U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-293/80-23

Docket No. 50-293

License No. DPR-35 Priority _____ Category C

Licensee: Boston Edison Company M/C Nuclear
800 Boylston Street
Boston, Massachusetts 02199

Facility Name: Pilgrim Nuclear Power Station, Unit 1 (PNPS)

Inspection at: Plymouth, Massachusetts

Inspection conducted: May 28-29, 1980

Inspectors: N. M. Terc, Radiation Specialist — 8/5/80 date signed

_____ date signed

_____ date signed

Approved by: R. J. Bores, Chief, Environmental and Special Projects Section, FF&MS Branch — 8/5/80 date signed

Inspection Summary:

Inspection on May 28-29, 1980
Areas Inspected: This inspection was limited to emergency planning areas addressed in Immediate Action Letter (IAL 80-06), dated February 27, 1980. The inspection involved eighteen hours onsite by one regionally-based NRC inspector.

Results: Of the five IAL 80-06 areas inspected, no items of noncompliance were found and it was determined that the licensee had met the intent of the Immediate Action Letter.



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## DETAILS

1. Individuals Contacted

*Machor, R., Assistant Station Manager
Whitney, G. G., Plant Engineer
*Hensch, M., Chief Radiological Engineer
*Balfour, H., Staff Assistant (Emergency Planning)
Cunningham, R., Staff Assistant (Emergency Planning)
*Hoey, W., Senior Radiation Protection Engineer
*Cook, P., Instructor
Fiedler, G., Watch Engineer
*Olsen, W. F., Senior Nuclear Training Specialist
*Mathis, C. J., Methods,Compliance and Training Group Leader
*Giardiello, P. F., Plant Engineer
Proksell, D., Health Physics Technician
Goddard, C., Health Physics Technician

Entech Engineering, Inc.

*Hamawi, J. N., Consultant

*Denotes those present at exit interview

2. General

On February 27, 1980, the Region I Office of Inspection and Enforcement issued an Immediate Action Letter (IAL 80-06) to the Boston Edison Company involving five areas of the licensee's emergency planning program at the Pilgrim Station. These items were identified during an NRC Health Physics Appraisal at the Pilgrim Station.

The licensee's resolution of each of the five areas addressed in IAL 80-06 is discussed below.

3. Detection of Protective Action Levels

The licensee's capability for rapidly detecting and measuring radionuclide concentrations in air was found to be inadequate to meet the requirements set forth by the PNPS Emergency Plan.

The licensee's action level of ten times the Maximum Permissible Concentration in air (MPC) for I-131 ($1 \times 10^{-9}$ uCi/cc) could not be detected with the GM detector and sampling procedures available at the time of the Health Physics Appraisal.

Subsequent to the HP Appraisal, the licensee has purchased two Eberline SAM-II, two-channel analyzers. One has been coupled to an RD-22 NaI(Tl) detector and the other to an RD-19 NaI(Tl) detector. In addition, the licensee has fourteen Eberline RAS-1, two RADECO H 809V and two RADECO H809C air samplers for use in conjunction with SAI GY-130 silver zeolite cartridges to perform emergency environmental monitoring. There is a large supply of these cartridges readily available at the licensee's Emergency Operations Center (EOC). The licensee also has four electric generators available to provide power to air samplers requiring 110 volts AC.

The licensee has developed procedures for the calibration of the SAM II-RD-22/19 Systems (Procedure 6.5-287). Both energy calibration and efficiency determinations are performed using barium-133 certified standard sources. The efficiency determination uses a cartridge geometry similar to that of silver zeolite cartridge.

The licensee's procedure requires that the internal gain of the SAM II be adjusted so that one millivolt equals one Kev gamma energy, and the entire barium-133 spectrum be scanned to obtain a plot of count-rate versus Kev values. The 356 Kev barium-133 peak is then identified and the ratio between this threshold voltage value and the 364 Kev iodine-131 photopeak threshold voltage value is obtained as a correction factor. (The width of the I-131 photopeak is about 80 Kev).

The threshold and window settings are then established and remain fixed for channel one of the SAM II. This channel will yield the total number of counts for the iodine-131 photopeak. Channel two of the SAM II is set so that the threshold starts about 400 Kev and the window setting is varied to obtain approximately the same number of counts in channel two, as in channel one and use this channel as background under field conditions that may include xenon gas and iodine-131. When a blank (background control) cartridge is placed against the detector, the window setting is manually changed until both channels yield the same number of counts within 100 counts per minute, in essence, adjusting both to record the same counts for background within the specified error. When the silver zeolite (emergency air sample) cartridge is placed against the detector, the recorded count-rate will yield the net number of counts due to the radioiodine that was collected in the cartridge by automatically subtracting the counts in channel two.

Air samplers were calibrated and the air flow rates were verified to remain constant within 10%.

The licensee is able to detect and measure levels as low as 10 MPC for iodine-131 with a counting time of ten minutes. This minimum detectable activity is within the lower limits of the protective action guides for the general population adopted by the Commonwealth of Massachusetts.

Based on the above findings, the licensee actions and results achieved meet the intent of the Immediate Action Letter.

4. Action Levels for Classification of Emergencies

During the Health Physics Appraisal, the auditor noted that the Emergency Operating Procedures (EOPs) did not either require evaluation of the emergency conditions relative to the emergency plan nor contain instructions for classifying the situation and implementing the emergency plan.
In addition, the auditor noted that licensee's implementation instructions were deficient in specifying appropriate and clear Action Levels upon which to base a decision to initiate emergency response activities.

