BOSTON EDISON COMPANY
GENERAL OFFICES 800 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02199

W. J. MERRITT
MANAGER
NUCLEAR ENGINEERING DEPARTMENT

February 11, 1981

BECo Ltr. #81-37

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington D.C. 20555

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

Information in Response for
NUREG 0737 January 1, 1981 Requirements

Ref. (a) BECo. Ltr. #81-01 dated January 5, 1981 "Responses to NUREG 0737 January 1, 1981 Requirements

(b) Telecon: Mark Williams, NRC, and J. Keyes, BECo, dated January 21, 1981

Dear Sir:

In References (a) and (b), Boston Edison Company requested an extension of the submittal date for two of the NUREG 0737 items. The purpose of the letter is to provide BECo's responses to those 0737 items which include:

II.K.3.13 RCIC Auto Restart

III.D.3.4 Control Room Habitability

We believe this information is responsive to your needs; however, should you have any additional comments or questions, please do not hesitate to contact us.

Very truly yours,

W J Merritt

Commonwealth of Massachusetts)
County of Suffolk)

Then personally appeared before me Wayne J. Merritt, who, being duly sworn did state that he is Manager-Nuclear Engineering of Boston Edison Company, the applicant herein, and that he is duly authorized to execute and file the submittal contained herein in the name and on behalf of Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My commission expires:

Geneva Ruff
Notary Public

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II.K.3.13 <u>RCIC Auto Restart</u>

Boston Edison has reviewed and agrees with the BWR Owners group position developed by General Electric and forwarded to you via General Electric letter BWR OG-80-12 dated December 29, 1980. However, based on existing equipment at PNPS-1, efforts are being initiated to implement option 1 <u>and</u> 2 to satisfy this requirement. Option 2 alone is sufficient to satisfy the intent of the requirement; i.e., the turbine will be reset following a high level trip. However, the turbine would not be available for restart following a protective trip (e.g. overspeed) with implementation of option 2 alone.

In the existing design, the turbine trip and throttle is tripped closed by either a mechanical overspeed trip or an electric solenoid valve which dumps the oil, thereby tripping the throttle valve. Currently, this valve must be manually reset at the turbine. To allow the RCIC to auto reset following a high water level trip Boston Edison has initiated efforts to implement the following:

1. Replace present solenoid oil dump valve with electro-mechanical trip device.
2. Logic modifications to effect automatic closure of the steam supply valve on high vessel level rather than the trip valve. The trip valve would stay open throughout the high level trip.

This modification is scheduled for implementation during the upcoming outage at PNPS-1 scheduled to commence in September, 1981, to allow for delivery of the electro-mechanical trip device (approx 30 weeks) and to allow sufficient time for installation.

In order to provide remote restart capability following protective trips, Boston Edison is investigating installation of a motor operator on the trip valve replacing the handwheel. Boston Edison has researched the availability of a qualified motor operator and has been advised of lead times of 50 weeks. This precludes implementation of this modification on the same schedule as option 2. Implementation of this portion of the modification, if necessary, is scheduled by July 1, 1982.

III.D.3.4 Control Room Habitability

STATEMENT OF PROBLEM

All licensees with control rooms that do not meet the criteria of the following sections of the Standard Review Plan:

2.2.1-2.2.2	Identification of Potential Hazards in Site Vicinity;
2.2.3	Evaluation of Potential Accidents; and
6.4	Habitability Systems.

shall perform the necessary evaluations and identify appropriate modifications. The following documents should be used for guidance in performing the required evaluations:

1. Regulatory Guide 1.78, "Assumptions for Evaluation the Habitability of Regulatory Power Plant Control Room During a Postulated Hazardous Chemical Release";

2. Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accident Chlorine Release"; and,

3. K. G. Murphy and K. M. Campe, "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Design Criteria 19," 13th AEC Air Cleaning Conference, August 1974.

