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Licensee: Boston Edison Company
800 Boylson Street
Boston, MA 02199

Facility Name: Pilgrim Nuclear Power Station

Inspection at: Plymouth, MA

Inspection Conducted: July 13-24, 1981

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SUMMARY

The appraisal of the state of onsite emergency preparedness at Pilgrim Nuclear Power Station involved six general areas:

Emergency organization;
Emergency training;
Emergency facilities and equipment;
Procedures which implement the emergency plan;
Coordination with offsite agencies; and
Walk-throughs of emergency duties.

The Emergency Preparedness Program was developed by individuals in the corporate office, as well as individuals at the site. In general, it appears that the coordination between these two entities was good.

The emergency organization was not described down to the working level for all emergency functions, and the minimum staffing requirements of NUREG-0654, Table B-1, were not provided.

Emergency facilities and equipment were for the most part satisfactory; however, deficiencies were noted in several areas, including the lack of adequate communications between the OSC, TSC, and Control Room; and lack of adequate equipment, supplies, or communications at the Alternate Emergency Operations Facility (AEOF).

Procedures which implement the emergency plan were generally adequate; however, deficiencies were identified in areas such as: post-accident sampling and analysis; onsite/inplant surveys; repair/corrective actions; emergency action levels; and communication of protective action recommendations to local officials and the public.

Observation and questioning of selected individuals during walk-throughs of their assigned emergency tasks and functions indicated that for the most part the individuals were aware of their assignments, their part in the emergency organization, and were able to perform effectively in spite of some procedural and training shortcomings.

1.0 ADMINISTRATION FOR EMERGENCY PREPAREDNESS

1.1 Responsibility Assigned

The Staff Assistant-Nuclear Safety at the Pilgrim Nuclear Power Station (PNPS) in Position Description (PD) 39-B23, dated May 14, 1981, was assigned the responsibility of site Emergency Planning Coordinator (EPC). During an interview with the auditors, this individual stated that he devoted from 10% to 20% of his time to emergency preparedness. His counterpart, the Emergency Planning Coordinator at the BECO corporate level, was assigned through PD 5/A-26, dated July 16, 1980 and by Section N.8 of the Emergency Plan. Although his job description stated that the corporate EPC would report to the Department Superintendent, the licensee explained that he reported to the Vice President-Nuclear. Section N.8 of the Emergency Plan assigned the overall responsibility for Emergency Planning at PNPS to the BECO corporate EPC.

Interviews with the licensee revealed that the Senior Radiation Protection Engineer, who reports to the Environmental and Radiological Health and Safety (ERHS) Group Leader, was in fact the person who performed implementation of many of the site emergency preparedness matters and served as liaison between the corporate and the site EPC. However, this individual's job description did not specifically reflect his responsibilities in the emergency preparedness program. In addition, the ERHS Group Leader had responsibilities for technical support in emergency planning areas (e.g., dose assesment and projection).

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matter should be considered for improvement:

- Revise the Position Descriptions for the site Emergency Planning Coordinator and his assistants to reflect the actual performance of emergency preparedness functions. (293/81-15-01)

1.2 Authority

The assignment of responsibilities in the emergency preparedness program were found by the auditors to be supported by sufficient authority. The Staff Assistant-Nuclear Safety received management and budgetary support required to upgrade facilities (e.g., EOF), purchase equipment, and implement changes as needed.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

1.3 Coordination

The site EPC was a member of the station Operations Review Committee (ORC) and was involved in routine coordination of events that may have an impact on emergency preparedness.

Coordination between site and corporate organizations pertaining to emergency planning was performed by the Senior Radiation Protection Engineer, although such interactions were of an informal nature. (See Section 1.1 of this report.)

Coordination between the licensee and offsite groups was marginal. (See Section 6.1 of this report.) However, the responsibility for coordination was documented in Section N.8.2 of the Emergency Plan.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

1.4 Selection and Qualifications

Position Description (PD) 39-B23 for the individual in charge of the onsite emergency preparedness program (that is, Staff Assistant-Nuclear Safety) did not include selection criteria on emergency planning-related matters; nor did the position description for the Senior Radiation Protection Engineer.

The selection criteria in PD 5/A-26 for the corporate EPC were limited to the following words: "The incumbent should have a working knowledge of Nuclear Operations Systems, equipment and procedures as well as regulatory requirements." The education and working experience of the individual in this position were found by the auditors not to be related to "knowledge of Nuclear Operations Systems, equipment and procedures."

No formal training program was made available for emergency planning personnel.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement.

- Establish selection/qualification criteria for key personnel responsible for emergency planning (e.g., corporate and site EPCs). (293/81-15-02)

- Develop training programs to enable the corporate and site EPCs to meet qualification criteria and maintain a state-of-the-art knowledge of emergency planning matters. (293/81-15-03)

2.0 EMERGENCY ORGANIZATION

2.1 Onsite Organization

The auditors reviewed the Pilgrim Nuclear Power Station Emergency Plan, dated April 1, 1981 (hereafter referred to as the Emergency Plan) and implementing procedures and held discussions with licensee personnel to evaluate the licensee's emergency organization.

