U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/LICENSE NO.: 50-293/95-25

LICENSEE: Boston Edison Company
Plymouth, MA 02360

FACILITY: Pilgrim Nuclear Power Station

LOCATION: Plymouth, Massachusetts

DATES: December 12-14, 1995

INSPECTORS: J. Lusher, Emergency Preparedness Specialist
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01/31/96
Date

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Division of Reactor Safety

1-31-96
Date

Areas Inspected: The licensee's performance during the biennial emergency preparedness exercise on December 13, 1995.

Results: Overall, the licensee's performance was good. Two exercise strengths were identified: 1) the performance of the Control Room Operators to identify, assess and perform mitigating actions; and 2) the comprehensiveness of the critique, in particular, the prompt identification, prioritization, and assignment of responsibility for correcting noted deficiencies. However, two exercise weaknesses were also identified: 1) untimely dispatch of early damage control teams from the operational support center; and 2) the incomplete utilization of the dose assessment program that led to confusion in developing the protective action recommendation at the general emergency.

DETAILS

1.0 INDIVIDUALS CONTACTED

The following individuals were contacted during the inspection and attended the exit meeting on December 14, 1996.

1.1 Principal Licensee Employees

* J. Alexander, Training and Management Services Manager
* E. Boulette, Senior Vice President - Nuclear
* N. Desmond, Regulatory Relations Manager
\# T. Devik, Nuclear Training Specialist
* P. Drooff, Radiological Support Team Leader
* D. Ellis, Senior Regulatory Affairs Engineer
\# R. Fairbank, Project Manager
* F. Famclaki, Quality Assurance Department Manager
* J. Gerety, Deputy Engineering Manager
* C. Goddard, Nuclear Services Group Manager
\# J. Keene, Regulatory Affairs Manager
* W. Kline, Nuclear Engineering Services Group Manager
* D. Kuba, Senior Operations Engineer
#* R. Markovich, Offsite Emergency Preparedness Manager
* P. Markson, Communications Specialist
* S. McCain, Controller Support
\# J. McClellan, Senior Quality Assurance Engineer
#* M. Medakovich, Nuclear Training Specialist
#* J. Morlino, Facilities and Equipment Supervisor
#* H. Oheim, General Manager - Technical Section
* L. Oliver, Vice President Nuclear Operations
* P. Sherman, Emergency Planner, Corporate and Public Information
#* D. Perry, Emergency Planner, Health Physics
* R. Sherry, Senior Nuclear Training Specialist
* A. Shiever, Technical Training Manager
#* J. Spangler, Onsite Emergency Preparedness Division Manager
* T. Sullivan, Plant Manager
#* G. Vazquez, Emergency Planner
* C. Walker, Simulator Controller
\# L. Wetherell, Deputy Plant Manager

1.2 NRC Employees

#* J. Lusher, Emergency Preparedness Specialist
#* D. Silk, Senior Emergency Preparedness Specialist
#* J. Laughlin, Emergency Preparedness Specialist
#* N. McNamara, Emergency Preparedness Specialist
#* D. Barss, Emergency Preparedness Specialist
#* W. Maier, Emergency Preparedness Specialist
#* R. Bores, Technical Assistant
* C. Miller, Chief, Emergency Preparedness and Radiological Protection Branch
#* R. Keimig, Chief, Emergency Preparedness and Safeguards Branch
#* Z. Abdullahi, Intern

\# Denotes attendance at the December 12, 1995 entrance meeting
* Denotes attendance at the December 14, 1995, exit meeting

The inspectors also interviewed other licensee and contractor personnel.

2.0 EMERGENCY EXERCISE

A biennial, full-participation, graded, emergency exercise was conducted at the Pilgrim Nuclear Power Station on December 13, 1995, from 7:30 a.m. to 4:15 p.m. The Commonwealth of Massachusetts and local communities participated. The Federal Emergency Management Agency evaluated the response of the State and other offsite agencies. The NRC evaluated the performance of the licensee's emergency response organization.

Exercise objectives were submitted to the NRC on September 11, 1995. The complete scenario package was submitted to the NRC on October 12, 1995. The NRC reviewers discussed the scenario with the licensee's emergency preparedness staff on October 23, 1995. The scenario provided adequate testing of the major portions of the Emergency Plan and Implementing Procedures, and also provided for demonstration of areas previously identified by the NRC as being in need of corrective action.

On December 12, 1995, at 3:00 p.m., the NRC inspection team attended a briefing by the licensee on the exercise scenario. The licensee identified those emergency response activities that would be simulated and stated that, since the plant was in operation, exercise controllers would intercede if any exercise activity had the potential to disrupt plant activities.

