therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power cable terminations (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Since isolation is the only safety function provided by M01001-21 and M01001-32, redundant protection for any postulated failure of M01001-21 would be provided by M01001-32. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01301-25, M01301-26
TER No. 26, 25 Sheet 1 of 1

Preparer: W S Clancy Date: 8/31/84

Independent Review: M R Ewing Date: 8/31/84

Approval: R B Haas Date: 9/7/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-2

M01301-25 and M01301-26 operate the block/isolation valves in the torus suction supply line to the RCIC turbine. These valves are located in the RCIC pump room mezzanine (zone 1.5) and are normally closed. The valves are to be remotely opened from the control room if low condensate storage level or high torus suppression pool level is sensed.

M01301-25 and M01301-26 can serve a containment isolation function during a PBOC or a PBIC. However, in both cases the valves are not required to actively function since they will be maintained in their normally closed position. Subsequent spurious opening of either valve is not deemed credible since all potentially sensitive control components are located in mild environments.

The only transient for which RCIC is credited and M01301-25/26 are required to open is a Control Rod Drop. RCIC is used following a Control Rod Drop to supply core cooling while depressurizing. The Control Rod Drop transient has been evaluated and it has been determined that no RCIC components are exposed to conditions different from those during normal RCIC operation. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-10
TER No. 27 Sheet 1 of 2

Preparer: W S Clancy Date: 9/14/84

Independent Review: N R Eus Date: 9/19/84

Approval: K E Grazio Date: 9/20/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2-80

This valve provides flow from the discharge of HPCIS pump P205 to the condensate storage tanks for full flow testing of the HPCIS. Because the valve is required to open for testing only, it normally remains closed during plant operation. The opening function is not safety-related. However, if the valve is opened for testing, it must close on HPCI initiation to assure adequate cooling flow to the core. Since this is its only safety-related function, operation of M02301-10 is required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-10
TER No. 27 Sheet 2 of 2

Preparer: W J Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: K L Graves Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of M02301-10 are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-3
TER No. 28a Sheet 1 of 1

Preparer: WS Clancy Date: 8/28/84

Independent Review: JL Rogers Date: 8/29/84

Approval: RE Grazio Date: 8/30/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-1-60

MO2301-3 operates the block valve in the steam supply line to the HPCI turbine. The valve is located in the HPCI pump room (zone 1.3) and is normally closed unless HPCI is in operation. During a transient requiring HPCI operation, the valves function is to open and remain open over a 5 hour mission time to supply steam to the HPCI pump turbine.

The FSAR Section 6.5.1.2.2 Safety Evaluation of the HPCI System, describes the system as one "designed to provide adequate reactor core cooling for small breaks." On this premise, a detailed analysis concluded that the "core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI system." Based on the prevention of core damage for those small break PBIC events requiring HPCI operation, those components that are essential to HPCIS operations, such as MO2301-3, will not be exposed to radiation during such transients in excess of levels occurring during normal operation and therefore need not be qualified for such small break PBIC transients.

During a PBOC-3 (HPCI Steam Line Break in the HPCI Pump Station) MO2301-3 would be exposed to a harsh steam and radiation environment. However, HPCI operation is not required for this transient. Instead, isolation of the leak would be accomplished by automatic closure of valve 2301-4.

During any other PBOC, HPCI would be required to operate for core cooling following isolation of the leak. However, the valve would be capable of opening prior to the exposure reaching narsh levels. The valve would remain in the desired open position since potentially sensitive control components would not be affected by the harsh environment.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-9
TER No. 28b Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eaton Date: 9/19/84

Approval: R L Gray Date: 9/20/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-1-60

This valve provides the first isolation on the discharge of HPCIS pump P205. The valve is normally maintained open and closure is only accomplished through a remote manual switch in the Main Control Room (C-903). Because containment and reactor vessel isolation is provided by valves 588 (feedwater line "B") and MO2301-8, the closing function of MO2301-9 is not safety-related. However, if the valve is closed, it must open on HPCI initiation to assure adequate cooling flow to the core. Since this is its only safety- related function, operation of MO2301-9 is required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO2301-9
TER No. 28b

Preparer: W J Clancy Date: 9/19/84

Independent Review: M R Ewr Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of MO2301-9 are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M0230?-14
TER No. 29 Sheet 1 of 2

Preparer: _____ Date: 9/19/84

Independent Review: _____ Date: 9/19/84

Approval: _____ Date: 9/20/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-25

On HPCIS startup, pump P205 discharge is inadequate to defeat the effect of reactor backpressure on the injection check valves. To assure safety of the pump, a flow path is provided from the discharge line to the suppression pool. This line is then automatically isolated when flow to the core is verified by an in-line sensing device. M02301-14 provides both the initiation and isolation of minimum flow bypass. The valve must open on a HPCIS initiation coincident with a low flow signal and must close on either a turbine trip or a high flow signal. Based on the functions of this valve, operation of M02301-14 is required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie ...in the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-14
TER No. 29 Sheet 2 of 2

Preparer: W S Clancy Date: 9/14/84

Independent Review: M R Ewing Date: 9/19/84

Approval: K H Graig Date: 9/20/84

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of M02301-14 are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-35, M02301-36
TER No. 31, 30 Sheet 1 of 2

Preparer: WS Clancy Date: 8/24/84

Independent Review: NR Ersin Date: 8/24/84

Approval: RC Mecredy Date: 8/27/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-25/SMB-00-7.5

M02301-35 and M02301-36 operate the block/isolation valves in the line from the Suppression Pool to the HPCI Pump Suction. These valves are located outside containment in the HPCI Pump Room (zone 1.3) and are normally closed. These valves will automatically open to supply torus water to the HPCI pumps if low condenser storage tank level or high torus water level is sensed. The valves are overridden closed in the event a HPCI Steam Line Break is sensed. All potentially sensitive control components are located in mild environments.

FSAR Section 6.5.1.2.2, Safety Evaluation for the HPCI, describes the HPCI System as one "designed to provide adequate reactor core cooling for small breaks." On this premise, a detailed analysis concluded that the "core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Based on the fact that no core damage results from those events for which HPCI operation is essential, components such as M02301-35 and M02301-36, which are considered essential to HPCI operation will not be exposed to radiation in excess of the levels experienced during normal operation. As a result, capability of these components to facilitate HPCI operation while exposed to a harsh environment need not be demonstrated.

However, M02301-35 and M02301-36 provide a second safety function of closing to provide containment isolation during a PBOC-3 (HPCI Steam Line Break in the HPCI Pump Compartment) while exposed to a harsh environment as a result of blowdown from the break. If the break occurs with both valves in their normal closed position, both valves will remain closed and this design function will be accomplished. If the break occurs while both valves are open, then M02301-35 which is equipped with a rewound motor is assumed to fail as is (open). However, an operator and motor combination similar to M02301-36 was qualified to a maximum of 250°F, 25 psig and 2×10^7 rads as documented in Limitorque Report B0003. Although the service profile (301°F and 16.2 psia maximum) is not enveloped by the qualification profile over the first five minutes, the thermal inertia of the operator in the superheated steam

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-35, M02301-36
TER No. 31, 30
Sheet 2 of 2

Preparer: W S Cary Date: 8/24/84

Independent Review: M R Ertman Date: 8/24/84

Approval: G A Arroyo Date: 8/27/84

environment, as documented in Limitorque Report B0027, will result in temperature in the vital portions of the actuator and motor, that would be enveloped by the qualification profile. The radiation exposure would not impact the ability of the component to operate until well after it had closed. It can therefore be assumed that M02301-36 would close to provide containment isolation.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO4010A/B, MO4060A/B
TER No. 33, 38 Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: N R Ellis Date: 8/24/84

Approval: W S Clancy Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00

MO4010A/B and MO4060A/B operate block valves in parallel paths supplying RBCCW to the "B" and "A" RHR heat exchangers respectively. These valves are located outside containment in their respective RHR/Core Spray Pump Quadrants (zones 1.1 and 1.2) and are normally closed. The control room operator is expected to open at least one of the valves associated with each RHR heat exchanger approximately 10 minutes into a design basis transient. RBCCW is supplied via these valves to the RHR System in either the LPCI, torus recirculation or shutdown cooling modes and, as a result, the valves operators have a 30 day mission time. Similar valve operator and motors were qualified for extended exposure to a steam environment (250°F and 25 psig maximum) and to radiation (2×10^7 rads) and documented in Limitorque Report B0003. MO4010A/B and MO4060A/B are therefore considered to be qualified to the profiles used in the B0003 tests pending completion of an inspection to verify that appropriate terminal blocks were utilized for terminating power leaks (required by IE notice 83-72).

During a PBIC, the only potential cause for a harsh environment exposure to these valves would be increased radiation. However, analysis has shown that the valves would not be exposed to radiation in excess of the qualified level until after their 30 day mission time had elapsed and therefore, these valves would be operable when required and are considered qualified for PBIC.

During a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) MO4010A/B and MO4060A/B would be exposed to a harsh steam and radiation environment. However, the qualification test profile per B0003 envelopes the service profile and the component is considered to be qualified for PBOC.

Since MO4010A/B and MO4060A/B will remain operable over their design mission length for all possible harsh environment exposures, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01400-4A, M01400-4B
TER No. 39, 36 Sheet 1 of 1

Preparer: W A Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R A Brazis Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-15

M01400-4A and M01400-4B operate isolation valves in the core spray test lines that run from the discharge of the core spray pumps to the torus. The valves are located outside containment within their respective RHR and core spray quadrants (zones 1.1 and 1.2). The valves are required to close when containment spray is initiated. The valves are exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) and/or to a harsh radiation environment during a PBIC and all other PBOCs. Limitorque Report B0003 documents the qualification testing of a similar valve operator and motor in a harsh steam and radiation environment which envelopes the service environment to which these valves are exposed for all postulated transients including a PBOC-5. M01400-4A/4B are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were used for power cable termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-36A, M01001-36B, M01001-37A, M01001-37B
TER No. 40a, 32, 40j, 37f Sheet 1 of 1

Preparer: W S Clancy Date: 8/29/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R L Grazio Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2/SMB-00

M01001-36A and M01001-36B control the block valves in the RHR injection line to the suppression pool cooling spray header. M01001-37A and M01001-37B control the block valves in the RHR injection line for suppression pool cooling. All valves are located outside containment in their respective RHR train quadrants (zones 1.1 and 1.2). All four valves are normally shut but would be required to open to initiate torus spray or torus recirculation cooling, as required, during a PBOC or PBIC. The valves have a 30 day mission time. All four valves could be exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) or to a harsh radiation environment during a PBIC or all other PBOCs. Limitorque Report B0003 documents the qualification testing of a similar valve operator and motor in a harsh steam and radiation environment that envelopes the service profile for all four valves for all postulated transients including PBOC-5. M01001-36A/36B and M01001-37A/37B are therefore considered to be qualified, pending completion of an inspection to verify that appropriate terminal blocks were used for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01400-3A, M01400-3B
TER No. 40b, 37g Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: C M Kozup Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-15

M01400-3A and M01400-3B operate the isolation valves in the core spray suction lines from the suppression pool. The valves are located outside containment within their respective RHR and core spray quadrants (zones 1.1 and 1.2). The valves are required to remain functional over a 30 day mission time to facilitate core spray system operation during a PBIC or a PBOC. The valves are exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) and/or to a harsh radiation environment during a PBIC and all other PBOCs. Limitorque Report B0003 documents the qualification testing of a similar valve operator and motor in a harsh steam and radiation environment which envelopes the service environment to which these valves are exposed for all postulated transients including a PBOC-5. M01400-3A/3B are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were used for power cable termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-7A, M01001-7B, M01001-7C, M01001-7D
TER No. 40c, 37a, 40d, 37b Sheet 1 of 2

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Rogers Date: 8/29/84

Approval: R E Gaj Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-15

These motor operators are installed on the RHR Pump Suction Block Valves for RHR suction from the torus. These valves are normally key-locked open except during Shutdown Cooling (SDC) Operation. The valves are located outside containment in the RHR Pump Quadrants (zones 1.1 and 1.2), and could be exposed to a harsh environment during a large break PBIC or PBOC. Spurious operation of the valve is not deemed credible since all potentially sensitive control components are not affected. These valves could be exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus) or to a harsh radiation environment following a large break PBIC or any PBOC. Limitorque Report B0003 documents qualification testing of a valve operator and motor similar to M01001-7(B-D) which envelops the service exposure to these valve operators for any postulated transient. M01001-7(B-D) are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. M01001-7A is equipped with a Reliance Electric motor that was rewound by GE at their Apparatus Service Shop in Medford MA. GE provided a Certificate of Conformance that the motor was rewound in the same manner as was found upon receipt inspection at their facility. The motor is therefore equipped with the equivalent of the Class B insulation used during original manufacture and is essentially similar to the other motors and the qualification testing documented in Limitorque Report B0003 therefore applies. Although the test profile was only for 16 days, a degradation analysis has established that the test was more severe than the 30 day mission life exposure. In addition to this technical analysis, the following systematic analysis justifies continued operation with M01001-7A as is.

During a large break PBIC from normal operating temperature and pressure, with shutdown cooling not in service, M01001-7(A-D) would be expected to remain open to supply torus suction to the RHR pumps in LPCI mode. Since the

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-7A, M01001-7B, M01001-7C, M01001-7D
TER No. 40c, 37a, 40d, 37b Sheet 2 of 2

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Moyer Date: 8/29/84

Approval: K L Graise Date: 8/30/84

valves would already be open, no active function would be required. In addition, since there is no credible means for spurious closure, and since core spray could provide redundant protection, exposure to a harsh environment during this transient would be inconsequential. The valves would remain in the open position to facilitate long term core cooling by LPCI and drainage from the pipe break to the torus.

During an intermediate or small break PBIC from normal operating temperature or pressure, ADS, HPCI or RCIC would actuate to depressurize the reactor vessel without core damage. M01001-7(A-D) would either remain in the open position to provide LPCI following ADS operation or to support torus recirculation cooling. However, since core damage would not occur these valves would not be exposed to a harsh environment and would remain operable.

During a PBIC of any size during SDC operation (with the lower temperatures and pressures and reactor sub-criticality necessary to support SDC operation), the environment to which M01001-7(A-D) would be exposed would be significantly less harsh and would allow sufficient time for the valves to be opened to provide LPCI. In addition, core spray would be used to provide redundant assurance of core cooling.

During a PBOC-5 (HPCI Steam Line Break in the Torus), M01001-7(A-D) could be exposed to a harsh environment. If the plant was at normal temperature and pressure, the valves would be expected to remain open to support LPCI from the torus. IF SDC was in service, the HPCI Steam Line would be isolated due to low pressure thus prohibiting the transient. In the event that M01001-7A could not be closed following termination of LPCI, long term core cooling could be provided following termination of the transient using train B of the RHR System.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1001-43(A-D)
TER No. 40f, 37c, 40e, 37d Sheet 1 of 1

Preparer: W S Clancy Date: 8/24/84

Independent Review: N R Eisenhut Date: 8/24/84

Approval: W S Clancy Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-15

MO1001-43(A-D) operate the RHR Pump Shutdown Cooling (SDC) Block Valves. These valves are normally closed unless SDC is in operation. The valves are located in their respective Core Spray/RHR pump rooms (zones 1.1 and 1.2). Limitorque Report B0003 documents qualification testing of a valve operator and motor similar to MO1001-43(B-D) for a steam and radiation environment that envelops the exposure of MO1001-43(B-D) for all postulated transients. MO1001-43(B-D) are therefore considered to be qualified pending an inspection to verify that appropriate terminal blocks were used for termination of the power leads (required by IE Notice 83-72). MO1001-43A is equipped with a Reliance Electric motor that was rewound by GE at their Apparatus Service Shop in Medford, MA. GE provided a certificate of conformance that the motor was rewound in the same manner as was found upon receipt inspection at their facility. The motor is therefore equipped with the equivilent of the class "B" insulation used during original manufacture and is essentially similar to the other motors and the qualification testing documented in Limitorque Report B0003 therefore applies. Although the test profile was only for 16 days, a degradation analysis established that the test was more severe than the 30 day mission life exposure.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-16A, M01001-16B
TER No. 40g, 37e Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R E Grazio Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-2

M01001-16A and M01001-16B operate the RHR heat exchanger bypass valves. These valves are located in their respective RHR pump quadrants (zones 1.1 and 1.2). The valves are normally closed except while operating RHR in the shutdown cooling (SDC) mode. During SDC operation, these valves are in a throttled-open position to control reactor vessel temperature. During a LPCI initiation, both valves will be signaled open following a 60 second delay in order to maximize injection flow and control vessel cooldown. These valves are exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) or to solely a harsh radiation environment during a PBIC and all other PBOCs. The valves are required to remain functional for a 30 day mission length to facilitate LPCI flow and SDC temperature control. Limitorque Report B0003 documents the qualification of a similar operator and motor in a harsh steam and radiation environment that envelopes the service profile for both valve operators for PBIC and all PBOCs including PBOC-5. M01001-16A and M01001-16B are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were used for power lead termination as required by IE Notice 83-72. Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. MO1001-18A, MO1001-18B
TER No. 40h, 35 Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R B Fazio Date: 8/30/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0/SMB-000

MO1001-18A and MO1001-18B operate the block valves in the minimum flow recirculation lines from the combined RHR pump discharge to the torus. The valves are designed to open upon sensing low flow from the pumps to prevent pump overheating and to close as RHR flow approaches 20% of rated LPCI flow in either injection line to ensure adequate delivery of LPCI during a PBIC/PBOC. The valves must remain operable for at least a 30 day mission length to provide overheating protection for the RHR pumps. The valves are located in their respective RHR quadrants (zones 1.1, 1.2) and could be exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) and/or to solely a harsh radiation environment during a PBIC and all other PBOC's. Limitorque Report B0003 documents the qualification of a similar motor and operator in a harsh steam and radiation environment that envelopes the service profile for all postulated transients affecting either valve including PBOC-5. MO1001-18A/18B are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were used for power lead termination as required by IE Notice 83-72. Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-34A, M01001-34B
TER No. 40i, 34 Sheet 1 of 2

Preparer: [signature] Date: 8/24/84

Independent Review: [signature] Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: AC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00/SMB-00-25

M01001-34A and 34B operate the torus cooling/torus spray line block valves. These valves are normally closed unless RHR is in operation in the torus cooling mode. The valves are located outside containment in their respective RHR and core spray pump rooms (zones 1.1 and 1.2). Limitorque Test Report B0003 documents qualification testing of a valve operator and motor similar to M01001-34A for exposure to a harsh steam and radiation environment which envelops the expected service profiles for all postulated transients affecting M01001-34A. M01001-34A is therefore considered qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for terminating the power leads (required by IE Notice 83-72). The A train of RHR could therefore provide adequate assurance of the operability of torus cooling spray regardless of the operability of M01001-34B and the B train of torus cooling spray. However, the performance of M01001-34B can be further justified using the following systematic analysis. M01001-34B is equipped with a Peerless AC motor with class B insulation for which limited qualification data is available.

During a large break PBIC or a small break followed by ADS operation, M01001-34A/34B would be initially required to close to prevent diversion of LPCI to the torus. This would normally be accomplished by the valves remaining in their normally closed position. This can be assured since all potentially sensitive control components would not be affected by a harsh environment. If the valves were in the open position at the start of the transient, they would be automatically closed in response to low reactor vessel level and high drywell pressure signals prior to a harsh radiation environment developing at their locations. The valves would then remain closed to support initiation of normal shutdown cooling (SDC) following termination of the transient or to facilitate SDC by LPCI or core spray and drainage through the break location. If torus cooling/core spray was required, M01001-34A which is qualified as documented in Limitorque Report B0003 to 2×10^7 rads, would remain operable for a period in excess of 150 days and could be used for torus recirculation/spray via the A RHR Loop.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-34A, M01001-34B
TER No. 40i, 34 Sheet 2 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: N R Eisenhut Date: 8/24/84

Approval: R C Mecredy Date: 8/27/84

During a small break LOCA for which HPCI or ADS is used to depressurize the reactor, M01001-34A/34B would initially be required to be closed for the LPCI mode operation of RHR and then to subsequently open for torus cooling/spray. However, such breaks do not result in core damage and as a result, M01001-34A/34B would not be exposed to a harsh environment.