The licensee's emergency organization was described throughout the Emergency Plan with Section N.5, "Organizational Control of Emergencies," giving an overview. Further description was found in the licensee's implementing procedures, 5.7 and 5.8 groups. The Emergency Plan, Figure N.5-4, showed the emergency organization scheme. Some specific discrepancies between the Emergency Plan, the implementing procedures, and Figure N.5-4 were identified as follows:

(1) The organizational scheme failed to address functional areas such as: in-plant surveys; search and rescue; repair and corrective actions; post-accident sampling and analysis; manpower planning and logistical support; and radwaste operations. (See also Section B of Emergency Preparedness Evaluation Report (EPER) for Pilgrim Station.)

(2) The line of command for the Operational Support Center (OSC) did not reflect the actual response as expected by key members of the organization. The OSC supervisor would be directed by the Watch Engineer in the Control Room (in-plant) and not by the Emergency Director as shown in Figure N.5-4.

(3) The procedures failed to clearly describe some of the functional areas shown in Figure N.5-4 of the Emergency Plan and in Figure 5.710A-1 of Procedure 5.7-1, as follows: Security, Administration Support and Onsite Recovery Organization.

The normal watch organization, outlined in Emergency Plan, Section N.5.1, would be responsible for the initial emergency response. In addition to the normal operations crew, this organization would include a health physics technician and members of the security force. Emergency Plan, Table N.4-3, "Emergency Manpower Availability," attempts to show for major functional areas the personnel available as a function time. As discussed in Section B of Emergency Preparedness Evaluation Report for Pilgrim Station (EPER), Table N.4-3 did not demonstrate compliance with the minimum staffing requirements of NUREG-0654, Rev. 1, Criterion B-5. The auditors found that the onsite organization did not in fact comply with the requirements of NUREG-0654.

The auditors interviewed members of the licensee's emergency planning staff and concluded that the responsibilities for the various emergency functional areas, and priorities consistent with a limited initial response had not been clearly delineated. (See Section B of EPER.)

The intermediate phase of the licensee emergency organization consisted of the full-fledged onsite emergency organization depicted in Emergency Plan,

Section N.5.2, and in Figure N.5-4, "PNPS Emergency Organization." Further description was found in the implementing procedures. (See, for example, Procedure 5.7.1.0.) A review of these documents showed various discrepancies in the description of this intermediate augmentation phase of emergency response.

The lines of succession for the Emergency Director were identified in the Emergency Plan, but differed from that in licensee's "Primary Assignment List," which was in fact an Emergency Call List. The lines of succession for other key members of the onsite emergency organization were also identified by title in the Emergency Plan, but did not always agree with the list of individuals specified in the "Primary Assignment List."

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Revise the description of the onsite emergency organization to provide for all emergency functions required during the initial and augmentation phases of emergency response, to include: the minimum staffing requirements of NUREG-0654, Rev. 1, Criterion B.5; a sufficient level of detail to completely and unambiguously delineate the command hierarchy, reporting chains, and functional interrelationships down to the working level; and the relationships between normal job assignments and emergency tasks. (293/81-15-04)

2.2 Augmentation Organization

The auditors reviewed the licensee's Emergency Plan, Section N.5.3, "Augmentation of the Onsite Organization," and N.5.3.1, "BECO Recovery Organization". In addition, the auditors reviewed Nuclear Operations Support Procedures (NOSP), Series 23 pertaining to the final augmentation phase, called "Recovery Organization," although in fact its emergency functions were not limited to the recovery phase.

The Recovery Organization also provided a framework by which corporate resources could be provided to the site for accident assessment, logistical support, nuclear operations, and public media support.

Emergency Plan, Figure N.5-7 showed the basic areas of emergency response of the licensee's "Recovery Organization."

The Plan states (See Section B of the EPER.) that the Recovery Organization was responsible for notification of various governmental agencies; however, this responsibility was also assigned to the Emergency Director.

Based on the above findings, this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

- Resolve conflicts in the notification responsibilities of the BECO Recovery Organization and the Emergency Director. (293/81-15-05)

3.0 TRAINING/RETRAINING

3.1 Program Establishment

The auditors reviewed the PNPS Training Manual and Emergency Plan, Section 8.1.1, "Training." The PNPS Training Manual provided for training of the following categories: Emergency Director, Emergency Teams, Emergency Centers, Security, Fire Brigade, Offsite Agencies and First Aid. For each of these categories an examination form was developed. The PNPS Training Manual stated that these forms will be completed before someone is assigned to specific duties. These forms were used by an examiner to certify that the individual had read and was familiar with the intent and content of the emergency procedures and had demonstrated the ability to perform certain tasks specified on the forms. The examination form also indicated if either a written quiz or oral examination was used for evaluation of the individual.

The PNPS Training Manual stated that "Personnel assigned to the teams will be retrained annually"; and Section 8.1.1.1 of the Emergency Plan states, "Station personnel identified as members of the Emergency Organization received retraining once a year." The PNPS Training Manual also stated that general employees training on radiation emergency procedures would be conducted "periodically." Auditor discussions with the licensee personnel indicated that general employee emergency training was provided every two years.

The general employee training provided to the auditors did not contain discussions of accident conditions and their relationships to plant personnel response. In addition, the training did not discuss the actions plant personnel should take if an evacuation of the site was required.

Neither the PNPS Training Manual nor procedures addressed Recovery Organization training; however, Recovery Organization training was outlined in the Emergency Plan, and the auditors reviewed lesson plans and attendance sheets that documented that Recovery Organization training was conducted.

Watch Engineers were, in addition to familiarization with procedures, required to: "Be able to estimate offsite concentrations and dose rates following a release" and "Demonstrate knowledge in the performance of:

Environmental Monitoring
Personnel Monitoring Team
Re-Entry Team
Marine Environmental Monitoring Team."