Each licensee submittal shall include the results of the analyses of control room concentrations from postulated accidental release of toxic gases and control room operator radiation exposures from airborne radioactive material and direct radiation resulting from design basis accidents. The toxic gas accident analysis should be performed for all potential hazardous chemical releases occurring either on the site or within the five miles of plant site boundary. Regulatory Guide 1.78 lists the chemicals most commonly encountered in the evaluation of control room habitability but is not all-inclusive.

The DBA radiation source term should be for the LOCA containment leakage and ESF leakage contribution outside containment as described in Appendix A and B of Standard Review Plan Chapter 15.6.5. In addition, BWR facility evaluations should add any leakage from the main steam isolation valves (e.g., valve stem leakage, valve seat leakage, main steam isolation valve leakage control system release) to the containment leakage and ESF leakage following a LOCA. Other DBA's should be reviewed to determine whether they might constitute a more severe control room hazard than the LOCA.

In addition to the accident analysis results, which should either identify the possible need for control room modifications or provide assurance that the habitability systems will operate under all postulated conditions to permit the control room operators to remain in the control room to take appropriate actions required by General Design Criterion 19, the licensee should submit sufficient information needed for an independent evaluation of the adequacy of the habitability systems.

III.D.3.4 Response

A. Control Room Operator Radiation Exposures from Airborne Radioactive Material and Direct Radiation Resulting from DBA's.

Engineering calculations were performed to estimate the dose that would be received by control room operators during the course of the most severe Design Basic Accident. (i.e., Loss of coolant accident as identified in the Pilgrim Unit 1 Safety Evaluation Report 8/25/71 Docket #50-293). All assumptions used in the evaluation are consistant with those considered by the NRC (at the time AEC) in the Safety Evaluation Report. Parameters such as Standby Gas Treatment System Filter Efficiency and Primary Containment Leak Rate were based on the current licensed or Technical Specification values. In addition, leakage through the Main Steam Isolation Valves to the main steam lines (and subsequently to the main condenser) was also considered in the analyses. Iodine depletion during transport in the main steam line was based on information provided by the NRC in NUREG/CR-0009, Technological Bases for Models of Spray washout of Airborne containment in containment vessels.

A summary of the main assumptions used in the analyses and results follows:

Loss of Coolant Accident:

100% Noble gases released to drywell (Reg. Guide 1.3)
50% Halogens released to drywell (Reg. Guide 1.3)

Decontamination Factors for Iodine:

	Elemental	Organic
Drywell	2	2
Main Steam Lines	100	1
SGTS Filter	100	100
Main Condenser	2	2
Primary Containment Leak Rate	1.0%/day	1.0%/day
MSIV Bypass Leak Rate	0.84%/day 11.4 SCFH	0.84%/day 11.4 SCFH
Main Condenser Leak Rate	0.5%/day	0.5%/day

In the analyses, the Primary Containment is assumed to leak to the atmosphere via the SGTS to the main stack where transport to the control room occurs. In addition, the primary containment leaks through the MSIV's to the main condenser which leaks to the atmosphere where transport to the control room occurs.

The resulting 30-day doses to control room operators (including appropriate occupancy factors) are: Thyroid Dose 9.4 Rem
Whole Body Dose 0.10 Rem

These results are within the limits for control room personnel established in GDC 19. (5 whole body - 30 thyroid)

A. <u>Control Room Operator Radiation Exposures from Airborne Radioactive Material and Direct Radiation Resulting from DBA's</u> (cont'd.)

Based on the result of our survey of the location of toxic chemicals stored near PNPS, to date, Boston Edison has concluded that no potential problem exists relative to exposure of control room operators to such chemicals spilling. Therefore, no analysis has as yet been performed. Boston Edison is continuing to formally document the results of its survey and will initiate an analysis if a potential problem is identified.