During a PBOC-5 (HPCI Steam Line Break in the torus compartment) M01001-34A/34B would be exposed to a harsh environment. However, qualification testing profiles for M01001-34A as documented in B0003 envelops the service profiles for all parameters and M01001-34A is therefore qualified as discussed previously and will function as required. If M01001-34B failed in the open position, redundant isolation of the B Loop torus spray and circulation lines could be provided by M01001-36B and M01001-37B which are qualified for the PBOC-5 service profile since their qualification testing per B0003 is bounding. If M01001-34B failed closed, torus cooling/spray could be provided as required using the A RHR train.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01301-60
TER No. 41 Sheet 1 of 1

Preparer: W A Clancy Date: 8/27/84

Independent Review: J L Rogers Date: 8/28/84

Approval: P L Grazio Date: 8/30/84

EQUIPMENT TYPE: DC Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-15

M01301-60 operates the block valve in the minimum flow bypass line from the RCIC pump to the torus. This valve is normally closed except momentarily during RCIC pump startup and during periods of RCIC pump operation at low flow rates. The valve is located in the RCIC pump mezzanine (zone 1.5) and must remain operable to ensure proper operation of the RCIC System.

M01301-60 serves a containment isolation function by manually closing from the control room during a PBIC or PBOC. During a PBIC, M01301-60 would be capable of closing prior to a harsh environment exposure occurring. In the event that M01301-60 was not closed prior to a harsh environment exposure during a PBIC or during a PBOC, redundant isolation would be provided by valve 1301-47.

Based on the above information, continued plant operation is justified;

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. SV2300-9
TER No. 42 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Gray Date: 9/20/84

EQUIPMENT TYPE: Solenoid Valve
MANUFACTURER: Skinner
MODEL: L2DB5150

The HPCIS turbine is automatically shutdown by tripping the turbine stop valve closed on any of several signals. This closure is accomplished by energizing SV2300-9 and thus relieving hydraulic pressure from the stop valve actuator. Failure of the solenoid valve to operate on demand could lead to damage of the turbine or pump while inadvertent operation could threaten the ability of HPCIS to provide adequate core cooling. Based on the functions of this valve, operation of SV2300-9 is required to assure either HPCIS equipment protection or continued satisfactory system operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. SV2300-9
TER No. 42 Sheet 2 of 2

Preparer: W S Clancy Date: 9/14/84

Independent Review: M R Ewing Date: 9/19/84

Approval: L A Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of SV2300-9 are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. CV9068A, CV9068B
TER No. 43 Sheet 1 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ellis Date: 8/24/84

Approval: W S Clancy Date: 8/27/84

EQUIPMENT TYPE: Solenoid Valve
MANUFACTURER: Atkomatic
MODEL: 15840

A condensate drain pot is provided on the HPCIS turbine exhaust line near where that line penetrates the Torus (X-223). Since the drain pot collects condensate from the exhaust line downstream of the containment isolation valves (on the Torus side), separate isolation valves have been provided on the line from the drain pot to the gland seal condenser. These valves (CV9068A & B) must be energized to open. This condition will exist only in the absence of a HPCIS isolation signal if either the manual control switches are positioned to "OPEN" or LS9068 senses high level in the drain pot.

These valves serve a dual safety role. During a HPCI isolation, these valves will be deenergized closed to provide containment isolation. The most likely failure mode to be induced by harsh environment exposure at this time would be solenoid deenergization with the valves subsequently failing closed. This would result in the establishment of the required containment isolation. In the unlikely event that both valves failed by sticking open, two possible scenarios could be postulated. If the valves had failed open prior to a DBA this failure would have been indicated by anomalies in the level control of the drain pot. Therefore, the operating staff would have been expected to respond by closing the two downstream manual valves to establish containment isolation and initiate a program for manual draining of the drain pots based on level alarms and/or schedule. As a result, isolation of this penetration would already be established prior to the DBA/harsh environment. If the valves failed open during a DBA requiring isolation of the torus, the liquid inventory in the torus would provide a water seal that would preclude the loss of gaseous or airborne material from the primary containment. As a result, leakage from this one inch penetration would be limited to minute amounts of water borne materials leaking past the turbine and gland seal condenser pump and blower seals. This leakage is estimated as having insignificant impact on overall containment integrity and the ability to comply with 10CFR100 limits.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. CV9068A, CV9068B
TER No. 43 Sheet 2 of 2

Preparer: W S Clamy Date: 8/24/84

Independent Review: N R Eisin Date: 8/24/84

Approval: R C Mecredy Date: 8/27/84

The other safety related function provided by these valves is to provide for automatic intermittent draining of the HPCI turbine exhaust line drain pots. This is accomplished to prevent the accumulation of condensation that could result in a water hammer. A "failed-open" failure of these valves would have little impact with the exception of a small increase in the gland seal condenser heat loads. A "failed-closed" failure of these valves could result in excessive condensate accumulation. However, water level in the drain pot is monitored and alarmed. If the valves failed as indicated by the alarm, prior to a DBA, the operating staff would respond by providing routine manual draining of the pots. As a result, it could be reasonably expected that accumulation of sufficient condensate to inhibit subsequent HPCI initiation would be highly unlikely. In the unlikely event that HPCI operation is inhibited, redundant protection could be provided by ADS/CS, ADS/LPCI or RCIC. The valves are not required to remain operable to support HPCI operation.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. AO 203-1A/D
TER No. 85 Sheet 1 of 2

Preparer: JL Rogers Date: 8/28/84

Independent Review: MR Evans Date: 8/28/84

Approval: [illegible] Date: 8/29/84

EQUIPMENT TYPE: Solenoid Valve/Terminal Blocks
MANUFACTURER: AVCO/Walkdown could not identify
MODEL: C5159/Walkdown could not identify

These valve control modules provide for hydraulic actuation of the four inboard main steam isolation valves. Each module contains two pilot solenoid valves, both of which must be deenergized to initiate MSIV closure. Failure of either valve to reposition on removal of electrical power will prevent closure of the respective MSIV. The valves are normally energized to hold hydraulic air under the MSIV operating piston. The terminal blocks, which have not been given specific equipment identification numbers, are in the electrical circuit of the solenoid valves.

The MSIV's are relied upon to function during

Pressure Regulator Failure,
Loss of Feedwater Flow,
Control Rod Drop Accident,
Pipe Break Inside Primary Containment, and
Pipe Break Outside Primary Containment

to assure reactor vessel and primary containment isolation, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

Neither of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. Also, based on FSAR analyses and event profiles, no Pipe Break Outside Primary Containment is expected to result in conditions of pressure, temperature and humidity which are any more severe in the vicinity of these inboard MSIV's than those experienced during normal operation.

Of these latter two events and the Pipe Break Inside Primary Containment, the PBOC with core damage generates the most severe conditions of radiation for the control modules. Similar controls have been tested to a level of 3×10^7 rads. During the PBOC with core damage, cumulative exposure (plus 40 year normal dose) will not exceed this level for over 2 hours. However, the MSIV's will receive the automatic isolation signal within 500

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. AO 203-1A/D
TER No. 85
Sheet 2 of 2

Preparer: J. L. Rogers Date: 8/28/84

Independent Review: M. R. Evans Date: 8/28/84

Approval: P. E. Yandow Date: 8/29/84

milliseconds of the pipe break. This is more conservative than either of the other two events (although closure initiates later for the PBIC, exposures will not exceed 3×10^7 rads for over 24 hours).

Since no electrical equipment within the valve control modules will be required to function subsequent to closure initiation, post-accident radiation doses will not prevent MSIV closure for required events.

Only the PBIC is expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of AO 203-1A/D. These conditions are not expected in the vicinity of the respective outboard MSIV control modules. These valves are tested periodically under controlled Technical Specification surveillance requirements; so that there can be reasonable assurance that they will perform as desired. It is therefore assumed that, should AO 203-1A/D be made inoperable, the required containment isolation would be accomplished satisfactorily by AO 203-2A/D.

The nonmetallic component materials in the Automatic Valve Corporation C5159 solenoid operated air valve assemblies are being replaced this outage with components made of viton. Components containing viton have been previously tested and proven to have a qualified life of greater than one refueling outage. A test program, testing similar valves, is currently in progress and is expected to be completed in early 1985. Upon completion of the test program a specific qualified life will be determined.

Based on all of the above, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. AO 203-2A/D, J623, J624, J625, J626
TER No. 86 Sheet 1 of 2

Preparer:	J L Rogers	Date:	8/28/84
Independent Review:	M R Ennis	Date:	8/28/84
Approval:	W E Gagne	Date:	8/29/84

EQUIPMENT TYPE: Solenoid Valve/Terminal Blocks
MANUFACTURER: AVCO/Walkdown could not identify
MODEL: C5159/Walkdown could not identify

These valve control modules provide for hydraulic actuation of the four outboard main steam isolation valves. Each module contains two pilot solenoid valves, both of which must be deenergized to initiate MSIV closure. Failure of either valve to reposition on removal of electrical power will prevent closure of the respective MSIV. The valves are normally energized to hold hydraulic air under the MSIV operating piston. The terminal blocks are in the electrical ci cuit of the solenoid valves.

The MSIV's are relied upon to function during

Pressure Regulator Failure,
Loss of Feedwater Flow,
Control Rod Drop Accident,
Pipe Break Inside Primary Containment, and
Pipe Break Outside Primary Containment

to assure reactor vessel and primary containment isolation, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

Neither of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. Also, based on FSAR analyses and event profiles, no Pipe Break Inside Primary Containment is expected to result in conditions of pressure, temperature and humidity which are any more severe in the vicinity of these outboard MSIV's than those experienced during normal operation.

Of the latter two events listed above, the PBOC with core damage generates the most severe conditions of radiation for the control modules. Similar controls have been tested to a level of 3×10^7 rads. During the PBOC with core damage, cumulative exposure (plus 40 year normal dose) will never exceed this level over the 30 day period evaluated. Also the MSIV's will receive the automatic isolation signal within 500 milliseconds of the pipe break.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. AO 203-2A/D, J623, J624, J625, J626
TER No. 86 Sheet 2 of 2

Preparer: JL Rogers Date: 8/28/84

Independent Review: MR Ensinna Date: 8/28/84

Approval: RS Grazio Date: 8/29/84

Since no electrical equipment within the valve control modules will be required to function subsequent to closure initiation, post-accident radiation doses will not prevent MSIV closure for required events.

Only the PBOC-7, PBOC-8 and PBOC-9 are expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of AO 203-2A/D. These conditions are not expected in the vicinity of the respective inboard MSIV control modules. These valves are tested periodically under controlled Technical Specification surveillance requirements; so that there can be reasonable assurance that they will perform as desired. It is therefore assumed that, should AO 203-2A/D be made inoperable, the required containment isolation would be accomplished satisfactorily by AO 203-1A/D.

The nonmetallic component materials in the Automatic Valve Corporation C5159 solenoid operated air valve assemblies are being replaced this outage with components made of viton. Components containing viton have been previously tested and proven to have a qualified life of greater than one refueling outage. A test program, testing similar valves, is currently in progress and is expected to be completed in early 1985. Upon completion of the test program a specific qualified life will be determined.

Based on all of the above, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Control Centers D7*, D8*, D9*
TER No. 88 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eaton Date: 9/19/84

Approval: R H Gazda Date: 9/20/84

EQUIPMENT TYPE: DC Motor Control Center
MANUFACTURER: Cutler Hammer
MODEL: 6AF685046

These three motor control centers (MCCs) provide DC power to a variety of safety related loads.

All three MCCs are located in open areas of the reactor building at elevation 23 (zones 1.9 and 1.10) and are exposed to a harsh superheated steam and radiation environment during a PBOC-1, PBOC-2T, PBOC-5, PBOC-8 and PBOC-9. The most challenging environment for these three MCCs is a PBOC-1 (HPCI steam line break in the HPCI valve station) which results in a service profile that peaks at 238°F and 15.25 psig. All three MCCs are also exposed to a harsh radiation environment following any other PBOC and a PBIC.

Wyle Labs has completed an analysis of these MCCs based on walkdown information. This analysis justifies continued operation of these components on the following basis.

Radiation

The most limiting radiation exposure of 1.96×10^5 rads is sustained over a 30 day mission length by D9. This exposure is composed of 1.3×10^5 rads gamma and 6.6×10^4 Beta (assuming a 90% self shielding credit for Beta due to a minimum 30 mill thickness for all vital safety related components). Wyle Labs has determined based on a review of their extensive materials library, elimination of materials not commonly used in MCC construction and walkdown inspection of the MCCs, that no components with radiation damage threshold limits above this exposure are included in these MCCs. Based on this analysis, it is judged that these MCCs can withstand the calculated radiation exposure and still perform their Class 1E safety related functions.

Temperature, Humidity and Operating Time

While no accident testing has been performed on these MCCs, proprietory testing known to Wyle Labs has been performed on another MCC containing similar components. The test, which was of 92 hrs duration, had a maximum

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Control Centers D7, D8, D9*
TER No. 88 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eaton Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

temperature exposure of 271°F. This temperature exceeds the calculated service profile for all three MCCs. Wyle Labs has performed a degradation analysis using the Arrhenius equation technique that has confirmed that the test profile, although only 92 hours in length, envelops the service profiles for at least the first 13 days of the 30 day mission length of these MCCs. Since the high temperature portion of the accident/service profile (which occurs over the first 3 hours) would be the portion most likely to cause an MCC failure, it is judged that the MCC could have functioned for the equivalent of the remaining 17 days while exposed to the calculated environmental conditions. Therefore, it has been concluded that the MCCs will remain functional for the 30 day mission length.

Pressure

The accident testing of similar components as referred to in the previous section was performed at a peak pressure of 40 psig without apparent component degradation. This testing envelops the service profile for pressure for all thre MCCs.

Aging

During the present refueling outage, Wyle Laboratories physically inspected every motor control center module which performs a Class 1E function and found no visual signs of deterioration after 10 years of service. Additionally, periodic surveillance testing is frequently performed in accordance with the technical specifications. Inspections of modules are made whenever corrective maintenance is required. Similar equipment has been qualified for 40 years operational life.

Based on the above facts, it is judged that the MCCs will continue to perform their Class 1E safety function.

Summary

Based on the above discussions, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Control Centers B14*, B15*, B17*, B18*, B20*
TER No. N/A, 89a, 90, 89b Sheet 1 of 3

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eisin Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: AC Motor Control Center
MANUFACTURER: Nelson Electric
MODEL: 1035E

These five motor control centers (MCCs) provide 460v AC power to a variety of safety related loads.

B17, B18 and B20 are all located in open areas of the reactor building at elevation 23 (zones 1.9 and 1.10) and are exposed to a harsh superheated steam environment during a PBOC-1, PBOC-2T, PBOC-5, PBOC-8 or PBOC-9. The most challenging environment for these three MCCs is a PBOC-1 (HPCI steam line break in the HPCI valve station) which results in a service profile that peaks at 238°F and 15.25 psig. These three MCCs are also exposed to a harsh radiation environment following any PBOC and a PBIC.

B14 and B15 are located in the "A" and "B" RBCCW compartments (zones 1.21 and 1.22) and are exposed to a harsh superheated steam environment during a PBOC-3 (HPCI steam line break in the HPCI pump station). This PBOC results in a service profile which is presently calculated to peak at 301°F and 15.2 psig. This analysis is presently being reperformed to eliminate overconservatisms in the original model. It is expected, based on preliminary calculations, that this will result in a decrease of the peak temperature exposure in this room to values comparable with the PBOC-1 exposure to B17, B18 and B20. At no time during the 30 day mission length after any PBOC or PBIC do B14 or B15 experience a harsh radiation environment.

Wyle Labs has completed an analysis of these MCCs based on walkdown information. This analysis justifies continued operation of these components on the following basis.

Radiation

B14 and B15 do not experience a harsh radiation environment. For the other three MCCs, the most limiting exposure (of 2.26×10^5 rads) is sustained over a 30 day mission length by B17 and B20. This exposure is composed of 1.6×10^5 rads gamma and 6.6×10^4 Beta (assuming a 90% self shielding credit for Beta due to a minimum 30 mill thickness for all vital safety related components). Wyle Labs has determined based on a review of their

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Control Centers B14*, B15*, B17*, B18*, B20*
TER No. N/A, 89a, 90, 89b Sheet 2 of 3

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ensin Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

extensive materials library, elimination of materials not commonly used in MCC construction and walkdown inspection of the MCCs, that no components with radiation damage threshold limits above this exposure are included in these MCCs. Based on this analysis, it is judged that these MCCs can withstand the calculated radiation exposure and still perform their Class 1E safety related functions.

Temperature, Humidity and Operating Time

While no accident testing has been performed on these MCCs, proprietory testing known to Wyle Labs has been performed on another MCC containing similar components. The test, which was of 92 hrs duration, had a maximum temperature exposure of 271°F. This temperature exceeds the calculated service profile for B17, B18 and B20 and is expected to envelop the revised service profiles for B14 and B15 which are presently under development. Wyle Labs has performed a degradation analysis using the Arrhenius equation technique that has confirmed that the test profile, although only 92 hours in length, envelops the service profiles for at least the first 13 days of the 30 day mission length of these MCCs. Since the high temperature portion of the accident/service profile (which occurs over the first 3 hours) would be the portion most likely to cause an MCC failure, it is judged that the MCC could have functioned for the equivalent of the remaining 17 days while exposed to the calculated environmental conditions. Therefore, it has been concluded that the MCCs will remain functional for the 30 day mission length.

Pressure

The accident testing of similar components as referred to in the previous section was performed at a peak pressure of 40 psig without apparent component degradation. This testing envelops the service profile for pressure for all four MCCs.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Control Centers B14*, B15*, B17*, B18*, B20*
TER No. N/A, 89a, 90, 89b Sheet 3 of 3

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: K L Graves Date: 9/20/84

Aging

During the present refueling outage, Wyle Laboratories physically inspected each MCC module which performs a Class 1E function and found no visual signs of deterioration after 10 years of service. Additionally, periodic surveillance testing is frequently performed in accordance with the technical specifications. Inspections of modules are made whenever corrective maintenance is required. Similar equipment has been qualified for 40 years operational life. Based on the above facts, it is judged that the MCCs will continue to perform their Class 1E safety function.

Summary

Based on the above discussions, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Termination Splices - VAC201A, B; VEX210A, B
TER No. 91, 93 Sheet 1 of 2

Preparer: W J Clancy Date: 9/14/84

Independent Review: MR E Date: 9/19/84

Approval: L L Grazio Date: 9/20/84

EQUIPMENT TYPE: Motor termination splices
MANUFACTURER: Various
MODEL: Various

The HPCI Area Cooling (VAC201A, B) and the Standby Gas Treatment System Fan motor termination splices are tape type motor termination splices with a glyptal outer covering. These splices are similar to the splices tested in FIRL Report #F-C3056.

Temperature and Pressure

The test splices were subjected to a steam environment for 7 1/2 days. The splices were electrically loaded throughout the exposure period. The peak temperature and pressure were 325°F and 80 PSIG for a duration of 16 hours. The temperature and pressure were reduced to 220°F and 5 PSIG for the remainder of the test. The samples were subjected to a chemical spray solution of 1900 ppm boron throughout the test.

