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May 24, 1982

BECo. Ltr. #82-148

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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 II)

Reference: (a) BECo letter #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.1.5	Containment Water Level Monitor
II.B.2	Design Review of Plant Shielding and Environmental Qualification of Equipment for Spaces/Systems Which May Be Used in Postaccident Operations
II.D.3	Direct Indication of Relief and Safety-Valve Position

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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ATTACHMENT #1

ITEM II.F.1.5

CONTAINMENT WIDE RANGE WATER LEVEL

MONITORING SYSTEM

Summary System Description

The operator has been provided with the capability to monitor containment water level at all times. The wide range system includes two continuously energized indicators and two recorders located in the control room. These displays are mounted on a dedicated post-accident monitoring panel to discern their intended use for post-accident conditions. The recorders provide trend information.

The monitoring instruments receive inputs from sensors which directly measure the desired variable. Separate instruments are used for accident (wide range) and normal (narrow range) monitoring due to the large difference in their ranges.

Design Details, Including Range, Accuracy & Qualification

The torus wide range water level instruments provide safety-related display information to the operator. The following components itemized below will provide information with suitable accuracy for the intended function:

a) Transmitters are Rosemount 1152DP5E22T0280PB; accuracy is ± 0.2% of span.

b) Indicators are Westinghouse type VX-252; accuracy ± 1.5% Full scale.

c) Recorders are Westinghouse Optimac; accuracy ± .5% Full scale.

The Centerline of the lowest ECCS suction line torus penetration is El. (-) 13'-6.5", the wide range level instrument lower scale limit is El. (-) 13'-7". The torus normal water level is between El. (-) 3'-0" and (-) 2'-9", the wide range level instrument upper scale limit is El. 11'-5".

Conditions which would cause anomalous or ambiguous (i.e., the redundant displays disagree due to a single random failure of one accident-monitoring channel) indication are minimized by the following features:

a) Torus water level design includes redundant wide range torus level 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 wide range torus level 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 wide range torus level 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.

The statement made in clarification number (4) to this task action plan in NUREG-0737 that the ECCS suction line may be used as a starting point for both the narrow range and wide range monitors has not been construed by Boston Edison to be requesting a modification to the narrow range instrument from its original design basis. The narrow range water level instrument at PNPS is specifically intended to measure the normal water level. The range of the instrument is from El. (-) 3'-10" to (-) 1'-2". (Lower limit of this span is 9'-8.5" above the lowest ECCS suction) After careful review of II.F.1 Attachment 5 of the functions served by the narrow range instruments, Boston Edison does not believe the narrow range instruments need to be qualified to the requirements of Regulatory Guide 1.89 because this safety function has been transferred to the wide range instruments.

The level instruments to be used during a LOCA or a PBOC will be the wide range instruments. The two wide range differential pressure transmitters, indicators, recorders and PAM panels and mountings were procured to IEEE 344-75 which forms the basis for Regulatory Guide 1.100. Mechanical components of the system were designed by ASME Code, Section III, Subsection NC, 1977, which includes seismic/torus motion simulation. Conduits and conduit supports conform to Class IE requirements.

The differential pressure transmitters for the wide-range torus water level are located in a potentially harsh environment. They were purchased in February 1980 and are qualified to the requirements set forth in the DOR Guidelines, with the exception that the 40-year radiation dose plus the accident dose in the area exceeds the dose received by the tested transmitter. Boston Edison plans to perform a component-specific radiation calculation that is expected to show that the dose received by the tested transmitter is greater than the dose to which the installed transmitter will be subjected. At that time, the transmitters will be qualified to the requirements of the DOR Guidelines. According to the manufacturer, the cables carrying the signals between the transmitters and the recorders "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". Upon receipt of the requisite documentation, BECo will verify qualification of the cable. The level indicator and level recorder are located in mild environment areas. Boston

Edison has not yet performed equipment qualification evaluation 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 1E 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.

The wide range indicators and recorders are mounted on a dedicated post-accident monitoring panel located physically away from other equipment, but close enough to provide easy access and readability. The monitors are labeled to minimize confusion.

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.

Availability requirements for this instrumentation will be incorporated in a future revision to technical specification upon receipt of model tech. spec. from the NRC.

Each total channel is capable of being accessed during normal operation. Redundant channels for wide-range water level instruments and physical separation are provided in accordance with Regulatory Guide 1.75 and are energized from the station Class IE power sources. The signals from these sensors are not used for other purposes; therefore, isolation devices are not required.