The personnel who would man the EOF as Emergency Directors receive the above training except for offsite release estimates. The Emergency Director training program for Watch Engineers did not require that they demonstrate their ability to:

Recognize and classify events using the EALs, or

Determine the offsite protective actions to be recommended to offsite officials (based on plant conditions).

The training provided to the Emergency Directors did not cover transfer of command and control from the EOF to the Alternate Emergency Operations Facility (AEOF) in the event that EOF evacuation became necessary.

Discussions with licensee personnel indicated that the Shift Technical Assistants (STAs) were trained to perform dose projection and demonstrated their ability to perform this function; however, the PNPS Training Manual did not address this requirement.

PNPS Training Manual Examination Form S-2, "PNPS Emergency Team Member," required that the emergency team members read and be familiar with the appropriate procedures and "demonstrate the ability to perform satisfactorily the requirements of the following: environmental monitoring, personnel monitoring, re-entry, and marine environmental monitoring."

In addition, Form S-2 required that they "demonstrate the ability to interpret radiation monitors and analyze sample filters and cartridges to evaluate the magnitude of radioactivity releases." However, the PNPS Training Manual did not require emergency team personnel to demonstrate their ability to perform those emergency functions that were not part of their normal duties.

The PNPS Training Manual stated that first aid training was required for health physics technicians, ALARA technicians, Nuclear Plant Operators, Auxiliary Operators, Operation Supervisors, and Watch Engineers. This training consisted of the Red Cross Standard First Aid - Multimedia and in some cases cardiopulmonary resuscitation.

PNPS Training Manual Examination Form S-4 required security personnel to read and be familiar with the contents of the appropriate procedures and demonstrate familiarity with personnel accountability and access/egress control during radiation emergencies.

The training of all the personnel who would report to the EOF, TSC, OSC, or AEOF was covered by PNPS Training Manual Examination Form S-3. It required that these personnel read and be familiar with the appropriate procedures and that they "demonstrate the ability to satisfactorily perform the requirements of the responsibilities assigned." The PNPS Training Manual did not require demonstration of all the emergency functions not part of normal duties such as:

EOF - Protective action decisionmaking based on plant conditions, or

AEOF - Transfer of responsibility for the EOF to the AEOF including interface with offsite officials.

THE PNPS Training Manual did not address the following emergency functions: rescue, repair/corrective actions, in-plant surveys, or plant chemistry (during emergencies).

Emergency Plan Section 8.1.1.3 stated that, "Each of the offsite emergency groups such as fire, medical, police, or civil defense will be either required, contacted or invited, at least every twelve months, to participate in a training program at PNPS."

The PNPS Training Manual stated that the examiners would be certified by the Training Department as qualified to examine the particular area. It provided for documentation of the names of attendees, date of training, lesson title, instructor, and type of training. The PNPS Training Manual did not provide for retraining when there were major changes in plant equipment or procedures.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Identify emergency response tasks that are not part of the assigned person's normal duties and demonstrate their ability to perform these tasks during practical exercises. (293/81-15-06)

In addition to the above findings, the following matters should be considered for improvement:

- Ensure that training/retraining of emergency response personnel is conducted on major changes in emergency equipment, facilities and procedures prior to their implementation. (293/81-15-07)

- Include the Recovery Organization training in the PNPS Training Manual. (293/81-15-08)

- Provide annual training of general employees on their response during radiological emergencies to include expected conditions during emergencies, protective actions, locations of remote assembly areas and site evacuation. (293/81-15-09)

3.2 Program Implementation

The auditors reviewed the training records against the emergency assignment roster maintained by the site. This review of the training records indicated that members of the site emergency organization received 3 days of classroom instruction that covered the entire new Emergency Plan and the responsibilities of all onsite personnel. Except for three HP technicians, all personnel appeared to have received this training. Discussions with licensee personnel indicated that those HP technicians had just been placed on the roster.

The auditors interviewed personnel who perform the following emergency functions:

Emergency Director	Watch Engineer
OSC Supervisor	TSC Supervisor
Team Leaders	Team Members
STA	Communication Supervisor
Security	Offsite Officials (Civil Defense, Fire/Police)

These interviews, record checks, and walk-throughs by the auditors confirmed that personnel, in general, received training as described in Section 3.1 of this report. The auditors found that plant personnel responded well during the interviews and had a good understanding of their roles as prescribed in the plan and procedures.

Auditor interviews of three Watch Engineers indicated that during their training they were talked-through the procedures dealing with EAL recognition, event classification, protective action decisionmaking based on EPA Protective Action Guides (PAGs) and notification. A walk-through of these functions with the auditors (See Section 7.2.1 of this report) indicated that the training was insufficient and that additional training was required in these areas.

Plymouth Fire Department officials stated the licensee had invited the local firemen to participate in "basic" firefighting at a fire school, but that the licensee did not provide site training on the interaction with plant personnel or firefighting under radiological conditions. The Duxbury fire officials stated that several times each year either Duxbury or Kingston equipment and personnel move to Plymouth when Plymouth equipment was committed. However, none of the officers of these departments had been invited to training by the licensee.

The Plymouth Police officials stated that the licensee did not invite their personnel to training.

