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May 25, 1982

BECo. Ltr. #82-152

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

License No. DPR-35
Docket No. 50-293

Implementation Review of NUREG 0737 (Submittal III)

Reference: (a) BECo. Ltr. #82-145, A. V. Morisi to D. B. Vassallo, dated May 18, 1982

Dear Sir:

Continuing our submittals as discussed in Reference (a) above, attached we have provided the design descriptions for the following NUREG-0737 positions:

II.F.1.4 Containment Pressure Monitor

II.K.3.15 Modify Break-Detection Logic to Prevent Spurious Isolation of High-Pressure Coolant Injection and Reactor Core Isolation Cooling

II.K.3.16 Reduction of Challenges and Failures of Relief Valves -- Feasibility Study and System Modification

We believe we meet the intent of the NUREG on these items and request your concurrence based upon your review of the attached information.

Please do not hesitate to contact us concerning your review of this letter and attachments.

Very truly yours,

Harrison R. Balfour for A. V. Morisi

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ITEM II.F.1.4

CONTAINMENT PRESSURE MONITORING

Description, Including Range and Accuracy

The Containment Pressure Monitoring System monitors containment pressure from below atmospheric pressure, through the normal range for plant operation, and extends to high pressure capability for accident conditions.

The system consists of redundant channels, each powered from its own Class IE vital bus and provides continuous indication in the control room. Each channel covers the required range from -5 psig to four times the design pressure of the containment. This span is accomplished by utilizing two transmitters with overlapping ranges per channel. Each of the four transmitters feeds both dedicated indicators and recorder pens located on control room Post Accident Monitoring (PAM) panels C170 and C171.

Two pressure transmitters and associated indicators and recorders are provided for trending and are calibrated to a range of -5 to +5 psig. Two additional pressure transmitters and associated indicators and recorders are calibrated to a range of 0-225 psig.

The instrument specifications are as follows:

Transmitters:	Accuracy:	± .25% of span
	Deadband:	None
	Response Time:	0.2 sec to 1.67 sec.
Indicators:	Accuracy:	± 1.5%
Recorders:	Accuracy:	± .5% of span
	Repeatability:	
	Speed of Response:	1 sec. for 100% step change

Time response of these loops is basically the response time of the transmitter electronics, since the length of the sensing lines is essentially non-existent in this application. There are no relays or switching times involved. These accuracies and response times are satisfactory to provide usable information to the operator.

The instrumentation is clearly marked, and scales are readable. Conditions which would cause anomalous or ambiguous (i.e., the redundant displays disagree due to a single random failure of one accident-monitoring channel) indications are minimized by the following features:

a) Containment pressure monitor design includes redundant wide range instruments which are environmentally qualified to the requirements of DOR Guidelines.

b) Station operating procedures will be developed which will require daily checking of the status of the containment pressure monitors. This will increase the availability of instrument channels at the time of any accident. Also, the status of both channels at the time the accident occurs would be known.

Because of the above design features, Boston Edison believes that it would be overly conservative to assume the failure of one monitoring channel in conjunction with the accident. In addition, loss of one containment pressure instrument would not be the most limiting single failure in the accident scenario. For these reasons, Boston Edison Company believes that the current design meets the intent of NUREG-0737.

Design and Qualification

Pilgrim has a steel containment (not-subatmospheric), with a design pressure of 56 psig. The high range transmitters and indicators were calibrated to 225 psig.

Two transmitters were used to cover the range from -5 to +225 psig. The two ranges are -5 to +5 psig for PT-1001-601A, B and 0 to 225 psig for PT-1001-600A, B. The ranges overlap, and separate indication is used for each transmitter. The instrument current loops are independent of each other; therefore, no range switching was used.

Instrumentation channels were specified to be seismically qualified to insure operability following a safe shutdown earthquake.

Redundant channels are supplied. They are physically and electrically separated. Raceways used are two independent rigid steel conduits. The two instrument channels (A and B) are powered from separate Class IE independent vital buses. The Post Accident Monitoring panel is divided into two separate enclosures providing physical and electrical separation for power supplies, indicators and recorders of each channel.

Both channels are displayed on recorders. Each channel uses a dedicated, two-pen recorder, one pen for the -5 to +5 psig range and one pen for the 0 to 225 psig range.

Both channels are continuously energized and sense containment pressure directly. Output signals from the transmitters are dedicated to containment pressure monitoring, making isolation devices unnecessary.

The high range loops (0-225 psig) are not practical to use for monitoring containment pressure during normal operation, even though the loops are energized. The low range loops can be used during normal operation, with indicator readings approximately in the midscale portion of the range.

Instrumentation will be available prior to an accident consistent with IEEE-279, Paragraph 4.11 or future technical specifications.

Boston Edison meets the intent of NUREG-0737 regarding environmental qualification of electrical equipment. NUREG-0737 does invoke Regulatory Guide 1.89; however, since 1979 Licensees (of plants operating at that time) have been required to prove the environmental qualification of Class IE equipment, located in a harsh environment, to requirements set forth in Enclosure 4 (DOR Guidelines) of I&E Bulletin 79-01B. The transmitters, which were purchased prior to May 23, 1980, have been qualified in accordance with the DOR Guidelines with the exception of Aging.