The design incorporates redundant channels; therefore, either channel may be removed and the other will still be able to measure the parameter. It will require a conscious effort (i.e. two distinct steps) to remove both channels from service at the same time.

Human Factors

No alarm is provided for the wide range parameter because:

(1) Sufficient alarms are already provided (from the original plant design);

(2) it is desirable to reduce the number of superfluous alarms;

and (3) It is desirable to minimize anamalous alarms, which potentially confuse the operator.

The operators were instructed on the containment wide range water level instruments during the training program conducted prior to start-up from Refueling Outage #5.

Calibration and Testing

Periodic calibration testing of the system will be performed once per refueling cycle and daily instrument checks in accordance with applicable portions of R.G. 1.118 (IEEE-338-77 except paragraph 6.3.2 and 6.3.4) and a test procedure which is now being prepared. The pre-operational calibration test conducted during start-up from Refueling Outage #5 satisfied the periodic test requirement for the current operating cycle. A procedure to require daily instrument checks will be developed.

Surveillance testing, identification of any malfunction, and necessary repair can be effected in a timely fashion, because all components are located in areas which are accessible during normal operation. Also, normally indicating redundant channels can be used to recognize malfunctioning components.

ITEM II.B.2

DESIGN REVIEW OF PLANT SHIELDING AND E-QUAL OF EQUIPMENT FOR POST ACCIDENT OPERATION

Identification of Vital Areas & Equipment Qualification

Areas which will or may require occupancy to permit an operator to aid in the mitigation of, or recovery from, an accident have been identified as vital. These areas include the Control Room and Technical Support Center, post-accident sample station, sample analysis area, H_2 control system controls (which are located in the control room), and diesel generator room. Boston Edison Company has recently identified a potential need for limited occupancy of the radwaste control room during and following a Design Basis Accident if excessive leakage from ECCS components necessitates a transfer of water to the floor drain sump. Boston Edison Company is presently evaluating the need to designate the Radwaste Control room as a vital area and is concurrently evaluating the habitability of this area. Access to other areas should not be required because BWR plants are specifically designed to mitigate major design basis events without access to the reactor building or any areas other than those identified above.

The systems considered in the analyses to contain high levels of radioactivity in a post-accident situation include:

Primary Containment
High Pressure Coolant Injection System
Reactor Core Isolation Cooling System
Residual Heat Removal System
Core Spray System
Sampling Lines
Standby Gas Treatment Systems
Drywell Spray System
CAD System Discharge Lines

Boston Edison has identified and submitted to the NRC in BECo Letter 82-40, February 8, 1982, a complete list of systems and equipment which must function post-accident as part of its response to IE Bulletin 79-01B.

Boston Edison is evaluating the environmental qualification data of all Class IE equipment that is located in a harsh environment. This evaluation is being conducted in accordance with the requirements set forth in the DOR Guidelines and NUREG-0588 as prescribed by IE Bulletin 79-01B. Further guidance and a revised completion date is included in recent rulemaking. Also included will be requirements pertaining to qualification of equipment located in mild environments. Boston Edison has not yet completed its qualification program for all safety-related electrical equipment and does not anticipate completion by June 30, 1982. We have qualified many components and have completed a thorough evaluation of harsh environment components not yet qualified and have submitted detailed justification for continued operation. It is anticipated that our qualification program will permit us to achieve compliance with the new rule and the completion date included therein.

Calculations & Identified Shielding Requirements

Calculations of dose rates and integrated doses to vital areas and equipment in the plant were based on the specified NUREG-0737 sources (with appropriate decay times) as input. Radiation from leakage of systems located outside of containment was generally not considered for these analysis, which is consistent with the information provided at the Public Meeting on Clarification of TMI-2 Requirements held in Arlington, VA on 9/22/80.

Dose rates and doses were calculated inside and outside containment. The radiation source assumed in the containment atmosphere was: 100% Noble gases, 50% Halogens, 1% others. Since procedures require that the Reactor Coolant System be depressurized following a severe accident, the 100/50/1 Source confined to the RCS, is not considered.

Dose rates and integrated doses to the Control Room and Technical Support Center occupants were calculated assuming continuous occupancy. Dose rates to other areas were calculated on the basis of conservative occupancy time estimates, and do not result in exposure of occupants to doses in excess of GDC 19. Calculations were done in a manner consistent with the NUREG-0737 guidance and information provided at the Public Meeting on Clarification of TMI-2 Requirements held in Arlington, VA. on September 22, 1980.