Discussion with offsite officials indicated that officials in the Town of Plymouth had attended sessions on EPA PAGs but that the relationship between plant conditions and protective actions had not been discussed.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Provide training for offsite support agencies including:

    - onsite and radiological training for the Plymouth Fire Department personnel and for the officers of the Kingston and Duxbury Departments;

    - onsite and interface training for Plymouth Police personnel; and

    - briefing of plume EPZ protective action decision makers, including fire and police officials, on protective actions as they relate to plant conditions. (293/81-15-10)

In addition to the above findings, the following matter should be considered for improvement:

- Ensure that all personnel who are assigned emergency functions, have been trained/qualified for those functions prior to their assignment on the emergency rosters. (293/81-15-11)

4.0 EMERGENCY FACILITIES AND EQUIPMENT

4.1 Emergency Facilities

4.1.1 Assessment Facilities

4.1.1.1 Control Room

The Control Room was equipped with updated copies of the Emergency Plan and the implementing procedures. One decisional aid specified in the Emergency Plan was the Emergency Data Acquisitions System (EDAS). EDAS was implemented using an HP-85A (See Section 5.4.2 of this report) desk-top computer. This desk-top computer had been programmed to perform dose assessment calculations that would be needed during an emergency. The use of the HP-85A was explained in Procedure 5.7.2.25, "Use of the HP 85 Offsite Dose Calculator." The auditors requested demonstrations of the performance of the HP-85A and verified that this equipment was operable.

The Control Room had an offsite notification procedure and a notification list which had the telephone numbers of all BECO employees who would be called to initially staff the emergency organization. The Control Room was also equipped with a map of the area surrounding the nuclear power station. The map was a composite of United States Geological Survey topological maps. The map as displayed was difficult to use as a decisional aid since it was partially obscured by equipment and did not have an outline of the plume Emergency Planning Zone (EPZ) or the standard directional sectors.

The Control Room contained an emergency radiological kit which contained full face respirators and iodine-absorbing canisters, anti-contamination clothing, copies of outdated procedures, an air sampling pump, a PIC-6A ionization chamber, and an E-520 survey instrument. The kit was for the "Rapid Assessment Team" which was no longer part of the emergency organization. Two self-contained breathing apparatus (SCBA) kits were also found in the Control Room.

The ventilation intake for the Control Room contained a radiation monitor (PRM 1705-16) and the flow of ventilation intake air would be diverted through a train of particulate and charcoal filters whenever high radiation levels are detected in the intake air. The auditors verified that the clean air supply system for the Control Room operators was in place and operable. There was also an area radiation monitor (ARM-3) which monitors external radiation fields in the Control Room. While potassium iodide (KI) was provided in the monitoring team kits, the Control Room was not equipped with KI.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Provide for clear access to the area map in the Control Room and for a map with standard directional sector and plume EPZ markings. (293/81-15-12)

- Provide KI in the Control Room. (293/81-15-13)

4.1.1.2 Technical Support Center (TSC)

The auditors reviewed the following BECO procedures which relate to the activities of the Technical Support Center: Procedure 5.7.1.0, "Description of Emergency Organization and Facilities"; Procedure 5.7.2.3, "Technical Support Center Supervisor"; and Procedure 5.8.2, "Emergency Facilities and Equipment Audits." In addition the auditor reviewed the June 1, 1981 BECO letter #81-121 to Mr. Darrell G. Eisenhut, USNRC from Mr. A. V. Morisi, Manager of the Nuclear Operations Support Department.

The TSC was located in the main security building approximately a 3- to 5-minute walk from the Control Room.

Licensee personnel indicated to the auditors that there would be approximately 15 to 18 people in the TSC. In the June 1, 1981 submittal to the NRC, the licensee indicated that the total floor area of the existing TSC is about 500 square feet and this was confirmed by auditor observation. With approximately 15 to 18 people working in this area, the auditors doubted that assignments could be carried out in a productive fashion. In addition, there was no space in which support staff could perform functions such as researching drawings or performing calculations.

The TSC did not have the same radiation shielding capability as that found in the Control Room. Also, it did not have a ventilation system with particulate (HEPA) or charcoal filters. However, this was not required for the interim TSC.

The TSC contained data displays and up-to-date records such as current plant technical specifications, plant operating procedures, emergency operating procedures, drawings, schematics, and diagrams showing current conditions of the plant's structure and systems.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matter should be considered for improvement:

- Relocate the interim TSC to a location providing adequate space and work environment. (293/81-15-14)

4.1.1.3 Operations Support Center (OSC)

The auditors reviewed the following BECO procedures which are related to the activities of the Operations Support Center: Procedure 5.7.1.0, "Description of Emergency Organization and Facilities"; Procedure 5.7.1.5, "General Emergency"; Procedure 5.7.1.6, "Activation of the Emergency Organization"; Procedure 5.8.1, "Emergency Drills and Exercises"; and Procedure 5.8.2 "Emergency Facilities and Equipment."

The Emergency Plan, Section N.7.1.4, stated that the OSC would be located in the office above the machine shop and in close proximity of the HP Control Point. The auditors inspected the OSC (which was actually the lunch room) and connecting offices of the Maintenance Department. An alternate OSC was designated as the I&C Labs, adjacent to the Control Room.

The auditors noted that the 37' x 17' size of the lunch room would be sufficient to accommodate the OSC Supervisor and his staff of approximately eight persons.

The OSC and alternate OSC were located outside the reactor building atmosphere boundary. In addition, the OSC-assigned health physics technician (HP Tech) would be available to monitor the OSC when directed by the Watch Engineer (initial response stage) or later by the Radiological Emergency Team Coordinator (RETC).