According to the manufacturer, the cables carrying the signals between the transmitter and the recorder "pass the test requirements of IEEE-383 paragraphs 2.1-2.4, demonstrating a minimum of 40 years service at a conductor temperature of 90°C, as well as the ability to withstand 200 megarads of gamma radiation followed by a simulated LOCA". A thorough review of the test reports will be performed upon receipt from the supplier.

The recorders are located in a mild environment. Boston Edison has not yet performed equipment qualification evaluations on safety related electrical equipment located in areas subjected to only mild environments. When 10CFR50.49 and Regulatory Guide 1.89 Revision 1 are both finalized, Licensees will be able to get a clear understanding of the NRC's requirements to qualify Class IE equipment that is located in mild environment areas. At that time Boston Edison will be able to perform a judicious review of the equipment and their respective qualification documents.

Four containment pressure transmitters, four indicators with mounts and PAM panels were procured to IEEE Standard 344-75 which is consistent with R.G. 1.100; two recorders with mountings conform to Westinghouse report W CAP-8587 registered with NRC; instrument piping and tubing are designed to ASME Section III; design of conduits and supports specified conformance to Class IE requirements.

The Boston Edison Quality Assurance Manual, Volume II (BEQAM II), Section 2, commits BECo to comply with the Regulatory Guides listed in Appendix B of NUREG-0737.

Calibration and Testing

Redundant channels are provided for cross-checking. Both channels are accessible. Test points and test connections are available to provide a means of locating malfunctioning components quickly and easily.

Periodic calibration testing of this system will be performed in accordance with a test procedure which is being prepared and will meet the applicable portions of R.G. 1.118 (IEEE 338-77, except para. 6.3.2 and 6.3.4). The preoperation test conducted prior to start-up from Refueling Outage #5 included calibration of indicators, recorders, and transmitters and satisfied the test requirements for the current operating cycle. The test procedures will ensure periodic checks in the operability and accuracy of the instrumentation during plant operation.

Since the design incorporates redundant channels, either channel may be removed from service, and the other will still be operational. It would require a conscious effort on the part of the operator or technician to deenergize both circuits. Easy access for calibration adjustments is provided for trained I&C technicians while guarding against unintentional instrument adjustments. There are no setpoints on this system. Isolation valves and test connections were installed on the pressure transmitters for easy removal from service for testing and maintenance.

Human Factors

The indicating instruments for this system are located on a panel dedicated to Post Accident Monitoring, and the indicating and recording devices are clearly labeled. All PAM indicating equipment is physically separated from other equipment panels. Monitors are clearly marked to minimize confusion. There are no control switches or alarms in the containment pressure monitor loops. The fact that there are no alarms in the instrument loops, is consistent with the desire to minimize the number of superfluous alarms potentially confusing to the operator.

The operators were instructed on this system during the training program conducted prior to start-up from Refueling Outage #5.

II.K.3.15

MODIFY BREAK-DETECTION LOGIC TO PREVENT SPURIOUS ISOLATION OF HIGH-PRESSURE COOLANT INJECTION AND REACTOR CORE ISOLATION COOLING

The HPCI and RCIC steam line break detection circuitry has been modified by installing time delay relays which are set at 3 seconds. The relays were installed prior to start-up from refueling outage number 5. As previously stated in BECo. letter 82-3 the time delay relays were installed based on the BWR Owners Group recommendation. The installation will provide added assurance that pressure spikes resulting from HPCI and RCIC system initiation will not cause inadvertent system isolation.

II.K.3.16

REDUCTION OF CHALLENGES AND FAILURES OF RELIEF VALVES - FEASIBILITY STUDY AND SYSTEM MODIFICATION

An investigation of the feasibility and contra-indications of reducing challenges to the relief valves using the methods described in section II.K.3.16 of NUREG-0737 was conducted by the General Electric Company on behalf of Boston Edison Company as part of its participation in the BWR Owners Group. G.E. provided the results to BECo. in a report, a copy of which was forwarded to the NRC via BWR Owners Group letter to NRC (D.B. Waters to D.G. Eisenhut) dated March 31, 1981.

Prior to the issuance of the report BECo. had modified the Safety Relief Valve by changing the Target Rock operators from 3-stage to 2-stage. The 2-stage design was qualified by Target Rock tests and by G.E.'s Safety Evaluation.

Another method which reduces the frequency of challenges to the SRV's is low-low set relief or equivalent manual action. Currently, PNPS operating procedures call for manual opening of a relief valve under conditions which are likely to cause automatic actuation.

As outlined in Table 5.1 of the "BWR Owner's Group of NUREG-0737 ITEM II.K.3.16 Reduction of Challenges and Failures of Relief Valves," the two candidate modifications discussed above should result in an order of magnitude reduction in the incidence of SORV's

Based on the results of the study, the previously implemented modification and existing operating procedures we believe that an order of magnitude reduction in the incidence of SORV's is possible at PNPS.