All areas, with the exception of the Technical Support Center, were adequately located and/or protected to insure that occupants would not be exposed to doses in excess of GDC 19 criteria and to insure adequate access to vital areas.

Status of Modifications

In previous correspondence BECo identified the following associated modifications:

(1) Remote Closure of Post-Accident Combustible Gas Control System (PACGCS) valves

(2) Remote Closure of Reactor Building Truck Lock Door

(3) Installation of PASS outside secondary containment

Remote Closure of the PACGCS valves is complete. Remote Closure of the Reactor Truck lock door is not necessary to ensure accessability of any vital areas.

The PASS system installation is not yet complete. Schedular relief for this item was previously requested, including the necessary justification in BECo Letter #82-24, dated January 25, 1982.

One additional modification is necessary. The existing TSC does not presently provide adequate protection for occupants to meet GDC 19 criteria during a Design Basis Accident. The existing TSC has 4" of concrete for protection against direct radiation and essentially no ventilation filtration for radioactive material,

but does provide adequate personnel protection for lesser accidents than the DBA.

Construction of a new TSC has been deferred until further guidance from the NRC is received (per BECo Letter 81-200, 6/1/81).

ATTACHMENT #3

ITEM II.D.3

SAFETY RELIEF VALVE INDICATION

Description, Including Range and Accuracy

One year before TMI occurred, Pilgrim Station identified a need to know the safety/relief valve positions. A non-safety, single channel, seismically qualified acoustic monitoring package manufactured by Technology for Energy Corp. (TEC) model 1414 with indication in the control room was installed for this purpose.

The safety/relief valve position, indicating signals have been derived from a reliable valve position detection device. The original installation was upgraded from model 500 charge converters to model 504 charge converters with model 160 transient shields, subsequent to TEC notifying BECo that model 500's failed an environmental qualification test.

The safety/relief valve indicators are in the control room on the Post Accident Monitoring Panel (C171). This allows for direct indication of 6 valve positions (4 relief, 2 spring safety) and provides confirmation of inferred valve positions shown by indicating lights on panel C903 (relief valves only).

The acoustical valve monitoring system has been installed and adjusted to provide full open or closed valve indication. The system cannot be used to indicate intermediate valve position, percent flow or as positive proof of valve leakage.

Design and Qualification

The valve position indication is not safety grade. This non-safety grade indication system has the following attributes:

(a) It is a reliable, single channel, direct indication powered from vital instrument bus Y4, for each of the six valves. The six channels do share some electronics in the PAM panel.

(b) Dual-element thermocouples (TE-6271 through TE-6276) in the tailpipes of the valves provide a backup method of determining valve position (open or closed).

(c) Operator use of safety/relief valve position information is discussed in PNPS Procedure Nos. 5.7.1.1 and 5.7.1.2.

Because the valve position indication system is not safety related, it need not be completely seismically qualified. However, since the accelerometers are mounted on seismic Category 1 piping, they are seismically qualified and mounted. Technology for Energy Corp. (TEC) has provided test reports attesting to the seismic adequacy of their acoustic monitoring package.

Even though non-safety, the valve position package was purchased and installed as an environmentally qualified system. BECo was subsequently notified by TEC that the charge converter and the cable for the charge converter failed a qualification test. BECo procured and installed, during the past outage, TEC's qualified model 504 charge converters and model 160 transient shields.

Human Factors

The control room indicators for this system are mounted on the right hand side of the PAM panel (C171) to put them close to the controls for the relief valves. This "indicator only" system does not require operator actions during normal and abnormal conditions. It will assist the operator during abnormal conditions as an aid in determining relief/safety valve position.

The valve position indication is located in the control room. An alarm is provided in conjunction with this indication.

The annunciators at Pilgrim Station are of a standard design. Color coding of some annunciator windows is the only alarm prioritization scheme used. The annunciators associated with this indication conform to this standard design and do not use color coded windows. Being of a standard design they will not cause operator error. Annunciator alarms would indicate on the PAM panel in a similar fashion as for other alarms. At present no prioritization of PNPS alarms is being considered.

Emergency procedures 5.7.1.1 "Emergency Categories and Associated Emergency Action Levels" and 5.7.1.2 "Unusual Events" have been revised to include the valve position indications. Pilgrim Stations' approved procedure 8.M.3-12 "Acoustic Monitoring" will be used to calibrate the acoustic monitoring system.

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