Operability Time

The test time was 7 1/2 days. A degradation equivalency analysis shows that the test profile is thermally more degrading than the composite outside containment profile at PNPS for 30 days.

Aging

An aging analysis shows that the materials of the tested splice have a minimum expected life at 105°F of 272 years (glass tape). The expected life of the glyptal (assume alkyd varnish) at 105°F is greater than 1×10^5 years.

Radiation

A radiation analysis shows that the materials of the tested splice have a minimum threshold value of 1.3E6 rads gamma (silicon rubber tape). Per REIC Report No. 21, the dielectric properties of silicones are little affected unless absorbed doses exceed 2×10^8 rads gamma.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Motor Termination Splices - VAC201A, B; VEX210A, B
TER No. 91, 93 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

Although the insulation resistance decreased during the test, all of the cable splices remained functional throughout the test. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. VAC204A, VAC204B, VAC204C, VAC204D
TER No. 92 Sheet 1 of 2

Preparer: MR Ens Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/24/84

EQUIPMENT TYPE: Unit Cooler Motors
MANUFACTURER: Louis Allis
MODEL: C0G4B

Temperature

The worst case postulated PBOC has a temperature spike to 228.7°F. Within 2.5 minutes the temperature will have decreased to 180°F, and within 10 minutes the temperature will be back down to 140°F. The motors are standard AC induction motors with class B insulation having a NEMA standard maximum continuous operating rating of 130°C (226°F). Due to the short duration of the extreme peak accident temperature and rapid decay of the accident conditions to normal, the temperature due to a PBOC should have no adverse affects on the motors.

Pressure

The worst case postulated PBOC has a pressure spike of .7 psig. Within 26 seconds the pressure will have decreased to normal atmospheric pressure. The motors are dripproof, open case motors that have no pressure retaining parts. Therefore, the pressure spike will have no adverse affects on the motors.

Humidity

During the worst case postulated PBOC the humidity is assumed to approach 100% immediately after the accident and then lower back to normal. The motors are a standard AC induction motors with class B insulation. The standard type construction is of a polyester enamel coated magnet wire which is then dipped twice in a polyester varnish after winding, and therefore the motors are suitable for moderate humidity levels. Once the motors are operating, the stator temperature rise will evaporate any moisture which may collect on the windings and preclude the buildup of additional moisture. Therefore, a PBOC will have no detrimental effects on the motors.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. VAC204A, VAC204B, VAC204C, VAC204D
TER No. 92
Sheet 2 of 2

Preparer: MR Ein Date: 8/24/84

Independent Review: DL Rogers Date: 8/24/84

Approval: RA Kenney Date: 8/24/84

Radiation

The worst case postulated LOCA radiation (including the 40 year dose) is 1.15×10^7 rads. The motors are AC induction motors with standard class B insulation. The radiation limiting materials are the polyester enamel and polyester varnish used as the insulating materials for the windings. Class B insulating systems for various types of motors have been shown, by testing, to be capable of withstanding 2×10^8 rads when used in this application. Therefore, the radiation due to a LOCA will have no detrimental effects on the motors.

Based on the above information, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HR-1A, 2A, 3A, 4A, 1B, 2B, 3B, 4B
TER No. 97 (controller) Sheet 1 of 1

Preparer: MR Eisin Date: 8/24/84

Independent Review: J L Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Humidity Control Relay
MANUFACTURER: Honeywell
MODEL: R7088C

These relative humidity controllers are not required for Standby Gas Treatment System (SGTS) operation. The normal function of the controllers are to energize resistance heaters to control the humidity of the air stream being filtered. The humidity controls have been bypassed so that full heater operation is initiated upon operation of the SGTS exhaust fan. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Terminations-Ring Tongue (<4KV)
TER No. 100 Sheet 1 of 2

Preparer: MR Ens Date: 8/24/84

Independent Review: WA Clancy Date: 8/24/84

Approval: RC Mecredy Date: 8/24/84

EQUIPMENT TYPE: Ring Tongue Terminals
MANUFACTURER: Various
MODEL: Various

According to Wyle Laboratories Corrective Action Report No. 47066-TER-1, the installed ring tongue terminals include both insulted and non-insulated models from a variety of manufacturers. The insulation materials used on insulated model has not been specifically identified. The commonly used insulation materials for this application are nylon, PVC, PVF, and PVDF. Justification for continued operation is required as specific qualification tests do not exist.

Uninsulated ring tongue terminals are not susceptible to degradation or environmentally induced failure at the levels of stress produced by the environments at the Pilgrim I plant. Failure of these interfaces is a function of installation configuration and terminal design.

Insulated ring tongue terminals are supplied with an insulating material covering the barrel of the terminals. This insulation is provided to prevent bare metal from protruding beyond the terminal block or connection to which it is fastened, thus reducing the hazard of shock to personnel and a possible shorting path between adjacent terminals and equipment. At the voltage levels of these terminations, the physical presence of any of the industry standard insulating materials is sufficient to perform this function.

The environments which could cause significant insulation deterioration in the Pilgrim plant are temperature and radiation. Degradation induced by these environments takes the form of material softening, material embrittlement, increased compression set, loss of elongation capability, or cracking when subjected to bending stresses or dynamic loads. None of these degradation mechanisms will impact the physical barrier insulation capability of the materials in their static termination application.

The justification discussed above has been substantiated by the application of numerous terminal lugs in nuclear equipment qualification tests. While these tests were not specifically designed to qualify the terminals and the models do not necessarily correlate with Pilgrim installed lugs, the tests demonstrate that in typical plant environments, neither insulated nor

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Terminations-Ring Tongue (<4KV)
TER No. 100 Sheet 2 of 2

Preparer: MR Ervin Date: 8/24/84

Independent Review: W S Clancy Date: 8/24/84

Approval: W S Clancy Date: 8/24/84

non-insulated terminal lugs constitute a significant potential failure mechanism. Samples of tests which included representative terminals as part of the test specimen or part of the test equipment are Wyle 45603-1, Wyle 45638, Franklin C5257, Wyle 43703, Wyle 44282, Wyle 44300, Franklin C5022.

Based on the above, continued operation with existing ring tongue terminals is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C152, C153, C154, C155, C156, C157, C158, C159, C163
TER No. 107, 108 Sheet 1 of 2

Preparer: MR Ervin Date: 8/24/84

Independent Review: WJ Clancy Date: 8/24/84

Approval: RC Clancy Date: 8/24/84

EQUIPMENT TYPE: Panel Indicating Lights
MANUFACTURER: General Electric
MODEL: ET-16

o Temperature

Temperature tests have been successfully conducted by Wyle on ET-16 lights. The tests were conducted at 160°F. Proper operation of the lights was verified before and after the temperature exposure. For this application the maximum accident temperature is 238.1°F which exceeds the 160°F test temperature, however, only for 15 minutes. These lights are located inside an enclosure (unvented) which will cause the temperature experienced by the lights to lag the accident temperature experienced by the enclosure. Tests have been conducted by Wyle Laboratories on similar sized cabinets (except with vents) which characterized the internal temperature of the cabinets as a function of time in a LOCA environment.

Results of these tests (Wyle Report No. 44439-2) show the internal cabinet temperature lagged the external temperature by a minimum of 50°F during the first 15 minutes. In that test the temperature and pressure were rapidly (within approximately 10 seconds) ramped to 54 psig and 280°F (minimum) respectively. Because the pressure for this application is much less than the pressure for the test (0.6 psig versus 54 psig) it is judged that in a similar test to the same maximum temperature that the internal temperature of the cabinet would lag the external temperature by substantially greater than the 50°F experienced in the test. Further, in the tests conducted by Wyle, varied components (examples: pressure transmitter and solenoid valve) were installed in the cabinet and their mass temperature was recorded in the test. The temperature of a typical component (pressure transmitter) lagged the accident temperature by approximately 80°F after the first 15 minutes of the test. In the Wyle test, the lights were maintained at 160°F. Based on the above tests and engineering rationale, it is judged that the test temperature of 160°F envelops the temperature which the lights would experience in the accident condition. Therefore, the lights are judged suitable for use in the temperature application.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C152, C153, C154, C155, C156, C157, C158, C159, C163
TER No. 107, 108 Sheet 2 of 2

Preparer: MR Ens Date: 8/24/84

Independent Review: W J Clancy Date: 8/24/84

Approval: R C Mecredy Date: 8/24/84

o Humidity

These lights are never exposed to more than 80% RH. Maximum voltage on the lights is 120 VAC. Wyle Laboratories has tested a variety of lights at humidity conditions in the range of 90% to 100%. In general, no problems have been experienced for these conditions where voltage never exceeds 120 volts unless the items experienced deformation resulting from temperature. Operation of the lights at the temperature conditions is justified in the above paragraph. Therefore, the lights are judged suitable for use in the humidity environment.

o Pressure

The maximum pressure which the lights would be exposed to in an accident is 15.3 psia (0.6 psig). The configuration of the lights is such that they will not entrap air or otherwise cause a pressure imbalance which would result in a functional disparity in the lights. Therefore the lights are judged suitable for use in this pressure environment.

o Radiation

The maximum radiation which the lights will experience is less than 1×10^6 rads (2.3×10^5 rads gamma and 6.6×10^5 rads beta) based on a specific location radiation analysis. Proprietary Wyle Test Report No. 45625-1A documents satisfactory operation of the lights following a radiation exposure of 2.1×10^6 rads. Therefore, the lights are judged suitable for use in the radiation environment.

Based on the above information, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Cable-Model PE/PVC
TER No. 110, 111, 112, 118, 119, 120, 121, 122, 123, 124, 252
Sheet 1 of 1

Preparer: JL Rogers Date: 8/28/84

Independent Review: WS Clamy Date: 8/28/84

Approval: RD Gratton Date: 8/29/84

EQUIPMENT TYPE: Cable
MANUFACTURER: General Electric
MODEL: PE/PVC

This equipment consists of polyethylene insulated polyvinylchloride jacketed cable provided by several manufacturers. While no qualification documentation or testing history has been found for these specific cables, similarly constructed cable has been successfully subjected to sequential testing (proprietary TR #17513-1), which documents qualification of the insulation system to 1.63×10^8 rads gamma and a LOCA condition including temperatures up to 325°F.

The generic materials which make up the insulation system have expected lives of greater than 1.4E4 years (PVC) and greater than 1.5E4 years (PE) in an ambient temperature of 105°F.

Therefore, continued operation is justified

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine EG-R Electro Mechanical Hydraulic Actuator
TER No. 152 Sheet 1 of 2

Preparer: W. Clancy Date: 9/19/84
Independent Review: M R Ewing Date: 9/19/84
Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Turbine Governor Control
MANUFACTURER: Woodward
MODEL: 8250-133

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine EG-R Electro Mechanical Hydraulic Actuator
TER No. 152

Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: J R Evans Date: 9/19/84

Approval: R L Gray Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the HPCI Turbine EG-R Electro Mechanical Hydraulic Actuator are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, radiation exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Control Cable Assemblies
TER No. 153 Shee 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eu Date: 9/19/84

Approval: L L Gray Date: 9/20/84

EQUIPMENT TYPE: Turbine Governor Control Cables
MANUFACTURER: Various
MODEL: Various

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Control Cable Assemblies
TER No. 153 Sheet 2 of 2

Preparer:	W S Clancy	Date: 9/19/84
Independent Review:	N R Ei	Date: 9/19/84
Approval:	K H Hajo	Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the HPCI Turbine Control Cable Assemblies are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Magnetic Pickup
TER No. 154 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84
Independent Review: N R Eaton Date: 9/19/84
Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Turbine Speed Sensor
MANUFACTURER: Woodward
MODEL: 1680-622

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Magnetic Pickup
TER No. 154 Sheet 2 of 2

Preparer: W J Cleary Date: 9/19/84

Independent Review: M R Ewa Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the HPCI Turbine Magnetic Pickup are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Ramp Generator & Signal Converter Box
TER No. 155 Sheet 1 of 2

Preparer: W A Cleary Date: 9/19/84

Independent Review: M R Ewa Date: 9/19/84

Approval: R Grazio Date: 9/20/84

EQUIPMENT TYPE: Turbine Ramp Generator & Signal Converter
MANUFACTURER: Woodward
MODEL: 8270-848/8271-083

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCI Turbine Ramp Generator & Signal Converter Box
TER No. 155 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ewing Date: 9/19/84

Approval: R F Gazda Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the HPCI Turbine Ramp Generator and Signal Converter Box are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Bias Speed Potentiometer
TER No. 156 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Bazo Date: 9/20/84

EQUIPMENT TYPE: Turbine Speed Controller
MANUFACTURER: Woodward
MODEL: 1657-523

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Bias Speed Potentiometer
TER No. 156 Sheet 2 of 2

Preparer:	W S Clancy	Date: 9/14/84
Independent Review:	N R Eaton	Date: 9/19/84
Approval:	R L Grazio	Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the Bias Speed Potentiometer are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Resistor Box
TER No. 157 Sheet 1 of 2

Preparer: W S Clamy Date: 9/19/84

Independent Review: NR Eu Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Turbine Governor Control
MANUFACTURER: Woodward
MODEL: 8270-281

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Resistor Box
TER No. 157 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ewing Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the Resistor Box are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. EG-M Control Box
TER No. 158 Sheet 1 of 2

Preparer: W S Clancy Date: 9/14/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Turbine Governor Control
MANUFACTURER: Woodward
MODEL: 8270-849/8270-811

This device contributes to HPCIS turbine speed control and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. EG-M Control Box
TER No. 158 Sheet 2 of 2

Preparer: W A Clancy Date: 9/19/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Haynes Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the EG-M Control Box are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. DPIS-261-2A,B,C,D,E,F,G,H,J,K,L,M,N,P,R,S
TER No. 172 Sheet 1 of 1

Preparer: J. Rogers Date: 8/24/84

Independent Review: W.S. Berry Date: 8/24/84

Approval: R.C. Berry Date: 8/27/84

EQUIPMENT TYPE: Differential Pressure Switch
MANUFACTURER: Barton
MODEL: 278

High steam flow in each main steam line is sensed by four indicating type differential pressure switches which sense the pressure difference across the flow restrictor in that line. High steam flow could indicate a break in a main steam line. The main steam line high differential pressure switches effect automatic isolation of all main steam lines at a setting of approximately 140% of normal main steam flow.

These switches are located in the RCIC Quad mezzanine, elev. 2'9" on Panel C-2256. These switches are required to operate in the event of PBOC-7 (Main Steam Line Break in the Condenser Bay) and PBOC-8 (Main Steam Line Break in the Steam Tunnel). In the event of PBOC-7 and PBOC-8, the isolation signal will be generated within 500 milliseconds of the break due to high differential pressure across the main steam line flow restricters. The harsh environment on the RCIC Quad Mezzanine occurs after this required safety function has been performed for both PBOC-7 and PBOC-8. This is also true for Main Steam Line Breaks Inside Containment. Once the MSIV's are signalled to close, no failure mode of the steam flow switches can prevent or reverse main steam line isolation valve closure. Deliberate operator action is necessary to reopen these valves. Closure of the switch contacts due to a short caused by the harsh environment will result in MSIV closure which is the safe position of the MSIV's.

In addition to the differential pressure switches, low pressure at the turbine inlet will initiate MSIV closure within about 200 milliseconds after the break occurs. These switches, PS-261-30A, B, C, D are located in a mild environment. These provide a backup to the differential pressure signal caused by the break.

Therefore, since completion of the safety function prior to exposure to the accident environment is accomplished and subsequent failures of the equipment does not degrade any safety function and an alternative means of accomplishing the same safety function exists, continued operation of Pilgrim Station is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. dPIS 5040A, dPIS 5040B
TER No. 173 Sheet 1 of 1

Preparer: J L Rogers Date: 8-30-84

Independent Review: M R Ensinna Date: 8/30/84

Approval: E L Grazio Date: 8/30/84

EQUIPMENT TYPE: Differential Pressure Switch
MANUFACTURER: Barton
MODEL: 288A

The primary containment is designed for an internal pressure not more than 2 psi less than the concurrent external pressure. If the suppression chamber pressure falls more than 0.5 psi below the Reactor Building pressure, dPIS 5040A&B will open contacts to deenergize SV 5040A&B respectively. These valves will, in turn, vent air from AO 5040A&B, respectively; allowing those valves to open. Consequently, air will be allowed to pass through vacuum breakers X212A&B into the Torus to repressurize containment. Failure of the differential pressure switches to deenergize SV 5040A&B when a containment vacuum is present will, therefore, threaten containment integrity.

On the other hand, AO 5040A&B also provide containment isolation. An isolation signal is provided to assure that no operator action can energize SV 5040A&B. However, this isolation signal is in series with each of the differential pressure switches; such that isolation will not prevent vacuum relief. Failure of the differential pressure switches in a position which opens AO 5040A&B despite the existence of a containment isolation signal will, therefore, threaten a breach of primary containment.

FSAR Appendix G analysis indicates that primary containment vacuum relief is required solely as an auxiliary for primary containment during the Control Rod Drop Accident and the Pipe Break Inside Primary Containment. Neither of these events will result in harsh conditions of pressure, temperature and humidity in the vicinity of the switches. Also, the greatest expected cumulative exposure (post-LOCA plus 40 year normal) is 7.4×10^5 rads, which is less than the qualified dose of 3×10^6 rads.

Therefore, these switches are considered to be environmentally qualified. The documentation packages for these switches are being completed and when completed, environmental qualification will be proven. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. DPIS1001-79B
TER No. 176
Sheet 1 of 2

Preparer: J. Rogers Date: 8/29/84

Independent Review: W.S. Clancy Date: 8/29/84

Approval: R.E. Grazio Date: 8/30/84

EQUIPMENT TYPE: Differential Pressure Switch
MANUFACTURER: Barton
MODEL: 289A

Function

To protect the RHR pumps from overheating at low flow rates, a minimum flow bypass pipeline, which routes water from the pump discharge to the suppression pool, is provided for each pair of pumps. A single motor-operated valve controls the condition of each bypass pipeline. Each minimum flow bypass valve (i.e. M01001-18A, M01001-18B) automatically opens upon sensing low flow in both injection lines. DPIS1001-79B is used to sense flow in Loop B for this purpose. The valves automatically close when the flow approaches 20 percent of rated LPCI flow in either injection line. Continued plant operation is justified on the following bases:

Aging

Conditions of aging were evaluated using the Arrhenius technique. Based on the analysis, which considered all non-metallic materials within the switch, an estimated life in excess of 40 years was established. This calculation supports projected operability of the differential pressure switch beyond 1986.

Pressure

The service profile for the location of this device reaches a peak of 15.3 psia, whereas the test pressure reaches a maximum of 7" H_2O (14.95 psi). The service profile is above 14.95 psia for approximately 18 seconds. Based on this fact and the weathertight construction of the instrument, in our engineering judgment no functional disparities will occur.

Radiation

DPIS1001-79B is qualified to a level of 3×10^6 rads. The levels of total integrated accident dose plus 40 year normal dose for area 1.2 are 1.15×10^7 rads for LOCA and 1.08×10^7 rads for HELB with core damage.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. DPIS1001-79B
TER No. 176 Sheet 2 of 2

Preparer: JP Rogers Date: 8/29/84

Independent Review: WS Clancy Date: 8/29/84

Approval: RV Sorge Date: 8/30/84

Cumulative doses over time for these events suggest a qualified mission time of either 38 hours post-LOCA or 14 hours post-HELB. Either period is considered of adequate duration to assure proper startup of RHR in the LPCI mode following the respective event. To assure proper operation subsequent to this initial startup, a fully qualified instrument provides operators, in the Main Control Room, with indication of RHR loop flow. The operators have also been provided with remote manual control of valves MO1001-18A and MO1001-18B. Should it be evident to operators that RHR loop flow is less than normal, actions can be taken sufficiently early to preclude pump damage.