Emergency Plan, Section N.7.1.4, states that "Protective clothing, respiratory equipment and other supplies which may be needed in response from the OSC are located in the HP office, 30 seconds from the OSC." (See also Sections 4.2.1.1, 5.5.1, and 7.2 of this report.)

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.1.1.4 Emergency Operations Facility (EOF)

The auditors toured the EOF which consisted of four trailers located outside the security boundary about a 5-minute walk from the main gate. The location of the primary EOF was as specified in the Emergency Plan. The EOF appeared large enough to provide working space for the assigned personnel to perform the required functions. There was space available on a limited basis for members of the news media; however, the licensee staff indicated that the Information Center at the Memorial Hall in Plymouth would be used for the news media.

The EOF was equipped as stated in the Emergency Plan and procedures. For example, there were low range and high range beta/gamma survey meters, an emergency assignment board with team designations and emergency assignments, as-built plant layout drawings, readout of station meteorology, first aid and decontamination supplies, emergency personnel protective equipment, clothing, air samplers with capability for particulate and radioiodine sampling, sample analysis equipment, personnel dosimetry, check and calibration sources, copies of the Emergency Plan and implementation procedures, state and local emergency plans and procedures, and site maps marked with the appropriate polar coordinates. The maps were also marked to depict preselected monitoring points, TLD locations, and environmental air sampling stations.

As discussed in Section 7.2.3 of this report, the auditors observed a noise level that may interfere with communications and Emergency Director decision making. In addition, the walk-through identified the need for a clear road map for field team direction.

The Alternate Emergency Operations Facility (AEOF) was located in Bridgewater, Mass., at the Area Two Headquarters of the Massachusetts Civil Defense Agency, approximately 20 miles from the Pilgrim Nuclear Power Station site. This was the location from which the Commonwealth of Massachusetts would coordinate emergency operations for eastern Massachusetts in the event of an emergency at Pilgrim Unit I.

The licensee indicated that, in the event that the primary EOF was uninhabitable, the equipment in the present EOF, mostly portable equipment, would be transferred to the alternate EOF. The alternate EOF contained adequate space for all operations and activities of the current EOF. However, on visiting the alternate EOF, the auditors found that the building was being painted inside and appeared to be in such disarray that it would be several hours, if not days, to have it in proper condition to accommodate the EOF functions.

The auditors noted, on the way to the alternate EOF, that the roads are quite curvy and severe winter conditions could cause some difficulty in bringing the equipment and teams to the alternate EOF. It took approximately 40 minutes to reach the alternate EOF from the present EOF, at legal driving speeds.

The auditors found no radio equipment "dedicated" for use by the licensee at the AEOF. The licensee was going to use the state radio equipment in the event of an emergency. The auditors felt that the lack of emergency supplies, maps, communications and other supplies would make it impossible to promptly transfer communication, offsite/onsite interface and coordination of offsite monitoring in the event the primary EOF must be evacuated. In addition, as discussed in Section 4.2.6 of this report these problems would be further compounded by the lack of adequate transportation and as discussed in Section 3.1 of this report by the lack of training.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Provide dedicated equipment and supplies, including communication equipment, at the AEOF as required for smooth and timely transfer of emergency operations, including command and control functions, to the AEOF, should evacuation of the primary EOF be required. (293/81-15-15)

In addition to the above findings, the following matters should be considered for improvement:

- Reduce the noise levels in the Emergency Director's EOF work area. (293/81-15-16)

- Provide detailed road maps in the EOF for aid in field monitoring team direction. (293/81-15-17)

4.1.1.5 Post-accident Coolant Sampling and Analysis

4.1.1.6 Post-accident Containment Air Sampling and Analysis

4.1.1.7 Post-accident Gaseous and Particulate Effluent Sampling and Analysis

The appraisal team did not appraise areas associated with Sections 4.1.1.5, 4.1.1.6 or 4.1.1.7, since these were reviewed during a separate onsite inspection conducted on June 21-26, 1981. (See Inspection Report 50-293/81-14.)

4.1.1.8 Transfer and Storage of Post-Accident Liquid Wastes

The auditors held discussions with the Senior Chemical Engineer to evaluate the licensee's liquid effluent sampling and analytical facilities. The licensee indicated that accident generated liquid wastes would be stored and, therefore, would not require sampling and analysis. The auditors reviewed the licensee's storage capability for post-accident liquid wastes.

The handling, processing, and storage tanks were located within the Radwaste Building. The total volume capacity was 114,000 gallons (i.e., 3 treated waste holdup tanks - 18,000 gallons each, and 4 receiving tanks - 15,000 gallons each). However, during discussions with the Senior Chemical Engineer, the auditors noted that no liquid wastes would be pumped to the rad waste tanks unless a manual release was initiated from the Control Room as a result of a "High Alarm" or "High-High Alarm." During an emergency situation, the liquid wastes could be contained within the drywell instead of entering the Rad Waste Processing Area.

It appeared to the auditors that ample storage capability was provided for the Pilgrim BWR design. However, leaks from the isolation valve or possible problems within the drywell could necessitate liquid effluent sampling and analysis.

The licensee did not appear to have a defined scheme for handling liquids which might be generated as a result of an accident, however, taking into account activity levels in the liquids, storage so as to minimize external exposure to workers who may have to enter the storage areas, and the need to analyze the activity of liquids prior to processing or making discharges. (See also Sections 5.4.2.10 and 5.4.2.11 of this report.)