3.0 ACTIVITIES OBSERVED

The NRC inspection team observed the activation and augmentation of the Emergency Response Facilities (ERFs) and the actions of the Emergency Response Organization (ERO) staff. The following specific activities were observed:

a. Selection and use of control room procedures;
b. Detection, classification, and assessment of scenario events;
c. Direction and coordination of emergency response;
d. Notification of licensee personnel and offsite agencies;
e. Communications/information flow, and record keeping;
f. Assessment and projection of offsite radiological dose, and consideration of protective actions;
g. Provisions for in-plant radiation protection;
h. Provisions for communicating information to the public;
i. Accident analysis and mitigation;
j. Accountability of personnel; and
k. Post-exercise critique by the licensee.

4.0 EXERCISE FINDING CLASSIFICATIONS

Emergency preparedness exercise findings classifications are defined as follows:

Exercise Strength: A strong positive indicator of the licensee's ability to cope with abnormal plant conditions and implement the Emergency Plan.

Exercise Weakness: Less than effective Emergency Plan implementation which did not, alone, constitute an overall response inadequacy.

5.0 EXERCISE OBSERVATIONS

Activation and utilization of the ERO and ERFs were consistent with the Emergency Plan (the Plan) and Emergency Plan Implementing Procedures (EPIPs). The following sections of this report provide observations made by the inspection team in the various ERFs during the exercise.

6.0 SIMULATOR CONTROL ROOM (SCR)

Control Room response to the exercise scenario took place from the plant-referenced simulator in the Chiltonville Training Center. The simulator effectively mimicked the actual Control Room, except for the use of the plant page system. Since the simulator page system does not transmit into the plant, a controller was stationed in the plant Control Room to repeat announcements made over the simulator plant page. This arrangement led to the premature plant page announcement of the Site Area Emergency. This error was immediately corrected by another controller.

The SCR crew performed excellently. There was notable strength in their ability to analyze instrument readings and sample results to determine plant conditions. The crew's use of the approved procedures in its mitigation strategies was also a strength. All scenario events were quickly identified and diagnosed, and key parameters related to the progression of the accident and the radiological release were continuously monitored. In addition, all thresholds for emergency action levels (EALs) were recognized promptly. A chemistry sample result was properly and promptly interpreted by the Nuclear Watch Engineer (NWE) and triggered the Alert declaration.

The Emergency Plant Operations Supervisor (EPOS) exercised positive command and control of the crew and the emergency response organization while he was in the position of the Emergency Director (ED). He held frequent and thorough briefings for the crew, established priorities and made task assignments. He also announced all emergency event declarations to the crew and kept the NWE informed of his decisions and needs. The EPOS was in frequent contact with the TSC and EOF via the Mitigation Telephone Line, and he clearly conveyed his needs and priorities to personnel in the other facilities.

All SCR crew notifications and communications with offsite agencies were timely, and were made according to the licensee's Emergency Plan and procedures. A follow-up notification of plant conditions for the Alert condition was also made properly.

Onsite protective actions were considered by the SCR crew, who exhibited sensitivity to minimize the dose to repair crews and field operators. Offsite protective action considerations were not observed in the simulator due to the early and prompt activation of the Emergency Operations Facility, which assumed this function from the simulator crew before a protective action recommendation was required.

In summary, the overall performance of the SCR crew was excellent with strengths observed in the analysis of plant conditions, and the adoption of accident mitigation strategies.

7.0 TECHNICAL SUPPORT CENTER (TSC)

The plant page announcement for the Alert declaration was made at 8:43 a.m. The TSC was fully staffed at 9:01 a.m. The TSC personnel referred to, and implemented the appropriate procedures to activate the center, and to perform their assigned duties throughout the exercise. The TSC supervisor was diligent in coordinating the activities of the operations, engineering, and radiation protection personnel, and relayed significant issues to the Emergency Plant Manager (EPM). When discussing repair activities, the supervisors emphasized ALARA and radiation dose-saving measures to the repair team members. Operations personnel in the TSC did a thorough job in monitoring the SCR staff's implementation of the Emergency Operating Procedures. Operations personnel also anticipated events and reviewed criteria in the EAL table that could result in an escalated emergency classification. The EPM demonstrated good command and control. He controlled the noise level in the TSC/OSC and provided frequent briefings to his staff regarding plant status and changing conditions. Once the job task list contained several items, the EPM appropriately prioritized the jobs in order of importance to utilize the available repair teams effectively. He encouraged the TSC supervisors to be proactive in their planning and responses to plant conditions. The EPM also reviewed the EAL table in parallel with others on the Mitigation Line in order to be able to concur in classification decisions promptly. Overall, very good individual performances and collective teamwork were demonstrated in the TSC.