Temperature

The service profile for the location of this device is less severe than the test temperature profile. Peak service temperature of 229°F is higher than the test temperature of 212°F. However, the time duration that the service temperature is above 212°F is less than one minute. The test temperature is about 40°F higher than the service profile for the remainder of the test period (6 hours). In our engineering judgment and based on preliminary calculations for similar components, the internal temperature under the service condition should not reach the test temperature of 212°F. On this basis, the temperature profile in the test report is actually more severe than the service temperature profile.

Steam Exposure

A prototype of this component was subjected to 100% humidity for 6 hours. In our engineering judgment, this test was more severe than the environment to which this component may be subjected during an accident.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. DPIS1001-79A
TER No. 180 Sheet 1 of 2

Preparer: [signature] Date: 8/28/84

Independent Review: J L Rogers Date: 8/28/84

Approval: [signature] Date: 8/29/84

EQUIPMENT TYPE: Differential Pressure Switch
MANUFACTURER: Barton
MODEL: 289A

Function

To protect the RHR pumps from overheating at low flow rates, a minimum flow bypass pipeline, which routes water from the pump discharge to the suppression pool, is provided for each pair of pumps. A single motor-operated valve controls the condition of each bypass pipeline. Each minimum flow bypass valve (i.e. M01001-18A, M01001-18B) automatically opens upon sensing low flow in both injection lines. DPIS1001-79A is used to sense flow in loop A for this purpose. The valves automatically close when the flow approaches 20 percent of rated LPCI flow in either injection line. Continued plant operation is justified on the following bases:

Aging

Conditions of aging were evaluated using the Arrhenius technique. Based on the analysis, which considered all non-metallic materials within the switch, an estimated life in excess of 40 years was established. This calculation supports projected operability of the differential pressure switch beyond 1986.

Pressure

The service profile for the location of this device reaches a peak of 15.4 psia, whereas the test pressure reaches a maximum of 7" H_2O (14.95 psi). The service profile is above 14.95 psia for approximately 18 seconds. Based on this fact and the weathertight construction of the instrument, in our engineering judgment no functional disparities will occur.

Radiation

DPIS1001-79A is qualified to a level of 3×10^6 rads. The levels of total integrated accident dose plus 40 year normal dose for area 1.1 are 1.14×10^7 rads for LOCA and 1.08×10^7 rads for HELB with core damage.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. DPIS1001-79A
TER No. 180 Sheet 2 of 2

Preparer: [signature] Date: 8/28/84

Independent Review: [signature] Date: 8/28/84

Approval: [signature] Date: 8/29/84

Cumulative doses over time for these events suggest a qualified mission time of either 28 hours post-LOCA or 14 hours post-HELB. Either period is considered of adequate duration to assure proper startup of RHR in the LPCI mode following the respective event. To assure proper operation subsequent to this initial startup, a fully qualified instrument provides operators, in the Main Control Room, with indication of RHR loop flow. The operators have also been provided with remote manual control of valves MO1001-18A and 18B. Should it be evident to operators that RHR loop flow is less than normal, actions can be taken sufficiently early to preclude pump damage.

Temperature

The service profile for the location of this device is less severe than the test temperature profile. Peak service temperature of 225°F is higher than the test temperature of 212°F. However, the time duration that the service temperature is above 212°F is less than one minute. The test temperature is about 40°F higher than the service profile for the remainder of the test period (6 hours). In our engineering judgment and based on preliminary calculations for similar components, the internal temperature under the service condition should not reach the test temperature of 212°F. On this basis, the temperature profile in the test report is actually more severe than the service temperature profile.

Steam Exposure

A prototype of this component was subjected to 100% humidity for 6 hours. In our engineering judgment, this test was more severe than the environment to which this component may be subjected during an accident.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1451A/B, PS1464A/B
TER No. 181(51/64 A), 208(51/64 B) Sheet 1 of 1

Preparer: NR Ervin Date: 9/19/84

Independent Review: WJ Clancy Date: 9/19/84

Approval: LB Grays Date: 9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 5N-AA3-X2PP/5N-AA3-X3PP

These pressure switches provide a permissive to the ADS system logic. Automatic blowdown of the reactor vessel will not occur until indication of satisfactory low pressure ECCS operation. These pressure switches provide indication of satisfactory Core Spray system operation.

Pipe Breaks Outside Containment and Pipe Breaks Inside Containment are the only design basis events which produce a harsh environment in the areas of these switches.

ADS requires low-low reactor water level, high drywell pressure, indication of Core Spray or RHR pump discharge pressure and expiration of a 2 minute time delay relay in order to automatically actuate. For PBOC's, high drywell pressure will not occur and operator action would be necessary to maintain adequate core cooling. No failure modes associated with exposure of these switches to a PBOC produced harsh environment will prevent manual actuation of ADS. Therefore, these switches do not need to be qualified for the effects of a PBOC.

These switches have been analyzed to 1×10^6 rads. For a PBIC, radiation levels of 1×10^6 rads are reached 4 hours after the pipe break. The FSAR credits operator action only when the operator can reasonably be expected to accomplish the required action under the existing conditions. In our judgement, at 4 hours into the event, operator action to initiate ADS in accordance with NOD Procedure 5.4.2 if required, can reasonably be assumed.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1001-93A, B, C, D; PS1001-104A, B, C, D
TER No. 182(93A/C), 182(104A/C), 209(93B/D), 209(104B/D) Sheet 1 of 1

Preparer:	NR Ens	Date:	9/19/84
Independent Review:	WS Clancy	Date:	9/19/84
Approval:	RS Grazio	Date:	9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 5N-AA3-X5PP/5N-AA3-X3PP

These pressure switches provide a permissive to the ADS system logic. Automatic blowdown of the reactor vessel will not occur until indication of satisfactory low pressure ECCS operation. These pressure switches provide indication of satisfactory RHR system operation.

Pipe Breaks Outside Containment and Pipe Breaks Inside Containment are the only design basis events which produce a harsh environment in the areas of these switches.

ADS requires low-low reactor water level, high drywell pressure, indication of Core Spray or RHR pump discharge pressure and expiration of a 2 minute time delay relay in order to automatically actuate. For PBOC's, high drywell pressure will not occur and operator action would be necessary to maintain adequate core cooling. No failure modes associated with exposure of these switches to a PBOC produced harsh environment will prevent manual actuation of ADS. Therefore, these switches do not need to be qualified for the effects of a PBOC.

These switches have been analyzed to 1×10^6 rads. For a PBIC, radiation levels of 1×10^6 rads are reached 4 hours after the pipe break. The FSAR credits operator action only when the operator can reasonably be expected to accomplish the required action under the existing conditions. In our judgement, at 4 hours into the event, operator action to initiate ADS in accordance with NOD Procedure 5.4.2 if required, can reasonably be assumed.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCIS Turbine Bearing Oil Pressure Switch
TER No. 185 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Ervin Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Oil Pressure Switch
MANUFACTURER: Square D
MODEL: 9012

This switch provides a permissive to start the HPCIS Auxiliary Oil Pump on system initiation. After about 30 seconds of automatic turbine startup, the pressure supplied by the shaft driven oil pump is sufficient and this device signals the aux oil pump to stop. Failure of this switch to permit the pump start signal will result in a failure to open the two hydraulically controlled turbine steam inlet valves, thus preventing system initiation on demand. The functions of this switch, however, are required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HPCIS Turbine Bearing Oil Pressure Switch
TER No. 185 Sheet 2 of 2

Preparer:	W S Clancy	Date: 9/19/84
Independent Review:	M R Ennis	Date: 9/19/84
Approval:	R Brazis	Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the HPCIS Turbine Bearing Oil Pressure Switch are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1001-90A/D
TER No. 189b,c (A, C), 203a, b (B, D) Sheet 1 of 1

Preparer: JL Rogers Date: 8/24/84

Independent Review: WS Clancy Date: 8/24/84

Approval: WS Clancy Date: 8/27/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 72N-AA4-PP

The function of these pressure switches is to provide a high drywell pressure permissive to start the RHR and Core Spray pumps. These switches will be exposed to a harsh steam and radiation environment following a PBOC-2B and 2T (Reactor Water Cleanup System Pipe Breaks) and a harsh radiation environment following a PBIC and all other PBOC's.

From FSAR Appendix G, high drywell pressure does not result from a PBOC. Therefore, actuation of these switches to mitigate the effects of a PBOC is not required.

For PBIC's, radiation levels of 1×10^6 rads are not reached until at least 100 hours after the pipe break occurs. As per GE letter the limiting materials are neoprene and Buna-N. Per D.O.R. Guidelines, Buna-N has a radiation threshold of 1×10^6 rads and neoprene a radiation threshold of 1×10^7 rads. Therefore, switch failure due to radiation would not be expected to occur until at least 100 hours after the pipe break. Automatic start of the RHR and Core Spray pumps would not be required at this time.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS-512A/D
TER No. 190 (A, B), 202 (C, D) Sheet 1 of 1

Preparer: MR Ens Date: 9/19/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RE Grazio Date: 9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 12NN-AA4-PP

The function of these pressure switches is to provide a scram signal to the Reactor Protection System and to isolate Secondary Containment upon indication of high drywell pressure. These pressure switches are exposed to a harsh steam and radiation environment following PBOC-2B and 2T (Reactor Water Cleanup System Breaks) and a harsh radiation environment following a PBIC and all other PBOC's.

According to FSAR Appendix G, PBOC's do not produce high drywell pressure. Furthermore, subsequent failures of these pressure switches in the harsh environment caused by these PBOC's will not reverse the previously accomplished safety functions of scram and secondary containment isolation. Therefore, these switches do not need to be qualified for the effects of PBOC's.

For PBIC's, radiation levels of 1×10^6 rads are not reached until at least 100 hours after the pipe break occurs. As per GE letter the limiting materials are neoprene and Buna-N. Per D.O.R. Guidelines, Buna-N has a radiation threshold of 1×10^6 rads and neoprene a radiation threshold of 1×10^7 rads. Therefore, switch failure due to radiation would not be expected to occur until at least 100 hours after the pipe break. The scram and secondary containment isolation functions would have been completed prior to this time.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1001-89A/D
TER No. 191 (A), 205 (B), 189a (C), 197 (D) Sheet 1 of 1

Preparer: W S Clancy Date: 9/19/84

Independent Review: M R Ewing Date: 9/19/84

Approval: R L Gray Date: 9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 12N-AA4-PP

The function of these pressure switches is to provide a high drywell pressure permissive to the ADS initiation logic. These switches are exposed to a harsh steam and radiation environment following PBOC -2B and 2T (Reactor Water Cleanup System Pipe Breaks) and a harsh radiation environment following a PBIC and all other PBOC's.

According to FSAR Appendix G, PBOC's do not produce high drywell pressure. Operator action is credited in the PNPS Emergency Operating Procedures to initiate ADS if required. Subsequent failure of these switches caused by a harsh environment will not prevent manual operation of ADS from the control room. Therefore, these switches do not need to be qualified for the effects of PBOC's.

For PBIC's, radiation levels of 1×10^6 rads are not reached until at least 100 hours after the pipe break occurs. As per GE letter the limiting materials are neoprene and Buna-N. Per D.O.R. Guidelines, Buna-N has a radiation threshold of 1×10^6 rads and neoprene a radiation threshold of 1×10^7 rads. Therefore, switch failure due to radiation would not be expected to occur until at least 100 hours after the pipe break. RCS depressurization will have been completed prior to this time in accordance with the requirements of NOD Procedure 5.4.2.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1001-83A/D
TER No. 192 (A), 193 (C), 198 (D), 204 (B) Sheet 1 of 1

Preparer: J L Rogers Date: 8/24/84

Independent Review: W H Clancy Date: 8/24/84

Approval: R A Penny Date: 8/27/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 12N-AA4-PP/12N-AA4-X2PP/12N-AA5

These pressure switches provide a drywell pressure permissive to the control logic of RHR valves 1001-23A/B, 1001-26A/B and 1001-37A/B. These valves must open in order to provide drywell and suppression pool spray for the purpose of primary containment cooling. These pressure switches may be exposed to a harsh steam and radiation environment following PBOC-2B and 2T (Reactor Water Cleanup System Pipe Breaks) and a harsh radiation environment following a PB1C and all other PBOC's.

From FSAR Section 5, the Containment Spray Subsystem provides containment spray capability as an alternate method for reducing containment pressure following a LOCA. This subsystem is designed to remove energy from the drywell by condensing steam or to cool noncondensable gases which have collected in the suppression pool. Since a PBOC does not result in these conditions, these pressure switches do not need to be able to withstand the environmental conditions associated with PBOC's.

For PB1C's, radiation levels of 1×10^6 rads are not reached until at least 100 hours after the pipe break occurs. As per GE letter the limiting materials are neoprene and Buna-N. Per D.O.R. Guidelines, Buna-N has a radiation threshold of 1×10^6 rads and neoprene a radiation threshold of 1×10^7 rads. Therefore, switch failure due to radiation would not be expected to occur until at least 100 hours after the pipe break. It can reasonably be assumed that the containment spray subsystem would not be required at this time.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1360-9 (A-D)
TER No. 194 Sheet 1 of 3

Preparer: J.L. Rogers Date: 8/24/84

Independent Review: W.S. Clancy Date: 8/24/84

Approval: W.S. Clancy Date: 8/27/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Barksdale
MODEL: P1H-M855S-V

PS1360-9 (A-D) are Barksdale model P1H-M85SS-V pressure switches used to sense low pressure in the steam line supply lines to the RCIC pump turbine. The switches are used to signal the closure of two motor operated valves in the RCIC steam supply line in order to prevent steam and radioactive gases from escaping through the turbine shaft seals into the reactor building over a 30 day mission length. This protection is only required after reactor steam pressure has decreased to such a low value that the turbine can no longer be operated (approximately 100 psig or less). This condition is expected to be reached during reactor vessel cooldown and depressurization within a few minutes following a LOCA or approximately 6-8 hrs following a small break PBIC or PBOC. It is expected that the reactor vessel will reach atmospheric pressure approximately 2-4 hours later at which time, this protective function will no longer be required. These switches are mounted in the RCIC steam leak instrument rack (C2257-B) located in the mezzanine of the RCIC quadrant. These switches could be exposed to a harsh superheated steam and radiation environment during a PBOC-5 (HPCI steam line break in the torus compartment) or PBOC-6 (RCIC steam line leak in the RCIC pump room) or to solely a harsh radiation environment during any other PBOC or a PBIC. Continued operation with these switches can be justified based on the following analyses.

Justification

o Temperature and Humidity

The PBOC-5 service profile (246°F maximum and 100% RH) exceeds the test profile (extended exposure to saturated steam at 212°F) for approximately the first 3 minutes of the transient. However, the thermal inertia of the switch and instrument rack in the presence of superheated steam should result in the temperatures actually experienced in the vital portions of the switch being enveloped by the test profile. In the unlikely event the switches did fail, two scenarios could occur. If the switch failed closed, RCIC, which is not credited for this transient, would remain isolated. If the switch failed

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1360-9 (A-D)
TER No. 194 Sheet 2 of 3

Preparer: JL Rogers Date: 8/24/84

Independent Review: WA Cleary Date: 8/24/84

Approval: RC Mecray Date: 8/27/84

open, the control room operator could be reasonably assumed to close the valves several hours later following reactor vessel cooldown/depressurization and termination of RCIC.

The PBOC-6 service profile (short term exposure to 155°F and 90% humidity) is less severe than the test profile (extended exposure at 212°F and 100% relative humidity) as documented in AETL Test Report 596-0398. Therefore, the test temperature profile in the test is actually more severe than the service condition and continued operation of the plant is justified.

o Pressure

The service profile reaches a peak of 14.9 psia, whereas the test pressure reaches a maximum of 7" H_2O (14.95 psia). Based on this fact and due to weathertight construction of this instrument, in our engineering judgment, no functional disparities will occur. Therefore, continued plant operation is justified.

o Radiation

From a Wyle Labs analysis of the materials used for construction of this component, the most limiting material is a fiberboard type insulator which has a damage threshold of approximately 10^6 rads for this application. The leak tight nature of the switch is expected to preclude beta radiation exposure to this components. It is estimated that the gamma dose to this component will meet the 10^6 threshold approximately 400 hours following a LOCA. It is expected that the RCIC steam line would have isolated on low pressure and sealed in prior to this time. In the event that this exposure induced a failure of the switch, the steam line valves would be capable of opening if the operator reset the isolation and either the operator held the control switches in the open position or a low reactor vessel level or high drywell pressure was sensed. In the unlikely event that these conditions were met, opening of the valves would have a negligible effect on the ability to maintain exposures below 10CFR100 limits since RCIC operation should be

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS1360-9 (A-D)
TER No. 194 Sheet 3 of 3

Preparer: J L Rogers Date: 8/24/84

Independent Review: W S Clancy Date: 8/24/84

Approval: [signature] Date: 8/27/84

completed and the reactor vessel would be expected to be nearing a cold depressurized condition at the time the damage threshold would be reached. In addition, failure of the switch would not inhibit the ability to reclose these valves. Continued operation is justified.

o Aging

Wyle Labs has completed aging and thermal degradation analyses that confirm that the six hour qualification exposure documented in AETL Test Report 596-0398, envelopes the conditions experienced at PNPS over 40 years and a 30 day mission length accident exposure for these switches.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2368A, PS2368B
TER No. 195 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eu Date: 9/19/84

Approval: R Stajs Date: 9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Barksdale
MODEL: B2T-M12SS

The HPCIS turbine is automatically shutdown by tripping the turbine stop valve closed on any of several signals. One of those signals is high turbine exhaust pressure as sensed by PS2368A and PS2368B. These switches serve their safety-related function only during HPCIS operation to assure the physical integrity of the turbine exhaust pipeline.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2368A, PS2368B
TER No. 195 Sheet 2 of 2

Preparer:	W S Clancy	Date:	9/11/84
Independent Review:	N R Eisenhut	Date:	9/19/84
Approval:	K Graesser	Date:	9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the pressure switches are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2360-1
TER No. 196 Sheet 1 of 2

Preparer: NR Ewin Date: 9/19/84

Independent Review: WJ Cleary Date: 9/19/84

Approval: RE Grazio Date: 9/20/84

EQUIPMENT TYPE:: Pressure Switch
MANUFACTURER: Barksdale
MODEL: D2H-M150-SS

This pressure switch detects HPCI pump low suction pressure and is, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of this pressure switch is the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2360-1
TER No. 196 Sheet 2 of 2

Preparer: NR Ennis Date: 9/19/84

Independent Review: W J Clancy Date: 9/19/84

Approval: R L Gray Date: 9/20/84

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS-2389 (A-D)
TER No. 207 Sheet 1 of 3

Preparer:	NR Ervin	Date:	8/24/84
Independent Review:	JL Rogers	Date:	8/24/84
Approval:	[signature]	Date:	8/27/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Barksdale
MODEL: P1H-M85SS-V

PS-2389(A-D) are Barksdale model P1H-M85SS-V pressure switches used to sense low pressure in the steam line supply lines to the HPCI pump turbine. The switches are used to signal the closure of two motor operated valves in the HPCI steam supply line in order to prevent steam and radioactive gases from escaping through the turbine shaft seals into the reactor building. This protection is only required after reactor steam pressure has decreased to such a low value that the turbine can no longer be operated (approximately 100 psig or less). This condition is expected to be reached during reactor vessel cooldown and depressurization within a few minutes following a LOCA or approximately 6-8 hrs following a small break PBIC or PBOC. It is expected that the reactor vessel will reach atmospheric pressure approximately 2-4 hours later at which time, this protective function will no longer be required. These switches are mounted in the HPCI steam leak instrument rack (C2257-A) located in the NW RHR quadrant. These switches could be exposed to a harsh superheated steam and radiation environment during a PBOC-5 (HPCI steam line break in the torus compartment) or to solely a harsh radiation environment during any other PBOC or a PBIC. Continued operation with these switches can be justified based on the following analyses.