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Review emergency plans and procedures for handling liquid wastes generated before and as a result of an accident, to clarify the scheme of handling these liquids, to identify the situations when liquid sampling and analysis would be necessary, and to provide for the required equipment and sampling and analytical procedures. (293/81-15-18)

4.1.1.9 Offsite Laboratory Facilities

The licensee used the services of the Yankee Atomic Environmental Laboratory located at Westboro, MA. This laboratory was also used by the Yankee Rowe, Vermont Yankee, and Maine Yankee nuclear power stations. The laboratory was under the direction of the Environmental Laboratory Group which consists of engineers, chemists, and environmental scientists with expertise in areas of environmental health physics, radiochemistry, public health, and nuclear instrumentation.

The auditors reviewed the laboratory "Administrative and Technical Responsibilities Manual," and Procedure 520, "Emergency Response Mobile Gamma-Ray Spectrometric Technique for Identification and Quantitative Determination of Radionuclides."

The laboratory appeared to be well equipped with current instrumentation for chemical as well as nuclear analyses. It had the capability to analyze various environmental samples as part of an ongoing routine environmental surveillance program; provide external radiation, in situ radionuclide deposition and concentration measurements; and provide adequate documentation of the various analytical data. The laboratory could provide the necessary backup capability for analyzing various inplant samples related to the radiation control measures of the licensee, as well as followup on bioassay measurements. In addition, the laboratory, when requested, could assist in the assessment of offsite radioactivity levels during an emergency situation.

The laboratory had mobile gamma-ray spectrometric equipment for identification and quantitative determination of various radionuclides. This consisted of a four-wheel drive van containing the following equipment: an electrical generator, a Ge(Li) Detector and a multi-channel analyzer.

Upon notification of an Alert, Site Area, or General Emergency the laboratory staff would test and equip the emergency vehicle for identification and measurement of gamma emitting nuclides. During an Alert the equipped emergency vehicle would remain at the laboratory until further notice. For a Site Area or General Emergency, the vehicle would be driven to the affected plant site.

The instruments were adequately maintained, calibrated and routinely checked, and repaired or replaced promptly when necessary.

Based on the above findings this portion of the licensee's program appears to be acceptable.

4.1.2 Protective Facilities

4.1.2.1 Assembly/Reassembly Areas

The plant parking lot was the assembly area for monitoring and accountability for non-essential site personnel evacuated from the plant. The Training Building was located next to the parking lot; and, the auditors felt that it was a superior assembly area since it would offer some degree of shelter and was large enough.

As discussed in Section 4.1.2.2 of this report, the medical treatment and decontamination facilities were located at the EOF about a 5-minute walk from the assembly area.

Non-essential personnel were to evacuate, following monitoring, to the junction of Route 3A and the Rocky Hill Road (about 2 miles) where they would wait further instructions. The reassembly of personnel at this intersection could interfere with site access and egress by response personnel and was too close to the site to provide adequate protection under core-melt accident conditions.

If the Emergency Director decided, based on accident conditions, non-essential personnel would be directed to an "alternate assembly area." The auditors were told by licensee personnel that an unidentified farmer's field on the outskirts of Plymouth would be used for this purpose. The auditors could not find any description of this location in the Emergency Plan and Procedures. The auditors were also informed that the unidentified farmer was unaware that his field was an assembly area.

Public recreation area evacuees were directed to the intersection of Rocky Hill Road and the recreation area access road to await a monitoring team. The entrance was located about one-half mile from the main stack. During some backshift periods there would not be any personnel on site available for rapid monitoring of these people.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Evaluate the use of the Training Building for an onsite assembly area for non-essential personnel. (293/81-15-19)

- Relocate the assembly monitoring area for the shorefront area evacuees beyond the immediate area of the plant and relocate the reassembly area for plant nonessential personnel (Route 3A and Rocky Hill Road) to an area beyond the immediate area of the plant that will not interfere with response activities or dismissal of these personnel so they can be integrated into the offsite evacuation/protective action plans. (293/81-15-20)

4.1.2.2 Medical Treatment Facilities

The auditors found that two medical facilities were maintained by the licensee for the treatment of contaminated injured personnel. The first was a well-stocked and equipped medical trailer near the Administration Building inside the protected area. The other medical trailer, which would only be used in the event of a Site or General Emergency, was located outside the protected area at the EOF.

The medical trailer at the EOF had self-contained decontamination showers that drain into a 250-gallon tank under the trailer. The licensee had made provisions for disposal of waste from this tank. The drain that was installed in the shower did not drain properly and permitted water to build up in the shower stall. In addition, this medical facility was not clean and was not sufficiently supplied. Items such as scissors, a solid radwaste can, absorbent plastic-backed paper, blankets, and soap and paper towels at the sinks were lacking. Since the medical trailer was in the EOF complex there was access to survey instruments and communications.

The auditors visited Jordan Hospital and reviewed their emergency plan and their treatment facilities for contaminated injured site personnel. Their facilities, as well as staff cooperation, were excellent.

Based on the above findings, the portion of the licensee's program appears acceptable, but the following matters should be considered for improvement:

- Clean and provide essential supplies at the medical facility at the EOF and correct the drainage problem in the decontamination showers. (293/81-15-21)

4.1.2.3 Decontamination Facilities

Provisions for decontamination included the onsite decontamination facility located within the HP Control Point, and a larger decontamination and medical treatment facility at the EOF. The Emergency Plan (Section N.7.7.2) refers to the latter decon facility as the "Emergency Decon Facility." The Emergency Coordinator and Chief Radiological Engineer indicated that the Emergency Decon Facility would only be used when site evacuation had occurred and contaminated persons could be taken from the assembly area (parking lot) or shorefront to the nearby decon trailer.