The licensee has subsequently developed and implemented in their procedures, Action Levels for declaring the various classes of emergencies listed in the PNPS Emergency Plan. Such Action Levels are based upon readings from installed instrumentation, such as effluent monitors installed in the Main Stack and in the Reactor Building Vent Stack, which have their readouts in the control room.

Emergency Operating Procedures make cross reference to the specific radiation emergency procedures which implement the required specific emergency actions. Emergency Action Levels and guiding criteria have been incorporated into the emergency plan implementation procedures, so that users can declare the proper Emergency Classification, based on distinct Action Levels obtained directly from plant instrumentation.

The inspector reviewed the relationships between plant stack radiation monitors and off-site radiation readings and determined that they were adequate to corroborate conditions and support recommendations to the officials of the Commonwealth of Massachusetts regarding protective action for the general public.

Emergency Action Levels were developed for the licensee by a consultant. An effluent model consisting of a spectrum of gaseous radioisotopes was developed for accident conditions, based on the radionuclide inventory at the Pilgrim Station and on various assumptions, including variations of the inventory during accident-type effluent releases. Assumptions included actual stack flow rates of 20,000 standard cubic feet per minute (SCFM), normal and fumigation meteorological conditions, and 100% of the noble gases and 25% of the halogens available for release via 95% efficient filters. The effluent monitors' response was considered to be due to noble gases alone.

Although non-fumigation conditions were considered to be more realistic for this particular site, fumigating-conditions-equations were ultimately used in making the computations required to determine monitor trigger levels. The licensee's stated reason for this was that fumigation conditions are considered conservative (by a factor of 1.44) and the results are reasonably similar.

From the above considerations, a relationship between actual stack monitor readings (for both Main Stack and Reactor Building Stack) was derived for a Pasquill meteorological stability condition B (moderately unstable) in the form of one simple equation for each monitor. This would allow personnel in the control room to obtain the dose rate at a distance 400 ft. away from the stack (at the site boundary SSW or S sectors). Correction factors are included for wind velocity and different downwind sectors, as well as, for stack flow rates.

After a "high-high alarm" is activated, personnel are directed to both conduct a rapid survey and compute the expected value of the radiation level. If results at the site boundary are $\geq$ 10 mR/hr, a Category III Site Emergency would be declared. If $\geq$ 100 mR/hr, a Category IV General Emergency would be declared.

In addition to the above, downwind environmental airborne radioiodine and particulate radioactivity surveys will be taken. If levels exceed 10 MPC for I-131, a Site Emergency would be declared. If levels exceed or would likely exceed 100 MPC for I-131 for 10 hours, a General Emergency would be declared.

Based on the above findings, this portion of the licensee's actions and results meet the intent of the IAL.

5. Emergency Plan Implementing Procedures

The licensee has revised a number of emergency plan implementing procedures. The inspector determined that in the new procedural revisions, the types, locations and uses of facilities and equipment reflect actual site conditions and that notification and call lists were current.

In addition, the changes reflected the new techniques, methods and instrumentation to be used for detecting, measuring and projecting radiation levels and radionuclide concentrations in air. In particular, the computerized NOVA program for dose assessment and projection had been incorporated and was functional.

Action levels for declaring the various classes of emergencies, as described in Paragraph 4 above, were also incorporated in the new procedures.

Based on the above findings, the licensee's actions and results appear to meet the intent of the IAL.

6. Training

The inspector reviewed the training and retraining of individuals assigned the functional areas of the response organization to verify that these individuals had been trained in their duties and would be able to respond effectively.

Selected personnel, in particular those affected by the procedure and instrumentation changes, were questioned in technical matters and in the specific actions for which they were responsible during emergency conditions. A watch engineer, operators, monitoring team leaders and team members were questioned. In addition, training records and attendance sheets were reviewed.

It was noted that all new monitoring team leaders were ANSI qualified HP technicians, and all members of their team were either ANSI qualified HP technicians or engineers.

The questioning of the watch engineer revealed that he was knowledgeable in the new Emergency Operation Procedures and their interface with the Emergency Plan Implementing Procedures, including the new Action Levels from monitoring instrumentation and their relationship to offsite radiation readings. In addition, he was familiar with the NOVA program for dose assessment.

Monitoring team leaders and team members stated that they had received four hours of emergency response training including procedural and instrument familiarization. Two members were selected to take a radioiodine sample under simulated conditions. The inspector concluded that training had been satisfactory and that both theoretical and practical know-how had been adequately addressed.

Based on the above findings, the licensee's actions and results meet the intent of the IAL.

7. Emergency Equipment and Facilities

The inspector inspected the licensee's emergency equipment and facilities and noted that inventories had been performed, and were satisfactory. All instruments inspected were found to be calibrated and were functional.

The inspector noted, however, that there was no continuous water supply for the decontamination shower and sink at the EOC. The licensee has made a temporary hook-up which allows five-gallon containers to manually provide water as required. The licensee stated that a permanent hook-up was not planned because of plans to construct a larger, more sophisticated EOC. In the new EOC there will be continuous water supply available for use in decontamination during emergencies.

Based on the above findings, the licensee's actions and results meet the intent of the IAL.

8. Exit Interview

The inspector met with the licensee's representatives denoted in Paragraph 1, at the conclusion of the inspection on May 29, 1980. During this meeting, the inspector summarized the purpose and scope of the inspection and the inspection findings. The inspector stated that the licensee had met the intent of the Immediate Action Letter (IAL 80-06).