Analytical Justification

o Temperature and Humidity

AETL Test Report 596-0398 documents the qualification testing of a similar component in a harsh steam environment. The test profile consisted of a rise to 212°F in an unspecified time with a dwell at 212°F for six hours. However, the PBOC-5 Service profile for this location consists of a rapid spike to 229°F with a return to less than 212°F in less than 3 minutes. It is our engineering judgment that due to the thermal inertia of the components, the internal temperature experienced by these switches during the predicted service event will be significantly less than that which was experienced in the test. Therefore, the test temperature profile is essentially more severe than the service conditions and continued operation of the plant is justified. It should be noted that HPCI operation is not

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS-2389 (A-D)
TER No. 207 Sheet 2 of 3

Preparer: NR Ervin Date: 8/24/84

Independent Review: JK Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

required during this transient and that the valves controlled by these switches will be automatically closed in response to increased HPCI flow and space temperature resulting from the leak.

o Pressure

The service profile reaches a peak pressure of 15.3 psia and decays to atmospheric pressure within seconds. In our engineering judgment, exposure to this pressure change will cause no functional disparities due to weathertight construction of these switches. It should be noted that HPCI operation is not required during this transient and that the valves controlled by these switches will be automatically closed in response to increased HPCI flow and space temperature resulting from the leak. Therefore, continued plant operation is justified.

o Radiation

From a Wyle Labs analysis of the materials used for construction of this component, the most limiting material is a fiberboard type insulator which has a damage threshold of approximately 10^6 rads for this application. The leak tight nature of the switch is expected to preclude beta radiation exposure to this components. It is estimated that the gamma dose to this component will meet the 10^6 threshold approximately 5 hours following a LOCA. It is expected that the HPCI steam line would have isolated on low pressure prior to this time. In the unlikely event that this exposure induced a failure of the switch, the steam line valves would be capable of opening if the operator held the control switches in the open position or if a low reactor vessel level or high drywell pressure is sensed. In the unlikely event that these conditions were met, opening of the valves would have a negligible effect on the ability to maintain exposures below 10CFR100 limits since HPCI operation should be completed and the reactor vessel would be expected to be nearing a cold depressurized condition at the time the damage threshold would be reached. In addition, failure of the switch would not inhibit the operators ability to reclose these valves. Continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS-2389 (A-D)
TER No. 207 Sheet 3 of 3

Preparer: MR Ervin Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

6 Aging

Wyle Labs has completed aging and thermal degradation analyses that confirm that the six hour qualification exposure documented in AETL Test Report 596-0398, envelopes the conditions experienced at PNPS over 40 years and a 30 day mission length accident exposure for these switches.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LIS-263-72A,LIS-263-72B, LIS-263-72C, LIS-263-72D
TER No. 213b, 212a, 213a, 212b Sheet 1 of 2

Preparer: W S Clancy Date: 8/24/84

Independent Review: M R Ertman Date: 8/24/84

Approval: W S Clancy Date: 8/27/84

EQUIPMENT TYPE: Level Indicating Switch
MANUFACTURER: Yarway
MODEL: 4418C

The function of these level switches is to provide automatic initiation signals to the ECCS, RCIC and Diesel Generators on reactor water level of -49" and to trip the HPCI and RCIC turbines on reactor water level of +48". These level switches are Yarway Model 4418C. These switches are believed to be qualified with the exception of the mercury switches which are installed in this model.

The only events which result in a harsh environment at the location of these level switches are PBOC's and PBIC's.

For PBOC's, only Reactor Water Cleanup System breaks result in a harsh environment at the switch locations. The service profile for these areas reaches a peak pressure of 15.3 psig at 4.9 seconds and a peak temperature of 189.6°F at 29 seconds. The pressure transient is over at 7 seconds when the pressure has dropped to essentially atmospheric pressure. In our engineering judgment, the mercury switch will undergo no functional disparities as a result of exposure to this service profile. If the feedwater system remains in service after reactor scram, then a low-low water level of -49" will not be reached. If feedwater is not available, then reactor water level will quickly drop to -49" and ECCS initiation will result. This water level will occur prior to reaching harsh radiation levels at 10 minutes. If these switches fail and cause a trip of HPCI and RCIC on a spurious high water level signal, the operator would have at least 10 minutes to utilize ADS to blowdown the reactor vessel so that core cooling can be maintained by low pressure ECCS. With the exception of the HPCI and RCIC systems, no failure mode of these switches could result in reversal of a completed safety action or prevent the accomplishment of any other safety action.

For a PBIC, radiation levels do not significantly increase above normal levels until 10 minutes after the break has occurred. For pipe breaks that are in the range of unassisted HPCI performance, no fuel damage occurs and radiation levels do not significantly increase above normal levels. For larger pipe breaks, reactor water level will drop to -49" before radiation

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LIS-263-72A,LIS-263-72B, LIS-263-72C, LIS-263-72D
TER No. 213b, 212a, 213a, 212b Sheet 2 of 2

Preparer: W A Clancy Date: 8/24/84

Independent Review: M R Ervin Date: 8/24/84

Approval: W A Clancy Date: 8/27/84

levels significantly increase above normal levels. In addition, high drywell pressure which will result from a PBIC will provide automatic initiation of LPCI, Core Spray, HPCI, RCIC and the Diesel Generators.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LIS263-57A, LIS263-57B, LIS263-58A, LIS263-58B
TER No. 214b, 214a, 210, 211 Sheet 1 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eu Date: 9/19/84

Approval: R L Grazio Date: 9/20/84

EQUIPMENT TYPE: Level Indicating Switch
MANUFACTURER: Yarway
MODEL: 4418C

The function of these level switches is to provide recirculation pump trip, reactor building isolation, reactor scram and isolation of various primary containment penetrations on low reactor water level (+9"). If reactor water level drops to low-low level (-49") then they effect main steam line isolation and recirculation pump trip. These level switches are Yarway Model 4418C. These switches are believed to be qualified with the exception of the mercury switches which are installed in this model.

The only events which result in a harsh environment at the location of these level switches are Pipe Breaks Outside Containment (PBOC) and Pipe Breaks Inside Containment (PBIC).

For PBOC's, only Reactor Water Cleanup System breaks result in a harsh environment at the switch locations. Calculations indicate that a reactor water level of +9" is reached at 23 seconds after this pipe break occurs. The service profile for these areas reaches a peak pressure of 15.3 psig at 4.9 seconds and a peak temperature of 189.6°F at 29 seconds. The pressure transient is over at 7 seconds when the pressure has dropped to essentially atmospheric pressure. In our engineering judgment, the mercury switch will unde[illegible]nctional disparities as a result of exposure to this service pr[illegible]he feedwater system remains in service after reactor scram, t[illegible]w water level of -49" will not be reached. If feedwater is not [illegible]en reactor water level will quickly drop to -49" and main steam [illegible]on will result. This water level will occur prior to reaching [illegible]tion levels at 10 minutes.

In the highly unlikely event that long term exposure to the humidity inherent in PBOC causes switch failure, then spurious closure of the MSIVs could result. However, this would not occur until several hours into the transient when closure of the MSIVs following cooldown would be eminent. In addition, the operating staff would have sufficient opportunity at this point in post transient recovery, to jumper between points DD-1 to DD-2, and BB-1 to BB-2

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LIS263-57A, LIS263-57B, LIS263-58A, LIS263-58B
TER No. 214b, 214a, 210, 211 Sheet 2 of 2

Preparer: W J Clancy Date: 9/19/84

Independent Review: M R Ewa Date: 9/19/84

Approval: K Graves Date: 9/20/84

in panel 915 in the cable spreading room and points DD-1 to DD-2 and BB-1 and BB-2 in panel 917 in the cable spreading room to eliminate these switches from these circuits.

For a PBIC, radiation levels do not significantly increase above normal levels until 10 minutes after the break has occurred. For pipe breaks that are in the range of unassisted HPCI performance, no fuel damage occurs and radiation levels do not significantly increase above normal levels. For larger pipe breaks, reactor water level will drop to -49" before radiation levels significantly increase above normal levels. In addition, high drywell pressure will result from PBIC's and quickly cause a reactor scram. As a backup to MSIV closure, if fuel damage occurs, the main steam line radiation monitors will close the MSIV's.

For both PBIC's and PBOC's, no subsequent failure modes of these switches will result in reversal of a completed safety action or prevent other safety actions from being accomplished.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LITS263-73A, LITS263-73B
TER No. 227 (A), 226 (B) Sheet 1 of 1

Preparer: D L Rogers Date: 8/28/84

Independent Review: M R Ensin Date: 8/28/84

Approval: R D Graja Date: 8/29/84

EQUIPMENT TYPE: Level Indicating Switch
MANUFACTURER: Yarway
MODEL: 4418EC

The function of these switches is to provide reactor water level indication in the main control room and to provide a reactor water level permissive to the containment spray subsystem of the RHR system.

The safety-related display function of these switches has been replaced by Rosemount differential pressure transmitters DPT1001-650A & B. These Rosemount transmitters Model 1153 Series B are qualified per IEEE-323-1974 and IEEE-344-1975 and the DOR guidelines to test conditions in excess of the service conditions.

The containment spray subsystem provides containment spray capability as an alternate method for reducing containment pressure following a PBIC. A PBIC could produce a harsh radiation environment at the switch locations. A harsh radiation level would not be exceeded until 1/2 hour after the accident occurred. After this time, switch failure due to radiation could occur. However, a keylocked manual override switch located in the main control room is provided to completely bypass the 2/3 core coverage permissive in the containment spray logic so that manual operation of containment spray could still be accomplished.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LS2351A, LS2351B
TER No. 232 Sheet 1 of 2

Preparer: W A Clancy Date: 9/19/84

Independent Review: M R Ewing Date: 9/19/84

Approval: R R Grazio Date: 9/20/84

EQUIPMENT TYPE: Level Switch
MANUFACTURER: Robertshaw
MODEL: SL-702A1

These level switches provide signals to HPCIS valves M02301-35 and M02301-36. On high suppression pool water level, the valves are automatically opened to shift HPCIS pump suction from the condensate storage tanks to the suppression pool. Because this opening cannot occur in the presence of a system isolation signal, failure of either or both level switches will not impair the isolation function of the torus suction valves. Also, when the HPCIS is not operating, these level switches will serve no safety-related function (since suppression pool water level will not be affected by opening of the torus suction valves). These devices are therefore, required to function only during HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. LS2351A, LS2351B
TER No. 232 Sheet 2 of 2

Preparer: W S Clancy Date: 9/19/84

Independent Review: N R Eaton Date: 9/19/84

Approval: R L Gray Date: 9/20/84

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of the level switches are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. GE Cable-Model SI57275 Inside Drywell
TER No. 250 Sheet 1 of 1

Preparer: JL Rogers Date: 8/24/84

Independent Review: WL Clamy Date: 8/24/84

Approval: RC Lamy Date: 8/27/84

EQUIPMENT TYPE: Cable
MANUFACTURER: General Electric
MODEL: SI57275

This component is GE Vulkene SIS switchboard wire which is fully qualified by test for all requirements except that the test radiation value is 4E7 rads gamma while the actual accident requirement is 6.3E7 gamma and 8.5E8 beta. Per DOR Guidelines, the minimum insulation thickness of 0.030 allows reduction of the beta dose to 8.5E7 making the total dose 14.8E7.

Franklin Institute Test report F-C2920 documents exposure of GE "Vulkene" non-jacketed single conductor cable to levels of radiation up to 5E8 gamma with subsequent LOCA testing. While not specifically referencing Model E57275, these tests were conducted prior to GE's introduction of "Vulkene Supreme" and can be considered to be generically applicable to #57275 Vulkene insulation.

This test, coupled with the actual specimen performance documented in the #57275 qualification test, is sufficient to justify continued operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. HS-1A, 2A, 3A, 4A, 1B, 2B, 3B, 4B
TER No. 256 Sheet 1 of 1

Preparer: MR Ensin Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Humidity Sensor
MANUFACTURER: Honeywell
MODEL: Q464A

These relative humidity sensors are not required for Standby Gas Treatment System (SGTS) Operation. The normal function of these sensors is to detect high humidity in the SGTS inlet and energize relays, which in turn cause the heater relays and heaters to be energized. The humidity controls have been bypassed, so that full heater operation is initiated upon operation of the SGTS exhaust fan. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. TSW-1A, TSW-1B
HTR T.S.

TER No. 258 Sheet 1 of 1

Preparer: NR Ervin Date: 9/18/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RT Gray Date: 9/20/84

EQUIPMENT TYPE: Temperature Switch
MANUFACTURER: Fenwal
MODEL: 40-102010-115

These temperature switches provide a safety high temperature shut-off of the SGTS heaters (VGTF201A, B). Operation of the SGTS is only required post LOCA and the harsh environment to which SGTS is exposed is only radiation . The dose in the area is approximately 5.6×10^7 rads. They are capillary tube type of temperature switches with the following chemical compounds in the capillary tube:

1.	Ortho-terphenyl	30%
2.	Dipheny-ether	50%
3.	Biphenyl	20%

The damage threshold of these components is at <u>least</u> 1×10^9 rads. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C68. C69
heater relay/xfmr/wire

TER No. 259, 260, 261, 262 Sheet 1 of 1

Preparer: NR Ervin Date: 9/19/84

Independent Review: WS Clancy Date: 9/12/84

Approval: RB Grazio Date: 9/20/84

EQUIPMENT TYPE: Contactor/Transformer/Wire
MANUFACTURER: Allen Bradley/Sola/Unknown
MODEL: 700DC-N200Z1/D47645/Unknown

Transformer

The manufacturer and model listed in the Franklin TER (#260) are incorrect. The transformer was manufactured by Sola. The transformer is only required to operate post-LOCA, and is not subjected to excessive temperature and pressure. The transformer materials include kraft paper, mylar tape, cotton, and polyester; all of which have a damage threshold greater than 2×10^5 rads. The amount of radiation to which the transformer may be subjected is 1.1×10^5 rads, therefore continued plant operation is justified.

Contactor and Wire

The heater contactors (TER #261) and wire (TER #259/#262) are not required post- PBOC. They are only required to operate post-LOCA and after a fuel handling accident. A component specific calculation was performed on panels C68 and C69. The result was a worst case dose of 1.1×10^5 rads, if SGTS operated 24 hours per day post-LOCA. Wyle Labs has recently performed a radiation materials analysis that determined the contactor can survive the calculated exposure without suffering deleterious effects. These components are therefore considered to be qualified pending receipt and review of the subject analysis. Research performed by EPRI has indicated that with the exception of Teflon, all potential wire insulation materials have a radiation threshold level greater than the radiation dose experienced at these panels. However, Teflon did not exhibit a 25% loss in tensile strength until the samples had received a dose in excess of that experienced at these panels. Therefore, the insulation material will not fail and continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Electroswitch 24/40 in Alternate Shutdown Panels
TER No. 264, 266 Sheet 1 of 3

Preparer: J. Rogers Date: 8/24/84

Independent Review: W.S. Asmay Date: 8/28/84

Approval: K.L. Graves Date: 8/29/84

EQUIPMENT TYPE: Panel Control Switches
MANUFACTURER: Electroswitch
MODEL: 24/40

The switches are located in remote shutdown panels which provide a means of accomplishing a safe shutdown of the plant from outside the main control room. They are not required to operate in a PBOC or LOCA. However, the switches must be demonstrated to not have a failure mode during an accident which would transfer control away from the control room.

Temperature

Temperature tests have been successfully conducted by Electroswitch on Series 24 (Report No. 2392-2) and Series 40 (Report No. 2392-14) switches. The tests were conducted at 176°F (80°C) for 120 hours. Proper operation of the switches was verified before and after the temperature exposure. For this application the maximum accident temperature is 238.1°F which exceeds the 176°F test temperature, however, only for 15 minutes. These switches are located inside an enclosure (unvented) which will cause the temperature experienced by the switches to lag the accident temperature experienced by the enclosure. Tests have been conducted by Wyle Laboratories on similar sized cabinets (except with vents) which characterized the internal temperature of the cabinets as a function of time in a LOCA environment.

Results of these tests (Wyle Report No. 44439-2) show the internal cabinet temperature lagged the external temperature by a minimum of 50°F during the first 15 minutes. In that test the temperature and pressure were rapidly (within approximately 10 seconds) ramped to 54 psig and 280°F (minimum) respectively. Because the pressure for this application is much less than the pressure for the test (0.6 psig versus 54 psig) it is judged that in a similar test to the same maximum temperature that the internal temperature of the cabinet would lag the external temperature by substantially greater than the 50°F experienced in the test. Further, in the tests conducted by Wyle, varied components (examples: pressure transmitter and solenoid valve) were installed in the cabinet and their mass temperature was recorded in the test. The temperature of a typical component (pressure transmitter) lagged the accident temperature by approximately 80°F after the first 15 minutes of

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Electroswitch 24/40 in Alternate Shutdown Panels
TER No. 264, 266 Sheet 2 of 3

Preparer: J. Rogers Date: 8/24/84

Independent Review: W.A. Clancy Date: 8/28/84

Approval: K.R. Graves Date: 8/29/84

the test. In the Electroswitch test, the switches were maintained at 176°F for 120 hours. Based on the above tests and engineering rational, it is judged that the test temperature of 176°F envelops the temperature which the switches would experience in the accident condition. Therefore, the switches are judged suitable for use in the temperature application.

Humidity

These switches are never exposed to more than 95% RH. Maximum voltage on the switches is 110 VAC. Wyle Laboratories has tested a variety of switches and terminal blocks at humidity conditions in the range of 90% to 100% including some LOCA tests. In general, no problems have been experienced for these conditions where voltage never exceeds 110 volts unless the items experienced deformation resulting from temperature. Operation of the switches at the temperature conditions is justified in the above paragraph. Also, Electroswitch has subjected the switches to 95% RH for 96 hours, unpowered. Operation of the switches was satisfactory in functional tests conducted prior to and following the humidity test. Therefore, the switches are judged suitable for use in the humidity environment.

Pressure

The maximum pressure which the switches would be exposed to in an accident is 15.3 psia (0.6 psig). The configuration of the switches is such that they will not entrap air or otherwise cause a pressure imbalance which would result in inadvertent actuation of the switches. Therefore the switches are judged suitable for use in this pressure environment.

Radiation

The maximum radiation which the switches will experience is less than 1×10^6 rads (2.3×10^5 rads gamma and 6.6×10^5 rads beta) based on a specific location radiation analysis. Electroswitch Test Report No. 3030-1 documents satisfactory operation of the switches following a radiation exposure of 1×10^7 rads. Therefore, the switches are judged suitable for use in the radiation environment.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Electroswitch 24/40 in Alternate Shutdown Panels
TER No. 264, 266 Sheet 3 of 3

Preparer: J L Rogers Date: 8/24/84

Independent Review: W S Clancy Date: 8/28/84

Approval: E F Sheehan Date: 8/29/84

Aging

Conditions of aging were evaluated using the Arrhenius technique. Based on the analysis which considered all nonmetallic materials within the switch, an estimated life in excess of 40 years was established. This calculation supports projected operability of the switches well beyond 1986.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. CS42-1724, CS42-1725, CS42-1824, CS42-1825
TER No. 269 Sheet 1 of 1

Preparer: NR Ewin Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Control Panel Switches
MANUFACTURER: General Electric
MODEL: CR2940

The functional requirement of these switches is that normally closed contacts internal to the switches remain shut. The switches are mounted in an enclosed control panel. The non-metallic portion of the switch is made of Dupont Delrin.