B. Information Used in Control Room Habitability Evaluation

1. Control Room Mode of Operation

a. Radiation protection for control room personnel in the accident mode is provided by operation of either of two 1000 CFM high efficiency air filtration trains. Initiation of these air filtration trains requires operator initiation in response to alarms from radiation monitors located in the air intake and control room. Initiation of either of the air filtration fans automatically closes and opens required dampers effectively isolating control room. Each train is powered from a separate diesel generator in the event of loss of preferred a-c power supply. Ventilation zones served by this system are maintained at a positive pressure with respect to other station ventilation zones.

b. Toxic chemical accident protection from outside the control room is limited to the extent that the operators can physically detect the presence of toxic gas and manually initiate shutdown of the control room ventilation system. Air infiltration would then be limited to a rate conservatively less than the 1000 CFM supplied for pressurization.

2. Control Room Characteristics

a. Control Room Air Volumes:

Because the HVAC system services the combined areas of control room, computer room & cable spreading room, throughout which intra-leakage can occur, these combined air volumes should be considered;

1. two levels = 71,860 ft^3

2. Main Control Room alone = 27,400 ft^3

b. Emergency Zones:

Control room, computer room, cable spreading room, Secondary alarm station (shown on print M-13 as the thermal staff room), Instrumentation and Control lab (shown on print M-13 as nuclear engineering and instrumentation engineering room), watch engineer room, Kitchen, janitorial, toilet, storage room, plus corridors and stairways.*

c. Control Room Ventilation System Schematic:

See Dwg. 292

See Dwg. 286: HVAC Control Diagram

*See layout drawings: M-12, M-13, M-16, M-17, M-292.

B. Information Used in Control Room Habitability Evaluation (cont'd.)

2. Control Room Characteristics (cont'd.)

d. Infiltration Leakage Rate:

Normal Operation - Negligible, control room maintained at positive pressure with respect to other station ventilation zones.

Accident Mode - Negligible, control room maintained at positive pressure by operator initiation of control room environmental control system.

Toxic Gas Release - 1000 CFM or considerably less if toxic gas release is detected and operator manually shuts down normal operating mode of environmental control system.

e. Air Filter and Adsorber Efficiencies:

HEPA = 99.9% each, per Mfr.
Charcoal = 95%

f. Closest Distance between Containment and Air Intake:

Control room air intake is adjacent to secondary containment (10ft); however, due to negative pressure maintained in secondary containment by the SGTS, gaseous leakage from containment into air intake of control room should not occur.

g. Layouts, with Dimensions:
See Details of Dwg. M-18; See also Dwg. C-2: "Pilgrim Plot Plan".

h. Control Room Shielding:

See Dwgs. M-12, M-13, M-16, M-17 for C.R. layout details (doors, ducts, etc.).

i. Automatic Isolation Capability:

Automatic isolation is not part of the design basis for the Main Control Room Environmental Control System. That portion of the system which isolates the control room, cable spreading room and computer room requires operator action to initiate isolation.

- Damper closing time from time of manual initiation = 10 seconds
- Damper inleakage = 0 for pressurized, filtered mode; = 115 CFM/damper for a non-pressurized, non-filtered mode.

j. Chlorine Detectors or Toxic Gas:

Neither chlorine nor toxic gas detectors are installed at Pilgrim Station (local or remote).

B. Information Used in Control Room Habitability Evaluation (cont'd)

2. Control Room Characteristics (cont'd)

k. Self-contained Breathing Apparatus Availabilty:

(1) Scott Air-Packs: Total of 10 units within protected area, each with 1/2 hour air supply:
- 5 next to control room
- 2 in the control room
- 2 in cable spreading room
- 1 in drywell access area

(2) Compressor system for recharging air-pack bottles, located in NW corner of warehouse.