Portable decon kits were not available to expedite the decontamination process at any reassembly area. Provisions for decontamination of vehicles and equipment that may be released from the Pilgrim site during emergency conditions were not provided.

The auditors inspected the available decon facilities--examining the decon supplies as well as ability to limit the spread of radioactivity. The onsite facility provided one shower stall with two showerheads and a deep sink as the source of water. Mild soap and decontaminant agents (potassium permanganate, carbasol, etc.), as described in the recently reviewed decontamination procedure, were available. Being located within the HP Control Point, provisions for survey instruments, solid and liquid wastes and replacement clothing were easily available. The routine HP procedures, Vol. 6, were also located at the HP Control Point. They provided procedural guidance for medical treatment, personnel and equipment decontamination, and all necessary forms.

The Emergency Decon Facility appeared to be capable of successfully decontaminating many victims. The shower area could have handled two victims confined to stretchers at one time. Specially designed liquid waste tanks (i.e., 250 gallons, rustproof construction) were also installed to trap the waste water. Survey instruments were provided at the EOF for survey during decontamination.

The auditors noted that most decontamination supplies useful in removing particulate radioactivity were available, much like the stock from the onsite decon facility. However, certain other provisions at the Emergency Decontamination Facility appear to be inadequate, including the lack of waste cans other than plastic trash containers for solid wastes, absorbent paper for floor coverings to create step-off pads or to limit the spread of contaminated liquids or particulates, and sufficient replacement clothing (29 plastic suits, no shoe covers or briefs, one towel were available).

Based on the above findings, this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

- Provide supplies and equipment for decontaminating personnel at reassembly areas and for vehicles prior to their release from the Pilgrim site. (293/81-15-22)

4.1.3 Expanded Support Facilities

The licensee had not designated specific work facilities and resources available for corporate, contractor, and nonlicensee augmentation personnel.

Based on the above finding, improvements in the following area are required to achieve an acceptable program:

- Evaluate the availability of faciltiies and resources in the vicinity of the site which could be used for the administrative and logistical support by the expanded support organization (corporate, contractor, and nonlicensee personnel) in the event of a large-scale response to an emergency situation, and incorporation of such facilities into the Emergency Plan and implementing procedures. (293/81-15-23)

4.1.4 News Center

The auditors conducted interviews with the Plymouth District Public Relations Manager and visited the Information Center.

An Information Center was established at Memorial Hall in Plymouth about five miles from the Pilgrim site. Memorial Hall was also the location of the Town of Plymouth EOC.

The Information Center provides about 15 telephone lines and dedicated work space for BECO, NRC, and State press relations personnel and for the press. The gymnasium/stage area of Memorial Hall would be used for news conferences and for news media work space.

BECO had an agreement to allow access to copying facilities located about a quarter of a mile from the Information Center.

The BECO personnel stated that visual aids and handouts were not stored at the Information Center but were available from the Boston Office (30 miles from the Information Center).

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.2 Emergency Equipment

4.2.1 Assessment Equipment

4.2.1.1 Emergency Kits and Emergency Survey Instrumentation

The Pilgrim Nuclear Power Station prepositioned supplies and survey instrumentation at the Emergency Operations Facility, the Technical Support Center, and in the Health Physics Control Point. The EOF and TSC kits and supplies were for use only during emergencies. The OSC relies on the supplies available at the Health Physics Control Point. The auditors examined the kits, equipment, and supplies and determined that they were as specified in the Emergency Plan and procedures. The emergency survey and personnel monitoring teams had access to the instrumentation, equipment, and supplies at

the Health Physics Control Point. However, there were no provisions for "dedicated" supplies and the licensee did not have in place a means for inventory control for these supplies. The problems associated with the use of the HP Control Point instruments are discussed in Section 5.5.1 of this report. Specifically, the current system did not provide assurance that the required supplies and equipment will be available when needed.

The auditors found that self-reading dosimeters above the range of 0-1R were not available at the Health Physics Control Point, which is in close proximity to the Reactor Building and Turbine Building. The self-reading dosimeters above this range were kept in the Records Office on the second floor of the warehouse, which was across the street from the reactor and turbine buildings. If they were needed for a search and rescue operation, the initiation of such an operation might be delayed in obtaining this dosimetry.

The auditors verified that the inventories of the emergency kits and survey instruments were correct and that the equipment was, in general, operable.

In addition, the kit to be used by the team that will monitor personnel did not contain sufficient tags which were used to identify evacuees requiring further monitoring or decontamination.

The auditor found only 10 TLDs at the EOF dedicated for emergency operations. This quantity was insufficient for emergency operations. The auditor found three dosimeter chargers at the EOF but neither high- nor low-range self-reading dosimeters.

The auditors found that, other than in the Blue Kit and the medical trailer, no KI was on site. In addition the stores of KI, that were found, were 300 mg tablets while the recommended dose is 130 mg.

The auditors also found that, while during the backshift the HP technician may be required to respond from the HP Control Point, no emergency procedures were found at the HP Control Point.

The licensee possesses the equipment and supplies for detecting airborne iodine in the presence of noble gases. However, the procedure for in-plant radioiodine analysis requires the use of a SAM-II instrument which was located outside the security perimeter in the EOF. This location could impair rapid in-plant radioiodine analyses.