The only way the contacts could open would be for catastrophic failure of the Delrin. The parameters that could cause catastrophic failure, would be temperature (Delrin softening or embrittling) or radiation (Delrin disintegrating). The radiation to which the switch might be subjected is 1.6×10^5 rad, but it has been tested to 1×10^6 rads, therefore radiation is not a problem. The temperature due to the worst case postulated break is 238.1°F, 24.5 seconds into the accident, and considering that Delrin has been tested to a much higher temperature (311°F) temperature is not a problem. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. 312D Anaconda*, 712B Anaconda*/SI57279
TER No. N/A Sheet 1 of 1

Preparer: MR Eisen Date: 8/30/84

Independent Review: JL Rogers Date: 8/30/84

Approval: [illegible] Date: 8/30/84

EQUIPMENT TYPE: Cable
MANUFACTURER: Anaconda/General Electric
MODEL: FR-EP-CPE/Vulkene Supreme

The insulation systems used on these cables have been environmentally qualified. The documentation packages for these cables are being completed and when completed, environmental qualification will be proven. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. 412A Okonite, 106 Kerite, 212B Rockbestos, SC16 Rockbestos
TER No. N/A Sheet 1 of 1

Preparer: M R Ervin Date: 8/24/84

Independent Review: W A Clancy Date: 8/24/84

Approval: G A Clancy Date: 8/24/84

EQUIPMENT TYPE: Cable
MANUFACTURER: Okonite/Kerite/Rockbestos
MODEL: Okalon/FR/Firewall III

The insulation systems used on these cables are environmentally qualified. The documentation packages for these cables are being completed and when completed, environmental qualification will be proven. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C129A*, C129B*
TER No. N/A
Sheet 1 of 2

Preparer: W S Clancy Date. 8/28/84

Independent Review: J Rogers Date: 8/29/84

Approval: R L Hayes Date: 8/30/84

EQUIPMENT TYPE: Instrument rack w/terminal block and wire
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

These instrument racks house a number of pressure switches for high drywell pressure. Instrument wire to eight of these switches and some terminal blocks could not be identified during a walkdown. The affected switches provide for the following safety functions in response to high drywell pressure.

RPS Trip
Secondary Containment Isolation
Permissive Logic for ADS Initiation
Permissive Logic for CS/LPCI Pump Operation
Permissive Logic for Drywell/Torus Spray

These racks are located in the reactor building at elevation 74' (zone 1.14G) and are exposed to a harsh high radiation environment following any PBOC or a PBIC. Continued operation can be justified from either a technical or systematic basis.

Technical Analysis

PBOC(s) do not result in a high drywell pressure condition (FSAR Appendix G). Therefore none of the affected pressure switches would be required to actively function while exposed to a harsh steam and radiation environment following a PBOC.

These instrument racks are exposed to approximately 10^6 rads over a 30 day mission length following a PBIC. Based on a Wyle Labs review of their extensive material library, and elimination of materials not commonly utilized in applications such as MCCs and instrument racks, it has been concluded that it is unlikely that any wire insulation unable to withstand this radiation exposure is installed in these racks.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C129A*, C129B*
TER No. N/A
Sheet 2 of 2

Preparer: W S Clamm Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: K Graesser Date: 8/30/84

As previously, discussed, the manufacturer of terminal blocks in these racks could not be positively determined during a walkdown. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured. Based on these considerations, continued operation is justified.

Systematic Analysis

Of the eight potentially affected instruments all but one were associated with the "A" trains of RPS, ADS, and ECCS. Therefore, redundant assurance of required safety functions would likely be provided by the "B" train if any of these switches failed to perform. The exception was caused by PS512A on C129A and PS512B on C129B. These switches provided for a RPS trip and secondary containment isolation during a PBIC. These switches are required to actively function during the first few minutes of a PBIC prior to exposure to a harsh radiation environment. In the unlikely event that the switches subsequently failed, no required safety function would be compromised.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C150, C151*
TER No. N/A Sheet 1 of 6

Preparer: W S Canny Date: 8/29/84
Independent Review: J K Leger Date: 8/29/84
Approval: R E Shaiw Date: 8/30/84

EQUIPMENT TYPE: Control Panel Switch/Light
MANUFACTURER: Electroswitch/General Electric
MODEL: 40/ET-16

Remote shutdown panels C150 and C151 are located in the "A" and "B" RBCCW rooms (zones 1.21 and 1.22) and are exposed to a harsh superheated steam environment (peaking at approximately 225°F and 15.2 psia) following a PBOC-3 (HPCI steam line break in the HPCI pump room). The panels contain series 40 Electroswitch Control Switches and GE Model ET-16 indicating lights. Failure of these components could cause loss of control of several RBCCW and salt service water pumps. The 225°F temperature is based on the preliminary results of a reanalysis of the PBOC-3 environment for these rooms. Continued operation can be justified on the following basis.

Series 40 Electroswitch

o Temperature

Temperature tests have been successfully conducted by Electroswitch on Series 24 (Report No. 2392-2) and Series 40 (Report No. 2392-14) switches. The tests were conducted at 176°F (80°C) for 120 hours. Proper operation of the switches was verified before and after the temperature exposure. For this application the maximum accident temperature is approximately 225°F which exceeds the 176°F test temperature, for approximately 15 minutes. These switches are located inside an essentially leak tight NEMA-12 enclosure (unvented) which will cause the temperature experienced by the switches to lag the accident temperature experienced by the enclosure. Tests have been conducted by Wyle Laboratories on similar sized cabinets (except with vents) which characterized the internal temperature of the cabinets as a function of time in a LOCA environment.

Results of these tests (Wyle Report No. 44439-2) show that the internal temperature of the vented cabinets lagged the external temperature by a minimum of 50°F during the first 15 minutes of exposure to a saturated steam environment. In that test the temperature and pressure were rapidly (within approximately 10 seconds) ramped to 54 psig and 280°F (minimum) respectively. Because the pressure for this application is much less than

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C150, C151*
TER No. N/A Sheet 2 of 6

Preparer: W S Cleary Date: 8/29/84

Independent Review: J R Rogers Date: 8/29/84

Approval: P A Graig Date: 8/30/84

the pressure for the test (0.5 psig versus 54 psig) and in light of the essentially leak tight nature of the enclosure, the hot environment is expected to be essentially precluded from entering the panel. It is therefore our engineering judgement that in a similar test of the unvented cabinets to the same maximum temperature but significantly lower pressure that the internal temperature of the cabinet would lag the external temperature by substantially greater than the 50°F experienced in the test. Further, in the tests conducted by Wyle, varied components (examples: pressure transmitter and solenoid valve) were installed in the cabinet and their mass temperature was recorded in the test. The temperature of a typical component (pressure transmitter) mounted in the vented cabinet lagged the accident temperature by approximately 80°F after the first 15 minutes of the test. It should be noted that saturated steam blanketing of high thermal inertia components such as the cabinet, as demonstrated in Limitorque Report 80027, would result in the accident environment being the equivalent of an exposure to 215°F to the exterior of the cabinet. The interior of the cabinet would be expected to lag 50 - 80°F minimum below this. In the Electroswitch test, the switches were maintained at 176°F for 120 hours. Based on the above tests and engineering rationale, it is judged that the test temperature of 176°F is comparable to the temperature which the switches would experience in the accident condition. Therefore, the switches are judged suitable for use in the temperature application.

o Humidity

The compartment within which these switches are mounted experiences 100% RH for a short time period. The humidity then decays rather quickly to a long term equilibrium of approximately 60%. Due to the essentially leak tight nature of the NEMA-12 enclosures, the switches should not experience the initial humidity spike. Maximum voltage on the switches is 120 VAC. Wyle Laboratories has tested a variety of switches and terminal blocks at humidity conditions in the range of 90% to 100% including some LOCA tests. In general, no problems have been experienced for these conditions where voltage never exceeds 120 volts unless the items experienced deformation resulting from temperature. Operation of the switches at the temperature conditions is justified in the above paragraph. Also, Electroswitch has subjected the

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C150, C151*
TER No. N/A Sheet 3 of 6

Preparer: W S Clancy Date: 8/29/84

Independent Review: J. Rogers Date: 8/29/84

Approval: R. A. Grojo Date: 8/30/84

switches to 95% RH for 96 hours, unpowered. Operation of the switches was satisfactory in functional tests conducted prior to and following the humidity test. Therefore, the switches are judged suitable for use in the humidity environment.

o Pressure

The maximum pressure which the switches would be exposed to in an accident is 15.2 psia (0.5 psig). The configuration of the switches is such that they will not entrap air or otherwise cause a pressure imbalance which would result in inadvertent actuation of the switches. Therefore the switches are judged suitable for use in this pressure environment.

o Radiation

The maximum radiation which the switches will experience is approximately 1.8×10^3 rads. Electroswitch Test Report No. 3030-1 documents satisfactory operation of the switches following a radiation exposure of 1×10^7 rads. Therefore, the switches are judged suitable for use in the radiation environment.

o Aging

Conditions of aging were evaluated using the Arrhenius technique. Based on the analysis which considered all nonmetallic materials within the switch, an estimated life in excess of 40 years was established.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

ipment Identification No. C150, C151*
No. N/A Sheet 4 of 6

parer:	W A Cleary	Date: 8/29/84
ependent Review:	J L Rogers	Date: 8/29/84
roval:	M J Traps	Date: 8/30/84

Model ET-16 Lights

Temperature

erature tests have been successfully conducted by Wyle on ET-16 lights. tests were conducted at 160°F. Proper operation of the lights was fied before and after the temperature exposure. For this application the mum accident temperature is approximately 225°F which exceeds the 160°F temperature for approximately 25 minutes. These lights are located de an essentially leak tight NEMA-12 enclosure (unvented) which will e the temperature experienced by the lights to lag the accident erature experienced by the enclosure. Tests have been conducted by Wyle ratories on similar sized cabinets (except with vents) which acterized the internal temperature of the cabinets as a function of time LOCA environment.

lts of these tests (Wyle Report No. 44439-2) show that the internal erature of the vented cabinets lagged the external temperature by a mum of 50°F during the first 15 minutes of exposure to a saturated steam ronment. In that test the temperature and pressure were rapidly (within oximately 10 seconds) ramped to 54 psig and 280°F (minimum) ectively. Because the pressure for this application is much less than pressure for the test (0.5 psig versus 54 psig) and in light of the ntially leak tight nature of the enclosure, the hot environment is cted to be essentially precluded from entering the panel. It is efore our engineering judgement that in a similar test of the unvented nets to the same maximum temperature but significantly lower pressure the internal temperature of the cabinet would lag the external erature by substantially greater than the 50°F experienced in the test. her, in the tests conducted by Wyle, varied components (examples: sure transmitter and solenoid valve) were installed in the cabinet and r mass temperature was recorded in the test. The temperature of a cal component (pressure transmitter) mounted in the vented cabinet lagged accident temperature by approximately 80°F after the first 15 minutes of test. It should be noted that saturated steam blanketing of high thermal tia components such as the cabinet, as demonstrated in Limitorque Report

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C150, C151*
TER No. N/A Sheet 5 of 6

Preparer: W S Clancy Date: 8/29/84

Independent Review: J C Rogers Date: 8/29/84

Approval: D E Grazio Date: 8/30/84

B0027, would result in the accident environment being the equivalent of a 215° saturated steam exposure to the exterior of the cabinets. The interior of the cabinet would be expected to lag 50°F to 80°F below this. In the Wyle test, the lights were maintained at 160°F. Based on the above tests and engineering rationale, it is judged that the test temperature of 160°F is comparable to the temperature which the lights would experience in the accident condition. Therefore, the lights are judged suitable for use in the temperature application.

o Humidity

The compartment within which this cabinet is mounted experiences 100% RH for a short time period. The humidity then decays rather quickly to an equilibrium of approximately 60%. Due to the leak tight nature of the NEMA-12 enclosures, the lights should not experience the initial humidity spike. Maximum voltage on the lights is 120 VAC. Wyle Laboratories has tested a variety of lights at humidity conditions in the range of 90% to 100%. In general, no problems have been experienced for these conditions where voltage never exceeds 120 volts unless the items experienced deformation resulting from temperature. Operation of the lights at the temperature conditions is justified in the above paragraph. Therefore, the lights are judged suitable for use in the humidity environment.

o Pressure

The maximum pressure which the lights would be exposed to in an accident is 15.2 psia (0.5 psig). The configuration of the lights is such that they will not entrap air or otherwise cause a pressure imbalance which would result in a functional disparity in the lights. Therefore the lights are judged suitable for use in this pressure environment.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C150, C151*
TER No. N/A Sheet 6 of 6

Preparer: W S Clancy Date: 8/29/84

Independent Review: J C Rogers Date: 8/29/84

Approval: K L Graise Date: 8/30/84

o Radiation

The maximum radiation which the lights will experience is approximately 1.8×10^3 rads. Proprietary Wyle Test Report No. 45625-1A documents satisfactory operation of the lights following a radiation exposure of 2.1×10^6 rads. Therefore, the lights are judged suitable for use in the radiation environment.

Based on the above information, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2205A*, C2207B*, C2260, C2201
TER No. N/A
Sheet 1 of 2

Preparer: W S Clancy Date: 8/29/84

Independent Review: J L Rogers Date: 8/29/84

Approval: A E Vaughn Date: 8/30/84

EQUIPMENT TYPE: Instrument rack w/terminal block and wire
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

These instrument racks contain some instrument wire and some terminal blocks which could not be identified during walkdown. These components are of concern since many if not all of the instruments in these racks are safety related. The racks are located in the reactor building and are exposed to a harsh steam environment following several different PBOCs and to radiation following any PBOC or a PBIC. Although the manufacturer of these components can not be positively identified, continued operation can be justified on the following basis.

The design specification for these instrument racks required the use of polyvinylchloride (PVC) jacketed polyethelene (PE) insulated cable or equivalent. It is our belief that based on this specification and a confirmation by walkdown that none of the identified cable failed to meet this specification, that the unidentifiable cable is very likely PE-PVC. Wyle Labs has indicated that PE-PVC cable has been subjected to sequential testing which documents qualification of the PE-PVC insulation system to 1.03 x 10^8 rads gamma and a LOCA steam environment with temperature up to 325°F. The service profiles experienced by the instrument racks over a 30 day mission length are enveloped by this testing. In addition, the generic materials which make up the insulation system have expected lives of greater than 10^4 years in a 104°F ambient environment.

As previously discussed, the manufacturer of terminal blocks installed in these junction boxes could not be positively determined during a walkdown. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2205A*, C2207B*, C2260, C2201
TER No. N/A Sheet 2 of 2

Preparer: W S Clancy Date: 8/28/84

Independent Review: J Rogers Date: 8/29/84

Approval: R E Graig Date: 8/30/84

Based on these considerations, we believe that the unidentified wire and terminal blocks in these instrument racks will remain operable and continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2207A
TER No. N/A

Sheet 1 of 1

Preparer: MR Ersin Date: 8/24/84

Independent Review: WS Clancy Date: 8/24/84

Approval: [signature] Date: 8/24/84

EQUIPMENT TYPE: Instrument rack w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

The manufacturer of terminal blocks in this local control panel could not be positively determined during a walkdown. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured. Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2257A

TER No. N/A Sheet 1 of 1

Preparer:	W S Clancy	Date: 8/28/84
Independent Review:	N R Ersin	Date: 8/30/84
Approval:	L E Grazio	Date: 8/30/84

EQUIPMENT TYPE: Instrument rack w/wire and terminal blocks
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

The manufacturer of the terminal block associated with DPIS2352 on C2257A has not been identified. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured. Based on these considerations, continued operation is justified.

The manufacturer of the instrument rack wire from the terminal blocks AA and DD to DPIS2353 and DPIS2352, respectively, is unknown. The wire is in a conduit from the switches to the enclosure for the terminal block. The differential pressure switches are only required to provide a signal (which "seals in") to the Primary Containment Isolation Control System during a HPCI Pipe Break. The differential pressure switches and therefore the terminal block and wire will perform their function prior to the environment becoming harsh. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2257B
TER No. N/A

Sheet 1 of 1

Preparer:	NR Ensin	Date:	8/27/84
Independent Review:	WS Clancy	Date:	8/28/84
Approval:	K Grazio	Date:	8/27/84

EQUIPMENT TYPE: Instrument rack w/terminal blocks
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

The manufacturer of the terminal block associated with DPIS1360-1B on C2257B has not been identified. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured. Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2303, T2303
TER No. N/A
Sheet 1 of 2

Preparer: MR Ervin Date: 9/19/84

Independent Review: W A Cleary Date: 9/19/84

Approval: R R Grazio Date: 9/20/84

EQUIPMENT TYPE: HPCI Control Panels
MANUFACTURER: Various
MODEL: Various

These panels contribute to HPCIS turbine start-up and speed control and are, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C2303, T2303
TER No. N/A Sheet 2 of 2

Preparer: NR Ein Date: 9/19/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RH Groj Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of these panels are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C61A, C61B
Indicating Lights

TER No. N/A

Sheet 1 of 1

Preparer: MR Ervin Date: 8/27/84

Independent Review: JL Rogers Date: 8/27/84

Approval: RC Denny Date: 8/27/84

EQUIPMENT TYPE: Control Panel Indicating Lights
MANUFACTURER: General Electric
MODEL: CR2940UC

These lights are for indication at the local control panels. They are not necessary for operation of the fans, however, failure could affect the control circuit and therefore degrade operation of their respective area cooling fans. There are three possible failure modes; open, short internal to the light, or short to the panel.

If a light fails open there will be no effect on the circuit and the fan will continue to operate normally.

If a light develops an internal short circuit there will be no effect on the circuit and the fan will continue to operate normally.

If a light develops a short to the panel the control circuit may be disabled and the fan may be deenergized. However, the only possible failure mechanism would be excessive moisture inside the panel such that the water created a path for current from the light connections to the panel. This failure mechanism is unlikely because the panels are gasketed, which will reduce the moisture inside, and because of the distance between the electrical connections and the panel. The distance is enough so that creation of an electrical arc, in this 120VAC control circuit, between the connections and the panel is unlikely. Also, if one of the fans becomes disabled it is highly unlikely that this would cause a significant effect on the equipment in the effected room, because the RHR rooms (areas 1.1 and 1.2) have redundant fans.

Based on the above information, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. C61A, C61B
Relays

TER No. N/A

Sheet 1 of 1

Preparer: MR Ens Date: 8/27/84

Independent Review: WS Clancy Date: 8/28/84

Approval: [illegible] Date: 8/29/84

EQUIPMENT TYPE: Control Panel Relays
MANUFACTURER: Johnson/Agastat
MODEL: KZ-4000-8/2412AN

These relays are for indication only. They are not necessary for operation of the fans, however, failure could affect the control circuit and therefore degrade operation of their respective area cooling fans. There are three possible failure modes; open, short internal to the relay, or short to the panel.

If a relay fails open there will be no effect on the circuit and the fan will continue to operate normally.