8.0 OPERATIONAL SUPPORT CENTER (OSC)

The OSC was activated 30 minutes after the Alert declaration. The OSC Supervisor (OSCS) implemented EP-IP-230, "OSC Activation and Response," and quickly completed the OSC activation checklist.

The OSC coordinators (maintenance, operations, radiological controls, and chemistry) demonstrated good teamwork in the formation and deployment of maintenance teams. Each team was thoroughly briefed before its departure and debriefed upon its return. The teams were also effectively tracked while in the field. Worker radiation exposure was closely monitored to prevent any overexposure. Status boards were kept current and accurately tracked job assignments, priorities, and the teams assigned to complete them.

However, the OSCS did not demonstrate adequate command and control. He did not brief OSC personnel well about plant and team status in accordance with EP-IP-230. The Emergency Plant Manager (EPM) conducted regular briefings over the TSC/OSC public address (PA) system, which kept OSC generally informed of plant status. The OSCS occasionally conducted one-on-one briefings of his staff as he walked around the TSC/OSC for face-to-face discussions with other responders, but this movement kept him away from his desk and sometimes he was unavailable to his staff. Further, the OSCS was not always aware of the status of maintenance teams. At one point, he told the EPM that a maintenance team had been dispatched when, in fact, it was not dispatched until 20 minutes later.

The OSC was slow to deploy maintenance teams early in the exercise. One team was assigned a task at 9:07 a.m., but did not leave the OSC until 10:21 a.m. (returned at 11:29 a.m.). Another team was delayed approximately 15 minutes because the assigned radiation technician did not have the proper glasses for wearing a self-contained breathing apparatus (SCBA). Additionally, there was not a sufficient quantity of disposable booties in the OSC supply locker, which could have potentially delayed the dispatch of teams. Some personnel who donned anti-contamination clothing did so without the booties. The delays of field team deployment early in the exercise was assessed as an exercise weakness (IFI 50-293/95-25-01).

9.0 EMERGENCY OPERATIONS FACILITY (EOF)

The inspectors observed that the EOF was activated 52 minutes following declaration of the Alert. The Emergency Director (ED) and the EOF support staff performed their assigned tasks in an organized and systematic manner. The EOF Operations Advisor (OA), Offsite Radiological Supervisor (ORS), and Emergency Offsite Manager (EOM) performed well in support of the ED.

Facility management and controls were effective. Periodic briefings were provided by the ED, ORS, OA, and EOM to keep the EOF staff informed of plant conditions and significant changes.

Event classifications were performed appropriately by EOF personnel. Frequent reference was made to the EALs in anticipation of the potential need to upgrade the emergency classification. Declaration of the Site Area Emergency (SAE) at 10:48 a.m. was appropriately made, based on plant conditions. The General Emergency (GE) was declared at 1:33 p.m., as plant conditions continued to deteriorate and an offsite release was identified.

The ED, EOM, ORS, and OA worked well as a team. Information such as plant conditions, trends, potential release paths, estimate of core damage, and the results of offsite monitoring were factored into the assessment process.

The required notifications and communications from the EOF following the declaration of the SAE and the GE were made promptly and accurately within the prescribed time limit, in accordance with the established procedures. Notifications were made directly to the Commonwealth of Massachusetts representatives in the EOF, and by telephone and facsimile transmission to offsite agencies using the offsite notification forms.

The implementation of protective actions for the public was effectively monitored by the EOF staff. Information on the implementation of protective actions, which is the responsibility of offsite officials, was provided by the State representatives in the EOF in discussions with the ED and the key EOF staff. Protective action information was also prominently displayed in the EOF. Status boards showed both the protective actions recommended by the licensee and the protective action directives issued by the State. They also showed a chronological listing of the major events occurring offsite that were provided by the State representatives in the EOF.

Representatives of the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Public Health (MDPH) were present in the EOF. Interaction between the Commonwealth personnel and the EOF staff was very effective. The EOF staff brought significant plant events to the attention of the Commonwealth representatives and the Commonwealth representatives were proactive in seeking out other desired information. Interaction with the offsite officials included communicating the basis and rationale for the General Emergency protective action recommendation (PAR).

10.0 DOSE PROJECTION

The EOP dose assessment function was staffed within 20 minutes of the Alert declaration. The Offsite Radiological Supervisor (ORS) and the dose assessment team demonstrated good teamwork. Communications among the ORS, team members and field teams and with their counterparts from the Commonwealth of Massachusetts were very good. The ORS briefed the Emergency Director (ED) and the NRC often through the NRC's Health Physics Network. The update presentations during the ED's briefings of the EOF staff were clear and concise. Radiological status boards were promptly updated and maintained current. Field teams were properly briefed, quickly dispatched, and well-coordinated throughout the exercise with those of the Commonwealth to ensure overall field monitoring effectiveness. The dose assessment team worked closely with their counterparts from the Commonwealth to determine whether general consistent dose projection/assessment results were achieved. Consistent results were obtained.