(3) Breathing air reservoir, presently located in control room see below:

Self Contained Breathing Apparatus

The design details are as follows:

Air Control Panel

One (1) control panel for controlling air from the three (3) air banks through a pressure regulator into a manifold to accommodate three (3) and one (1) spare hose assemblies, 30 feet long to the personnel using the respiratory protection mask. The panel has a series of gages, valves, quick disconnects and control for efficient distribution of the air from the tanks to the user. The four (4) 30 ft. hoses have a 5000 PSI working pressure with a 4 to 1 safety factor. The entire system meets the Federal OSHA Standards. The complete operation system includes 4 Scott hoseline units with emergency egress tanks (5 minute egress air supply).

Air Storage Module Assembly (Attachment 1)

The module contains 15 each D.O.T. 3AA 3600 PSI working pressure, 352 cu. ft. capacity storage bottles. Each bottle contains a CGA 346 compressed air cutoff valve with the proper burst disc for safety. The bottles are designed for a 10% overfill if desired. This would give a 380 cu. ft. per bottle storage capacity @ 3980 PSIG. The 15 bottles are securely fastened in a rectangular skid mounted frame assembly to accommodate lifting, either by fork lift or overhead crane, or hoist. The skid mounted frame accommodates the storage bottles, each with individual fastening devices. The bottles are interconnected with pigtail and tee connectors in a series of three (3) banks of five (5) units. Each bank is individually connected to an air control panel mounted on the module package. The skid mounted frame assembly is cleaned, primed and painted, and is also mounted on casters for mobile operation.

B. Information Used in Control Room Habitability Evaluation (cont'd)

2. Control Room Characteristics (cont'd)

l. Bottled Air Supply:

(1) 10 Air packs x 1/2 hr. each = 5 hours bottled air (within protected area) plus 20 extra bottles maintained full via the compressor x 1/2 hr = 10 hours. plus a minimum of 6 hours air supply per person for 3 people in the control room supplied via the breathing air reservoir (see above)

m. Emergency Food and Potable Water Supply:

None provided.

n. Control Room Personnel Capacity:

Emergency Staff consists of seven idividuals: A chief operating engineer, watch engineer, shift technical advisor, shift supervisor, and three operators.

o. Potassium Iodide Drug Supply:

At least 400 tablets at 300 mg. each, located in the Emergency Control Center.

3. On-Site Storage of Chlorine & other Hazardous Chemicals:

a. Total amount and Size of Container:

No chlorine (per se) stored on site - see response to Reg. Guide 1.95 criteria. Other "Hazardous" Chemicals:

7 bottles (225 ft^3 each) compressed acetylene, 10 bottles compressed propane, 4 bottles compressed argon, and 5 bottles compressed hydrogen/nitrogen mixture.

NOTE: The above quantities are subject to daily fluctuation. This inventory reflects the status as of 11/26/80.

b. Proximity to Control Room Air Intake:

For bottles in rack, see Dwg. C-2; rack located ~50ft from the NE corner of the turbine building.

General Note: When considering "Hazardous" chemicals for toxicity. (namely to control room operators), note that the "Hazardous" chemicals listed above are not considered toxic, and would probably present more of an explosion problem before they could concentrate to to the point of causing severe oxygen displacement in the control room. Due to this, precautions and procedures resulting from potential explosions are considered in greater depth than the overcoming of operators due to high toxicity levels.

B. Information Used in Control Room Habitability Evaluation (cont'd)

4. Offsite Manufacturing, Storage, or Transportation Facilities of Hazardous Chemicals

a. Facilities within Five (5) Miles:

Lout Pond Water Treatment Facility

b. Proximity to Control Room:

Approximately 4.5 miles WSW

c. Quantity of Hazardous Chemicals in One Container:

150 lb/container; 7 containers maximum

d. Frequency of Hazardous Chemical Transportation Traffic:

Barge 150/year Rail 130/year Truck 110/year	A reasonable assumption, based on the fact that there is no major storage facility in the area. No official figures were readily available.

e. Documentation is being procured. If further information indicates a potential problem exists, the problem will be addressed and NRC will be notified.

5. List of Drawings

M-12	E1
M-13	12
M-16	E2
M-17	9
M-18	E1
M-286	12
M-292	E1
C-2	E1