If a relay develops a short to the panel or an internal short circuit, the control circuit may be disabled and the fan may be deenergized. However, the only possible failure mechanism would be excessive moisture inside the panel such that the water created a path for current from the relay connections to the panel or to other relay connections. This failure mechanism is unlikely because the panels are gasketed, which will reduce the moisture inside, and because of the distance between the electrical connections and the panel. The distance is enough so that creation of an electrical arc between the connections and the panel, in this 120VAC control circuit, is unlikely. Also, if one of the fans becomes disabled it is highly unlikely that this would cause a significant effect on the equipment in the effected room, because the RHR rooms (areas 1.1 and 1.2) have redundant fans.

Based on the above information, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. CS42-1821, CS42-1822
TER No. N/A Sheet 1 of 1

Preparer:	NR Ensin	Date:	8/24/84
Independent Review:	WS Clancy	Date:	8/24/84
Approval:	WS Clancy	Date:	8/24/84

EQUIPMENT TYPE: Control Panel Switches
MANUFACTURER: General Electric
MODEL: CR2940

The functional requirement of these switches (that control VAC201) is that normally closed contacts internal to the switches remain shut. The switches are mounted in an enclosed control panel. The non-metallic portion of the switch is made of Dupont Delrin.

The only way the contacts could open would be for catastrophic failure of the Delrin. The parameters that could cause catastrophic failure, would be temperature (Delrin softening or embrittling) or radiation (Delrin disintegrating). The radiation to which the switch might be subjected is 1.6×10^5 rads, but it has been tested to 1×10^6 rads, therefore radiation is not a problem. The temperature due to the worst case postulated break is 238.1°F, 24.5 seconds into the accident, and considering that Delrin has been tested to a much higher temperature (311°F) temperature is not a problem. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. CX2, CX4, 520, CX8
TER No. N/A Sheet 1 of 1

Preparer: MR Ervin Date: 8/24/84

Independent Review: W J Clancy Date: 8/24/84

Approval: R C Mecredy Date: 8/24/84

EQUIPMENT TYPE: Cable
MANUFACTURER: Various
MODEL: PE

This equipment consists of polyethylene insulated cable (installed outside of the drywell) provided by several manufacturers. While no qualification documentation or testing history has been found for these specific cables, similarly constructed cable has been successfully subjected to sequential testing (proprietary TR #17513-1), which documents qualification of the insulation system to 1.63×10^8 rads gamma and a LOCA condition including temperatures up to 325°F. These conditions are more severe than the conditions at PNPS.

The generic materials which make up the insulation system have expected lives of greater than 1.5E4 years (PE) in an ambient temperature of 105°F.

Based on the above, it is judged that the PE cable installed is justified for continued use pending further testing or replacement.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J32
TER No. N/A
Sheet 1 of 1

Preparer: NR Ewin Date: 8/27/84

Independent Review: WS Clancy Date: 8/28/84

Approval: [illegible] Date: 8/29/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Buchanan
MODEL: 243

This junction box is in the electrical circuit of the following temperature switches:

Switch	Location	Setpoint
TS2370C	HPCI Valve Room exh. duct	160°F-170°F
TS2371C	Torus Area exh. duct	190°F-200°F
TS2372C	HPCI Valve Room exh. duct	160°F-170°F
TS2373C	Torus Area exh. duct	190°F-200°F

Exceeding the setpoint is an indication of a HPCI steam line break. The closing of the temperature switch contacts causes an auto isolation signal (which "seals in") to be sent to MO2301-4, 5, 35, and 36, which shut to isolate the HPCI steam supply line and the HPCI pump suction line from the Torus. The terminal block inside the junction box need only operate up to the point that the isolation signal "seals in". Because the terminal block is inside the junction box there will be a time lag between the temperature switches being subjected to the pipe break and the terminal blocks being subjected to the pipe break. The terminal blocks will not be subjected to an elevated temperature prior to performing their safety function. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J216*
TER No. N/A Sheet 1 of 1

Preparer: MR Ervin Date: 8/30/84

Independent Review: JK Rogers Date: 8/30/84

Approval: GE Grazi Date: 8/30/84

EQUIPMENT TYPE: Junction Box w/Terminal Block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

This junction box is in the electrical circuit for solenoid valve SV220-44, that in turn controls AO220-44 (Reactor Coolant Sample Line Inboard Isolation Valve). SV220-44 is normally shut and is required to be shut to ensure primary containment isolation post-accident. If AO220-44 is open at the beginning of an accident, the isolation signal causes SV220-44 to deenergize which will cause AO220-44 to shut. In addition to this inboard isolation valve, this line has an in-series outboard isolation valve. There are no design basis events which expose both isolation valves or their associated electrical circuitry to a harsh environment during their mission times. Thus, isolation of this line is assured for all design basis events.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J217
TER No. N/A Sheet 1 of 1

Preparer: MR Ens Date: 8/24/84

Independent Review: WS Clamp Date: 8/24/84

Approval: RA Daly Date: 8/24/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

This junction box is in the electrical circuit for solenoid valve SV220-45, that in turn controls AO220-45 (Reactor Coolant Sample Line Outboard Isolation Valve). SV220-45 is normally shut and is required to be shut to ensure primary containment isolation post-accident. If AO220-45 is open at the beginning of an accident, the isolation signal causes SV220-45 to deenergize which will cause AO220-45 to shut. All credible failures of the terminal block within J217 will also deenergize SV220-45 and cause AO220-45 to shut. Therefore, failure of J217 will have no adverse effects, and continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J444, J463
TER No. N/A Sheet 1 of 1

Preparer: M R Eis Date: 8/24/84

Independent Review: J L Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

These junction boxes are in the electrical circuits for solenoid valves that are required to deenergize to shut Reactor Building isolation dampers. The dampers shut immediately after low reactor water level, high drywell pressure or high radiation in refueling floor exhaust duct is sensed. If the terminal block inside the junction box fails after the dampers are shut, there will be no detrimental effects because the dampers are already shut. In the unlikely event that the terminal block fails prior to the solenoids deenergizing and the dampers shutting, the failure will simply speed up the process of isolating the Reactor Building. After the dampers have shut, there is no plausible failure of the terminal block that could reopen the valve. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J451
TER No. N/A
Sheet 1 of 1

Preparer: MR Ervin Date: 8/24/84

Independent Review: WS Clancy Date: 8/24/84

Approval: [signature] Date: 8/24/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Buchanan
MODEL: 243

This junction box is in the electrical circuit for the following valves:

SV5033B	Normal Purge Suppy to Drywell
SV5033C	Normal Nitrogen Makeup to Drywell
SV5035B	Purge Air to Drywell
SV5036B	Purge Air to Torus
SV5042B	Purge Exhaust from Torus
SV5044B	Purge Exhaust from Drywell

SV5033C is normally energized and AO5033C is normally open. All other valves are normally deenergized and their respective air operated valves are normally shut. All of the air operators fail shut. All of the solenoid valves receive Containment Isolation signals upon a LOCA. The isolation signal causes the solenoid valves to deenergize (if not already deenergized) and the air operated valves to shut. All credible failures of the terminal block within J451 will also deenergize the solenoid valves and cause the air operated valve to shut. Therefore, failure of J451 will have no adverse effects, and continued plant operation is justified.

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BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J462*, J466*
TER No. N/A Sheet 1 of 1

Prepared: J L Rogers Date: 8/29/84

Independent Review: W A Clancy Date: 8/29/84

Approval: R W Gregg Date: 8/30/84

EQUIPMENT TYPE: Junction Box w/Terminal Block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

J462 and J466 contain terminal blocks for various solenoid valves and damper position switches for the Standby Gas Treatment System. They have been identified as Buchanan-243 nylon terminal blocks and are located on Elevation 23' in the Reactor Building. These blocks could be exposed to a harsh steam and radiation environment following a PBOC and a harsh radiation environment following a PBIC.

PNPS FSAR Appendix G does not credit Standby Gas Treatment System operation for mitigating the effects of a PBOC. No failure mode of these terminal blocks could prevent any safety action necessary for mitigating the effects of a PBOC from occurring. Therefore, these blocks are not required to be qualified for the harsh steam and radiation environment resulting from a PBOC.

For a PBIC, radiation levels at the location of these terminal blocks are approximately 3.5×10^6 rads after 30 days. These blocks have a radiation threshold of 8.5×10^5 rads and a 25% damage threshold of 4.7×10^6 rads. Also, the worst failure mode associated with the failure of these terminal blocks is loss of power to the circuit. The solenoids are energized when the SGTS dampers are closed. The dampers' fail-safe position is open and occurs when the solenoids are deenergized. Thus, this failure mode is not of concern for the solenoid valves. Loss of power to the position indication switches would result in loss of all position indication in the control room (no illumination of red or green lights). However, SGTS flow indication in the Control Room would be provided by flow transmitters in the common A and B train outlet. These flow transmitters are located in a mild environment and would be expected to function post-accident.

In addition, none of the failure modes associated with these blocks would prevent initiation of the SGTS nor cause the system to trip after it had initiated.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J538, J539
TER No. N/A Sheet 1 of 1

Preparer: NR Ericson Date: 8/24/84

Independent Review: W A Clancy Date: 8/24/84

Approval: [signature] Date: 8/24/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Buchanan
MODEL: 525/222

These junction boxes are in the electrical circuit for relative humidity sensors (HS-1A, 2A, 3A, 4A, 1B, 2B, 3B, 4B). The relative humidity sensors are not required for Standby Gas Treatment System (SGTS) Operation. The normal function of the sensors is to detect high humidity in the SGTS inlet and energize relays, which in turn cause the heater relays and heaters to be energized. The humidity controls have been bypassed, so that full heater operation is initiated upon operation of the SGTS exhaust fan. Therefore, these junction boxes are not required and continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J561, J874, J866, J863*
TER No. N/A
Sheet 1 of 1

Preparer: MR Ensin Date: 8/27/84

Independent Review: JL Rogers Date: 8/27/84

Approval: RC Denny Date: 8/27/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

The manufacturer of the terminal block in these junction boxes could not be positively determined during a walkdown. However, Sandia National Laboratories and other laboratories have compiled extensive test data on terminal blocks (both protected and unprotected) of various manufacturers. Sandia tested over 400 terminals in their own facilities. The partial test data indicates that the continued operability of the terminal strips while exposed to the calculated harsh environment is adequately assured. Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J599, J600, J601, J602, J606
TER No. N/A Sheet 1 of 1

Preparer: NR Ervin Date: 8/24/84

Independent Review: WS Clancy Date: 8/24/84

Approval: GC Clancy Date: 8/24/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

This junction box is in the electrical circuit of the following temperature switches:

Switch	Location	Setpoint
TS1360-16C	RCIC Valve Station	190° - 200°
TS1360-14C	RCIC Valve Station	190° - 200°
TS1360-17C	Torus Area Exhaust Duct	140° - 150°
TS1360-15C	Torus Area Exhaust Duct	140° - 150°
TS1360-16D	RCIC Valve Station	190° - 200°
TS1360-14D	RCIC Valve Station	190° - 200°
TS1360-17D	Torus Area Exhuast Duct	140° - 150°
TS1360-15D	Torus Area Exhaust Duct	140° - 150°

Exceeding the setpoint is an indication of a RCIC steam line break. The closing of the temperature switch contacts causes an auto isolation signal (which "seals in") to be sent to MO1301-16 and 17, which shut to isolate the RCIC steam supply line. The terminal block inside the junction box need only operate up to the point that the isolation signal "seals in". Because the terminal block is inside the junction box there will be a time lag between the temperature switches being subjected to the pipe break and the terminal blocks being subjected to the pipe break. The terminal blocks will never be subjected to an elevated temperature prior to performing their safety function. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J603, J604
TER No. N/A
Sheet 1 of 1

Preparer: NR Ens Date: 8/27/84

Independent Review: WS Clancy Date: 8/28/84

Approval: KE Grace Date: 8/29/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

This junction box is in the electrical circuit of the following temperature switches:

Switch	Location	Setpoint
TS2370C	HPCI Valve Room exh. duct	160°F-170°F
TS2370D	HPCI Valve Room exh. duct	160°F-170°F
TS2372C	HPCI Valve Room exh. duct	160°F-170°F
TS2373C	HPCI Valve Room exh. duct	160°F-170°F

Exceeding the setpoint is an indication of a HPCI steam line break. The closing of the temperature switch contacts causes an auto isolation signal (which "seals in") to be sent to M02301-4, 5, 35, 36, and CV9068A and B which shut to isolate the HPCI steam supply line and the HPCI pump suction line from the Torus. The terminal block inside the junction box need only operate up to the point that the isolation signal "seals in". Because the terminal block is inside the junction box there will be a time lag between the temperature switches being subjected to the pipe break and the terminal blocks being subjected to the pipe break. The terminal blocks will never be subjected to an elevated temperature prior to performing their safety function. Therefore, continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J720
TER No. N/A

Sheet 1 of 1

Preparer: NR Ennis Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: [signature] Date: 8/27/84

EQUIPMENT TYPE: Junction box w/terminal block
MANUFACTURER: Walkdown could not identify
MODEL: Walkdown could not identify

This junction box is in the electrical circuit for MO/N-113 and SVL-70. MO/N-113 (SGTS exhaust fan damper unit 'B') has been electrically deenergized in the 4000 cfm position, and therefore, failure of the terminal block within this junction box will not cause the damper to move. SVL-70 is the solenoid valve that operates the outlet isolation damper for SGTS 'B' unit. Failure of the terminal block within J720 will cause SVL-70 to deenergize, and cause AON-112 to fail open. Either or both SGTS units can be operated with AON-112 open. Therefore failure of this junction box will have no adverse effects on plant safety and continued plant operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. J859
TER No. N/A

Sheet 1 of 1

Preparer: MR Ervin Date: 8/31/84

Independent Review: WS Clancy Date: 8/31/84

Approval: RB Grazio Date: 9/10/84

EQUIPMENT TYPE: Junction box w/splice
MANUFACTURER: Kerite
MODEL: 5-5NS-HT

The insulatic system used on the splices in this junction box are environmentally qualified. The documentation packages for these splices are being completed and when completed, environmental qualification of the splices and this junction box will be proven. Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01001-19
TER No. N/A Sheet 1 of 1

Preparer: W S Clancy Date: 9/10/84

Independent Review: N R Eisenhut Date: 9/19/84

Approval: R L Gray Date: 9/20/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-25

M01001-19 operates the block valve in the cross tie between the "A" and "B" train RHR pump combined discharge headers. The valve is located in the CRD mezzanine pump room at elevation 2'9" (zone 1.8). The valve is normally key-locked open and should remain open to ensure that all four RHR pumps deliver LPCI to the selected loop. This valve could be exposed to a harsh steam and radiation environment during a PBOC-5 (HPCI Steam Line Break in the Torus Compartment) or solely to a harsh radiation environment during any other PBOC or a PBIC. The valve is required to remain functional for a 30 day mission time to facilitate operation of the RHR system in a variety of modes. Limitorque Report B0003 documents the qualification of a similar operator and motor for a harsh steam and radiation environment that envelopes the service profile for all postulated transients affecting M01001-19 including the PBOC-5. M01001-19 is therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Continued operation is therefore justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M01301-49
TER No. N/A Sheet 1 of 1

Preparer: JL Rogers Date: 8/24/84

Independent Review: NR Eisin Date: 8/24/84

Approval: RD Daney Date: 8/27/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-00-10

M01301-49 operates the block valve in the discharge of the RCIC pump. This valve is located outside the containment in the RCIC Pump Room (zone 1.10). M01301-49 utilizes a 125v DC reliance motor with class "HR" insulation for which complete qualification documentation is not available. M01301-49 is normally closed and is automatically signaled opened in response to a low reactor vessel level to facilitate injection of RCIC coolant into the vessel. The only transients for which RCIC operation is credited are Control Rod Drop, total loss of AC power and loss of feedwater.

However, these transients have been evaluated and no RCICs equipment will be subject to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation. Therefore operability of M01301-49 during exposure to a harsh environment need not be demonstrated for transients requiring RCIC operation.

M01301-49 serves a second safety related function by providing containment isolation for transients not requiring RCIC operation. M01301-49 would remain in a normally closed position during such transients and would not be required to actively function. In the unlikely event that M01301-49 was open and failed open, redundant isolation of this penetration would be provided by M01301-48, A01301-50 and 58A.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M03800*, M03801*, M03805, M03806
TER No. N/A Sheet 1 of 1

Preparer: W S Clancy Date: 8/29/84

Independent Review: J C Rogers Date: 8/29/84

Approval: P G Grais Date: 8/30/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000

M03801, M03805, M03800 and M03806 operate the block/isolation valves in the salt service water discharge from TBCCW heat exchangers and RBCCW heat exchangers respectively. These valves are located in the RBCCW Pump Rooms and are normally maintained in a throttled open position. Following a design basis accident, M03801 and M03805 will close to a preset throttle position and M03800 and M03806 will go full open to ensure an adequate supply of salt service water to the RBCCW heat exchangers to facilitate LPCI/RHR torus cooling operation. All four operators are equipped with Reliance Motors utilizing Class B Insulation for outside containment application.

During a PBIC, these valves are exposed to increased radiation. However, a harsh radiation environment does not develop until well after the 30 day mission life of these valves has passed and as a result, the valve operators need not be qualified for a PBIC.

A valve operator and motor combination similar to M03805 and M03806 was qualified for extended exposure to steam at 250°F as documented in Limitorque Report B0003. During a PBOC-3, these valve operators are exposed to superheated steam resulting in a service profile which peaks at approximately 225°F and is enveloped by the qualification test profile. Therefore the valves are considered to be essentially qualified for this steam exposure pending an inspection required by IEN 83-72 to verify that appropriate terminal blocks were used for power lead terminations. Inspection of the terminal blocks is in progress and no deficiencies have been reported to date. Therefore there is a high degree of assurance that the terminal blocks in these operators are qualified and the operators will remain operable during the steam exposure. In addition, the valves would not be exposed to a harsh radiation environment over their 30 day mission length. Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M02301-6
TER No. N/A
Sheet 1 of 1

Preparer: W A Clancy Date: 8/24/84

Independent Review: J L Rogers Date: 8/24/84

Approval: [signature] Date: 8/24/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-0-25

M02301-6 operates the valve in the line from the condensate storage tanks to the HPCI pump suction. The valve is located in the RBCCW pump room-B (zone 1.22) and is normally open. The valve will automatically be closed to facilitate a transfer of HPCI suction to the torus in the event that high torus level or low condensate storage tank level is sensed.

During a PBOC-3 (HPCI Steam Line Break in the HPCI Pump Station) this valve would be exposed to a harsh environment. However, HPCI operation is not required for this transient so the exposure of this valve is inconsequential since it serves no function other than supporting HPCI operation.

During any other PBOC, a PBIC or a Control Rod Drop, this valve must remain operable over the five (5) hours mission time of the HPCI System. However, analysis has indicated that the valve would not be exposed to a harsh environment during this time frame.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification Nr M04009A, M04009B, M04085A*
TER No. N/A Sheet 1 of 1

Preparer: W S Clancy Date: 8/30/84

Independent Review: M R Ennis Date: 8/30/84

Approval: R E Grazio Date: 8/30/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

M04009A, M04009B and M04085A are required for isolation of non-essential loads in the RBCCW System and may also be used for subsequent restoration of non-essential RBCCW loads once the heat load of the RHR heat exchangers has decreased. These valves are located outside containment in the RBCCW Pump Compartments and are normally open.

During a PBIC, these valves will be exposed to increased amounts of radiation. However, the increase will be insufficient to cause a harsh environment exposure until after the valves mission length has elapsed. As a result, the operability of these valves post-PBIC is assured.