Due to a communicator problem in the SCR, communication of radiological parameters and plant status information to the EOF was very poor for the first two hours after the EOF was activated. However, this problem had minimal impact on the dose assessment team because of their effective simulated use of the Safety Parameter Display System (SPDS). The SPDS could not provide scenario parameters from the simulator, but the exercise controllers provided the scenario parameters to the dose assessment team when those parameters were properly selected on the SPDS. This information was promptly posted on status boards and utilized in the licensee's dose assessment/protective action recommendation software computer program (DAPAR).

The dose assessment team successfully used DAPAR to project doses at various distances from the plant, based on effluent monitoring data and meteorological conditions. They also demonstrated the use of DAPAR for modelling dose projections through alternate monitored pathways, and with various in-plant release pathways and radioactivity removal options in service. The team, however, was not familiar with the full capabilities of the DAPAR program. For example, they were not aware that DAPAR could be used to project offsite doses based on drywell radiation levels. Such projections provide an advance indication of the potential magnitude of the offsite consequences as a result of loss of containment integrity under various circumstances. They also

provide a means of assessing the impact in the event the release is not through a monitored pathway, or the monitor becomes inoperable. Prior to the simulated release, the team used DAPAR to determine what effluent monitor readings (from a monitored release) would require protective action recommendations. Because the simulated release was monitored, the team was able to effectively assess the offsite consequences.

The team also had difficulty in determining the relationship between field team iodine measurements and the thyroid-committed dose limits. The dose assessment team was not familiar with the DAPAR subroutine available for these calculations. The team attempted to use Procedure EP-IP-440, "Emergency Exposure Controls," but because units and terms were not clearly defined in the procedure, the attempt was unsuccessful. Subsequently, the team borrowed the procedure used by the Commonwealth at the EOF, and successfully determined the thyroid dose implications.

Because of an omission in the DAPAR program, the dose assessment team did not correctly identify one subarea for evacuation based on the program printout. This resulted in subareas being omitted from the initial protective action recommendation from the licensee. The omission was recognized a few minutes later and resulted in including the subarea in the protective action recommendation made to the Commonwealth. The inspector noted that use of the available procedure would have precluded the omission.

While dose assessment from monitored releases were well performed, the inspector determined that an exercise weakness existed. Due to the lack of familiarity with DAPAR for assessing the consequences of a release, and due to a program omission, an evacuation subarea was omitted and resulted in an inaccurate initial PAR (IFI 50-293/95-25-02).

After the exercise, the inspector asked the licensee why no attempt was made during the exercise to specifically quantify the radionuclide activity collected on the air-sampling media in the field. While gross measurement of the charcoal media were obtained, these measurements were assumed to be only I-131. No field measurements were made of the particulate activity. The inspector discussed the need to validate the radionuclide spectrum of released activity and the impact of noble gas, daughter products on measurements. The licensee indicated that this area would be reviewed.

11.0 LICENSEE ACTION ON PREVIOUSLY IDENTIFIED ITEMS

a. **(CLOSED) IFI 50-293/94-24-01** During the November 15, 1994, emergency preparedness exercise, TSC personnel were observed not following EP-IP-330, "Core Damage." Once data was obtained (i.e., PASS sample, containment radiation or hydrogen levels), it was applied to graphs that correlated the data to a corresponding amount of core damage. The graphs that were being used by core damage assessment personnel did not apply to the type of accident that was simulated to have occurred. The graphs did, however, provide a rough approximation of core damage. The inspectors concluded that TSC personnel should have followed EP-IP-330 or received permission to deviate from it.

During this exercise, the licensee implemented a revised EP-IP-330. TSC personnel were aggressive in obtaining the necessary data (and data updates) and correctly implemented the procedure throughout the exercise. The results were continuously provided to the appropriate supervisors and the EPM, to keep them apprised of core damage status. This item is closed.

12.0 LICENSEE CRITIQUE

The NRC team considered the licensee's critique very good. It identified all of the NRC's concerns, as well as others, made commitments to correct the weaknesses and assigned responsibilities.

13.0 EMERGENCY PLAN AND PROCEDURES REVIEW

The inspector reviewed the changes made by the licensee to the Emergency Plan Implementing Procedure EP-IP-330, "Core Damage," Revision 2, prior to this inspection. The inspector concluded that none of the changes made to the procedure reduced the plan's effectiveness or the state-of-readiness of emergency preparedness.

14.0 EXIT MEETING

Following the critique, the inspectors met with the licensee's personnel listed in Section 1.0 of this report to discuss the inspection findings. The team leader summarized the NRC's observations. Licensee management acknowledged the NRC's findings.