A valve operator and motor similar to these valve operators was qualified for extended exposure to saturated steam at 250°F as documented in Limitorque Qualification Test Report B0003. During a PBOC-3, these valves are exposed to superheated steam resulting in a peak accident temperature of approximately 225°F. These valve operators are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators have been reported and therefore there is a high degree of assurance that the terminal blocks in these valve operators are qualified. Based on this determination, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M04065
TER No. N/A Sheet 1 of 1

Preparer: W S Clancy Date: 8/28/84

Independent Review: J L Rogers Date: 8/29/84

Approval: R H Groce Date: 8/30/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-5

M04065 operates the block valve in the RBCCW supply line to fuel pool heat exchanger E-206A. This valve is normally open and needs to be capable of closing to reduce non-essential loads on the RBCCW system during a design basis event requiring RBCCW cooling water supply to the RHR heat exchanger(s). This valve is located outside containment in the fuel pool heat exchanger room (zone 1.13).

A valve operator and motor similar to M04065 was qualified in a steam environment to 250°F, 25 psig and 2×10^7 rads as documented in Limitorque Report B0003. This qualification profile envelopes the service profile for all potential harsh environment exposures to M04065 and is therefore considered qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal blocks in this motor operator are qualified. Based on this determination, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. M04083, M04084*
TER No. N/A Sheet 1 of 1

Preparer: W S Clancy Date: 8/30/84

Independent Review: N R Eu Date: 8/30/84

Approval: R E Grazio Date: 8/30/84

EQUIPMENT TYPE: Motor Operator
MANUFACTURER: Limitorque
MODEL: SMB-000-2

M04083 and M04084 operate the RBCCW bypass valves for the RBCCW to Salt Service Water Heat Exchangers. The valves are located in the RBCCW compartments (zones 1.21 and 1.22) and are normally maintained in a throttled position. If the valves failed to operate, the ability of the RHR system to cool the torus would be degraded.

During a PBIC, these valves are exposed to increased radiation. However, a harsh exposure does not occur until well after the 30 day mission life of these valves has passed. As a result, operability of these valves post-PBIC is assured.

A valve operator and motor similar to these valve operators was qualified for extended exposure to saturated steam at 250°F as documented in Limitorque Qualification Test Report B0003. During a PBOC-3, these valves are exposed to superheated steam resulting in a peak accident temperature of approximately 225°F. These valve operators are therefore considered to be qualified pending completion of an inspection to verify that appropriate terminal blocks were utilized for power lead termination (required by IE Notice 83-72). Inspection of the terminal blocks in the Limitorque operators is in progress. No deficiencies in the terminal blocks have been reported and therefore there is a high degree of assurance that the terminal block in these valve operators are qualified. Based on this determination, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. N912, N923
TER No. N/A Sheet 1 of 2

Preparer: NR Ewin Date: 9/19/84

Independent Review: WJ Clancy Date: 9/19/84

Approval: RLBrazis Date: 9/20/84

EQUIPMENT TYPE: Local Control Switch
MANUFACTURER: General Electric
MODEL: CR2940

N912 is a local start switch for P223 (Gland Seal Condenser Blower) and N923 is a local start switch for P220 (Gland Seal Condenser Condensate Pump).

These switches contribute to HPCIS turbine operation and are, therefore, required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. N912, N923
TER No. N/A
Sheet 2 of 2

Preparer: NR Ein Date: 9/19/84

Independent Review: WJ Clancy Date: 9/20/84

Approval: RE Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of these switches are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. N921
TER No. N/A

Sheet 1 of 2

Preparer: N R Ein Date: 9/19/84

Independent Review: W S Clary Date: 9/19/84

Approval: L L Gray Date: 9/20/84

EQUIPMENT TYPE: Local Control Switch
MANUFACTURER: General Electric
MODEL: CR2940

N921 is a local switch for P229 (HPCI Turbine Auxiliary Oil Pump). P229 is only required during turbine startup and shutdown.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. N921
TER No. N/A

Sheet 2 of 2

Preparer: NR Ein Date: 9/19/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RR Grazio Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of this switch is the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. P202 (A-F)*
TER No. N/A Sheet 1 of 2

Preparer: W S Clamp Date: 8/30/84

Independent Review: J L Rogers Date: 8/31/84

Approval: M Graiza Date: 9/10/84

EQUIPMENT TYPE: RBCCW Pump and Motor Termination Splice
MANUFACTURER: General Electric
MODEL: 5K364AK2020

These motors operate the RBCCW pumps and are located in the reactor auxiliary bay at elevation 3' (zones 1.21 and 1.22). These motors are exposed to a harsh superheated steam environment peaking at approximately 225°F following a PBOC-3 (HPCI steam line break in the HPCI pump compartment). The motors are equipped with class "B" insulation (P202D was rewound). All six motors utilize a tape type motor termination splice. Continued operation can be justified based on the following considerations.

Motors

All 6 motors were supplied by General Electric with class B insulation. However, the motor for P202D was subsequently rewound by the GE Apparatus Shop in Medford MA. The motor was inspected by GE upon receipt, rewound with "as-is" or equal insulation in the same manner as it was received, and a C of C was issued to that effect. The rewind materials are therefore traceable as having class B or equivalent insulation.

Similar General Electric motors with class B insulation were subject to a qualification test (QSR 111-A-04) which included exposure to a harsh superheated steam environment peaking at 350°F and 66 psig. This envelopes the accident profile for these components. Although the test profile was only for 24 hours, Wyle Labs has performed a degradation analysis that shows the test profile was more severe than the 30 day accident profile.

Splices

Plant walkdowns verified that tape type motor termination splices with a glyptal outer covering were utilized on these components. Similar splices have been qualification tested (FRL F-C3056). The test splices were subjected to a steam environment for 7-1/2 days. The splices were electrically loaded throughout the exposure period. The peak temperature and pressure of 325°F and 80 psig was maintained for a duration of 16 hours. The temperature and pressure were reduced to 220°F and 5 psig for the remainder

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. P202 (A-F)*
TER No. N/A
Sheet 2 of 2

Preparer: W S Clancy Date: 8/30/84
Independent Review: JL Rogers Date: 8/31/84
Approval: [signature] Date: 9/10/84

of the test. The samples were subjected to a chemical spray solution throughout the test. Wyle Labs has completed degradation equivalency analysis which shows that the test profile is thermally more degrading than the composite outside containment profile at Pilgrim Station for 30 days. An aging analysis was also performed by Wyle Labs shows that the materials of the tested splice have a minimum expected life at 105°F of 272 years (glass tape). The expected life of the glyptal (assume alkyd varnish) at 105°F is greater than 1×10^5 years.

Based on these considerations, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. P229
TER No. N/A

Sheet 1 of 2

Preparer: M R Ennis Date: 9/19/84

Independent Review: W J Clancy Date: 9/19/84

Approval: A L Grazio Date: 9/20/84

EQUIPMENT TYPE: Lube Oil Pump Motor
MANUFACTURER: Baldor
MODEL: 310401-404

P229 is the HPCI Turbine Auxiliary Oil Pump. It is only required during turbine startup and shutdown.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of this pump is the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. P229
TER No. N/A

Preparer: NR Ein Date: 9/19/84

Independent Review: WA Cheng Date: 9/19/84

Approval: KL Graziano Date: 9/20/84

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation levels will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2390A, PS2390B
TER No. N/A Sheet 1 of 2

Preparer: MR Ennis Date: 9/19/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RW Grazio Date: 9/20/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Static-O-Ring
MODEL: 6N-AA2-X5PP

These pressure switches provide a condensate storage tank level signal to HPCI valve control to open M02301-35, 36. M02301-35, 36 also serve as HPCI isolation valves. The HPCI isolation signal overrides the Condensate Storage Tank level signal provided by these pressure switches. Therefore, PS2390A, B are required solely to assure satisfactory HPCIS operation.

The HPCIS is relied upon to operate during and following

Loss of Feedwater Flow,
Total Loss of Offsite Power,
Shutdown from Outside Control Room (Special Event),
Pipe Break Inside Primary Containment,
Control Rod Drop Accident, and
Pipe Break Outside Primary Containment

to assure continued core cooling, and thus mitigate consequences which could result in potential offsite exposures comparable to the 10CFR100 guidelines.

None of the first three events listed above is expected to result in environmental conditions any more severe than those experienced during normal operation. The fourth event is addressed in the HPCIS Safety Evaluation, which states that, "The HPCIS is designed to provide adequate core cooling for small breaks...core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the range of the HPCI." Thus, the size of LOCA presumed to generate postulated core damage is beyond the capacity of HPCIS to provide core cooling.

The Control Rod Drop Accident has been evaluated and no HPCIS equipment will be subjected to pressure, temperature, radiation or humidity conditions any more severe than those experienced during normal operation.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS2390A, PS2390B
TER No. N/A
Sheet 2 of 2

Preparer: NR Evans Date: 9/19/84

Independent Review: WS Clancy Date: 9/19/84

Approval: RE Shapiro Date: 9/20/84

Those pipe breaks outside containment which could be expected to result in harsh conditions of pressure, temperature and humidity in the vicinity of these pressure switches are the PBOC-3 and the PBOC-5. Each of these events, however, incapacitates the HPCIS. System operability is, therefore, not required for either PBOC.

On the other hand, system operability is required for the main steam line breaks, PBOC-7 and PBOC-8. However, FSAR analysis of the PNPS design basis Main Steam Line Break Accident indicates that, with a maximum 10.5 second MSIV closure and continued core coverage (from normal or standby systems, including HPCIS), there would be no fuel damage. Without core damage, exposures will not exceed 10^4 rads.

MSIV closure time is verified once per quarter under Technical Specification surveillance requirements. The closure time must be greater than 3 seconds and less than 5 seconds for the valve to be considered operable. For valve closure times shorter than 10.5 seconds, the postulated accident is considered less severe than that analyzed.

Core cooling systems are also verified operable periodically under plant surveillance requirements. Thus, if HPCIS was incapacitated as a consequence of the PBOC, then ADS, LPCI and Core Spray would be available to redundantly assure safe shutdown of the plant. If all core cooling systems operate as designed and tested, harsh radiation will not occur.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS4008, PS4058*
TER No. N/A
Sheet 1 of 2

Preparer: W S Clancy Date: 8/31/84
Independent Review: M R Ey Date: 8/31/84
Approval: R D Grazio Date: 9/7/84

EQUIPMENT TYPE: Pressure Switch
MANUFACTURER: Barton
MODEL: 288A

These pressure switches send a pump low discharge pressure signal for pumps P202 (A-F) to the RBCCW Control Circuitry. When the discharge pressure goes below 31 psig the pressure switch sends a signal to start the Standby RBCCW pump(s), which are in "auto". Failure of the pressure switch may prevent the pumps from starting automatically upon failure of one pump.

The pressure switches are located in the RBCCW compartments (zones 1.21 and 1.22) and are exposed to a harsh superheated steam environment resulting in a peak temperature/pressure of approximately 225°F/1.5 psig. The switches are not exposed to a harsh radiation environment during their 30 day mission length. Continued operation can be justified using partial test data summarized in qualification test report R3-288A-1.

Temperature

The service profile for the location of this device is more severe than the test temperature profile. The peak service temperature of 225°F is higher than the test temperature of 212°F. However, the service temperature is above 212°F for only a few minutes and the test temperature is significantly higher than the service profile for the remainder of the test period (6 hours). It should be noted that saturated steam blanketing of high thermal inertia components such as this pressure switch, as demonstrated in Limitorque Report B0027, would result in the accident environment being the equivalent of an exposure to 215°F to the exterior of the switches. In addition the thermal inertia of the switch itself should cause the internal temperature of the pressure switches under the service condition to remain less than the test temperature of 212°F. On this basis, the temperature profile in the test report is actually more severe than the service temperature profile.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. PS4008, PS4058*
TER No. N/A Sheet 2 of 2

Preparer: W S Cleary Date: 8/31/84

Independent Review: M R Eis Date: 8/31/84

Approval: R D Hazzard Date: 9/7/84

Steam Exposure

A prototype of this component was subjected to 100% humidity for 6 hours. In our engineering judgment, this test was more severe than the environment to which this component may be subjected during an accident.

Aging

Conditions of aging were evaluated using the Arrhenius technique. Based on the analysis, which considered all non-metallic materials within the switch, an estimated life in excess of 40 years was established. This calculation supports projected operability of the differential pressure switch beyond 1986.

Pressure

The service profile for the location of this device reaches a peak of 1.5 psig, whereas the test pressure reaches a maximum of 7" H_2O (14.95 psi). The service profile is above 14.95 psia for approximately 2 seconds. Based on this fact and the weathertight construction of the instrument, in our engineering judgment no functional disparities will occur.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Ring Tongue Terminations (<4KV) Outside Containment
TER No. N/A

Sheet 1 of 2

Preparer: JL Rogers Date: 8/28/84

Independent Review: MR Ewing Date: 8/28/84

Approval: RE Grazio Date: 8/29/84

EQUIPMENT TYPE: Ring Tongue Terminals
MANUFACTURER: Various
MODEL: Various

According to Wyle Laboratories Corrective Action Report No. 47066-TER-1, the installed ring tongue terminals include both insulated and non-insulated models from a variety of manufacturers. The insulation materials used on insulated models has not been specifically identified. The commonly used insulation materials for this application are nylon, PVC, PVF, and PVDF. Justification for continued operation is required as specific qualification tests do not exist.

Uninsulated ring tongue terminals are not susceptible to degradation or environmentally induced failure at the levels of stress produced by the environments at the Pilgrim I plant. Failure of these interfaces is a function of installation configuration and terminal design.

Insulated ring tongue terminals are supplied with an insulating material covering the barrel of the terminals. This insulation is provided to prevent bare metal from protruding beyond the terminal block or connection to which it is fastened, thus reducing the hazard of shock to personnel and a possible shorting path between adjacent terminals and equipment. At the voltage levels of these terminations, the physical presence of any of the industry standard insulating materials is sufficient to perform this function.

The environments which could cause significant insulation deterioration in the Pilgrim plant are temperature and radiation. Degradation induced by these environments takes the form of material softening, material embrittlement, increased compression set, loss of elongation capability, or cracking when subjected to bending stresses or dynamic loads. None of these degradation mechanisms will impact the physical barrier insulation capability of the materials in their static termination application.

The justification discussed above has been substantiated by the application of numerous terminal lugs in nuclear equipment qualification tests. While these tests were not specifically designed to qualify the terminals and the models do not necessarily correlate with Pilgrim installed lugs, the tests

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. Ring Tongue Terminations (<4KV) Outside Containment
TER No. N/A Sheet 2 of 2

Preparer: J L Rogers Date: 8/28/84

Independent Review: M R Ein Date: 8/28/84

Approval: K L Graise Date: 8/29/84

demonstrate that in typical plant environments, neither insulated nor non-insulated terminal lugs constitute a significant potential failure mechanism. Samples of tests which included representative terminals as part of the test specimen or part of the test equipment are Wyle 45603-1, Wyle 45638, Franklin C5257, Wyle 43703, Wyle 44282, Wyle 44300, Franklin C5022.

Based on the above, continued operation with existing ring tongue terminals is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. S1, S37, CXG, Z3, Z3A, S48, CO2, CO3, S19, S27
TER No. N/A Sheet 1 of 1

Preparer: NR Ervin Date: 8/24/84

Independent Review: JL Rogers Date: 8/24/84

Approval: BC Mahony Date: 8/27/84

EQUIPMENT TYPE: Cable
MANUFACTURER: Various
MODEL: PE/PVC

This equipment consists of polyethylene insulated polyvinylchloride jacketed cable (installed outside the drywell) provided by several manufacturers. While no qualification documentation or testing history has been found for these specific cables, similarly constructed cable has been successfully subjected to sequential testing (proprietary TR #17513-1), which documents qualification of the insulation system to 1.63×10^8 rads gamma and a LOCA condition including temperatures up to 325°F. These conditions are more severe than the conditions at PNPS.

The generic materials which make up the insulation system have expected lives of greater than 1.4E4 years (PVC) and greater than 1.5E4 years (PE) in an ambient temperature of 105°F.

Based on the above, it is judged that the PVC/PE cable installed is justified for continued use pending further testing or replacement.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. SVL82, SVL83
TER No. N/A
Sheet 1 of 1

Preparer: MR Ervin Date: 8/24/84

Independent Review: WS Clancy Date: 8/24/84

Approval: RC Mecredy Date: 8/24/84

EQUIPMENT TYPE: Solenoid Valve
MANUFACTURER: ASCO
MODEL: HT8320A22

These solenoid valves control air operated valves that allow the SGTS to obtain a suction on the suppression pool. These valves are not required to operate post-PBOC; therefore, they only need to be qualified for radiation. The 40 year TID plus LOCA dose is 2.86×10^6 rads. The two materials of concern in this valve are the Buna-N elastomers and the acetal disc holder. In EPRI Report NP-2129, "Radiation Effects on Organic Materials in Nuclear Plants" Buna-N is listed as not reaching the 50% loss of elongation point until after 7×10^7 rads and acetal resins are listed as reaching the 50% loss of tensile strength at 4×10^6 rads. Each of these doses is greater than the combined 40 year TID plus accident dose. Therefore, no detrimental effects, due to radiation, are expected, and continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. TIP Ball and Shear Valves
TER No. N/A
Sheet 1 of 1

Preparer: Thomas Fasano Date: August 24, 1984

Independent Review: W S Clary Date: 8/24/84

Approval: W S Clary Date: 8/27/84

EQUIPMENT TYPE: Containment Isolation Valves
MANUFACTURER: Consolidated Controls
MODEL 73110-2 (Ball)/73074-1 (Shear)

The safety function of these valves is primary containment isolation. The only accident for which they must provide this safety function is a pipe break inside primary containment. The components are located outside containment, and therefore, they must be qualified for radiation and aging only.

Continued operation with these components not qualified is justified because they provide diverse means of isolating the affected penetrations. The ball valves are closed more than 99% of the time (TIP usage is approximately 3 hrs. per 2 week period) and they do not require power to remain closed. In the unlikely event that a pipe break inside primary containment occurs with the TIP probes inside the drywell, diversity in the system provides assurance that the penetrations will be isolated. The limit switches in the ball valve provide a signal to the Primary Containment Isolation display in the Main Control Room. Should any of the ball valves spuriously open or be held open by a stuck probe under accident conditions, the operators can detect this and fire the shear valves which are powered by 125V DC, ensuring operability in case offsite power is lost.

Therefore, continued operation is justified.

BOSTON EDISON COMPANY
JUSTIFICATION FOR
CONTINUED OPERATION

Equipment Identification No. SVL61
TER No. N/A

Sheet 1 of 1

Preparer: NR Ervin Date: 8/27/84

Independent Review: JL Rogers Date: 8/27/84

Approval: GA Davis Date: 8/27/84

EQUIPMENT TYPE: Solenoid Valve
MANUFACTURER: ASCO
MODEL: HT8320A107

This solenoid valve is an ASCO HT8320A107. It is unknown if this valve will survive the radiation due to a LOCA; however, it is not required to operate post- accident. SVL61 controls the air supply to operate the cross-tie damper between Reactor Building Clean Exhaust and Refueling Floor Exhaust Ducts. This damper provides the isolation between safety-related and nonsafety-related exhaust ducts. If the SVL61 disc fails, the air supply to AO/N-138 will be vented and AO/N-138, which is normally closed, will fail open. If AO/N-138 fails open, when SGTS operates, a suction will be drawn on both the Reactor Building Clean Exhaust and the Refueling Floor Exhaust simultaneously.

If SVL61 fails such that air is continuously supplied to AO/N-138, AO/N-138 will remain shut. However, the Reactor Building Clean Exhaust and Refueling Floor Exhaust can both be ventilated through their own ducts and isolation valves (AO/N-100 and AO/N-101).

Therefore, continued operation is justified.