The auditors verified that the emergency radiation survey equipment carried current calibration stickers.

Based on the above finding, improvements in the following areas are required to achieve an acceptable program:

- Provide dedicated instruments and supplies needed for operations of the OSC or assure through a system of management controls that such instruments and equipment are maintained at or above established minimum inventory levels and are available and operable for emergency use. (293/81-15-24)

In addition to the above findings, the following matters should be considered for improvement:

- Provide adequate supplies in emergency kits and centers to meet the needs during an emergency to include sufficient numbers of self-reading dosimeters and TLDs for emergency response personnel and personnel responding from off site to the centers; procedures at the HP Control Point; and means of airborne radioiodine detection and measurement within the security perimeter. (293/81-15-25)

4.2.1.2 Area and Process Radiation Monitors

The Emergency Plan and procedures assigned an emergency action level (EAL) to each of the area and process radiation monitors by stating that an increase by a factor of 1000 in the reading of any area or process radiation monitor would be taken to be an indication of a significant lack of control of radioactive materials. In addition, other emergency action levels were associated with area alarms and process radiation monitors or readings, such as a high alarm on a steamline process monitor or a reading of an effluent monitor equivalent to a specified dose rate under adverse meteorological conditions. The auditors examined 14 area radiation monitors and 11 process radiation monitors in order to determine if a thousandfold increase in the monitor's reading would be within the instrument's range. That is, the auditors determined whether or not these monitors would remain onscale if their readings increase by a factor of 1000. In the case of the area radiation monitors, only 6 of the 14 monitors could endure a thousandfold increase in dose rate without exceeding their maximum range. The relationship of monitor readings to EALs is discussed further in Section 5.2.2 of this report, along with areas requiring corrective actions.

All the monitor readouts were located in the Control Room and contained up-to-date calibration stickers.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.2.1.3 Non-radiation Process Monitors

Table N.4-2 of the Emergency Plan titled "Instrumentation Available for Detection of Emergencies" contained a list of 39 nonradiation process monitors. The auditors verified that these process monitors were present and operable. The readouts of these monitors were readily observable in the Control Room. The auditors also verified that readouts of the flow rates in the main plant stack and the reactor building vent were also present in the Control Room and were observable and operable.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.2.1.4 Meteorological Instrumentation

The bases for the auditors' review of the licensee's meteorological measurements program included Regulatory Guides 1.23 and 1.97 and the criteria set forth in NUREG-0654, NUREG-0696, and NUREG-0737.

The licensee outlined the characteristics of the primary meteorological measurements system in Emergency Plan, Chapter 7. The integration of meteorological data into the licensee's dose assessment scheme was summarized in Annex B to the Plan and is implemented using Procedures 5.7.2.22 and 5.7.2.23 for the automated and manual assessment schemes, respectively. The auditors also reviewed the licensee's preventive maintenance program detailed in the procedure manual for the meteorological program (Volume 2 of the Environmental and Radiological Health and Safety Group).

The auditors determined that the licensee's meteorological capabilities addressed the requirements of NUREG-0737, III.A.2, and the criteria set forth in Appendix 2 to NUREG-0654, Rev. 1, in adopting the compensating measures to NUREG 0654, Appendix 2, Milestone 3.

The meteorological instrumentation provided the basic parameters (i.e., wind direction and speed, and an estimation of atmospheric stability) necessary to perform the dose assessment function. Data from the meteorological measurements system were recorded on strip charts immediately available in the Control Room. These data were also available from a digital system in the EOF and are intended to be similarly available from a redundant display in the Control Room. In the event the primary system (220-ft tower) information was unavailable, a backup system (160-ft tower) was available to provide multi-level wind data and ΔT. Currently, this data would be obtained by dispatching a radio-equipped individual to the 160-ft tower to provide this information. Data from the backup system were intended to be integrated into the digital data acquisition system. All systems were operable at the time of the appraisal.

The licensee maintained an extensive program of graded preventative maintenance activities. Operability checks were made on the recording systems of both the primary and backup systems on each shift. Surveillances and electronic checks were performed on a twice weekly schedule by technicians. Calibrations were performed on a quarterly schedule. This program should assure that inoperable equipment is promptly detected and restored.

The measurements program at the time of the appraisal was found to be subject to minor detector siting and exposure problems that could be corrected expeditiously. The licensee expected to complete these corrections prior to July 23, 1981. The criteria outlined in the proposed Rev. 1 to Regulatory Guide 1.23 should be considered where applicable.

The licensee had not adequately factored atmospheric transport considerations into his dose assessment scheme. The capability that was reviewed did not consider the influence of terrain effects (sea breeze and topography) on potential trajectory modification. The licensee had identified the effects as likely situations and accordingly had accommodated adjustments to plume centerline

heights and fumigation conditions, however, there had been no consideration of potential changes in plume trajectory.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Resolve detector siting and exposure deficiencies in the meteorological program consistent with the criteria set forth in Regulatory Guide 1.23 and good engineering practice. (293/81-15-26)

- Identify and incorporate techniques into the dose calculational methodology to compensate for the potential uncertainties associated with plume trajectories as a result of the influence of terrain effects. (293/81-15-27)

4.2.2 Protective Equipment

4.2.2.1 Respiratory Protection

Auditors found that only four SCBAs were dedicated for emergency use. These were located in the Logistics Trailer at the EOF. There were only 12 other SCBAs on site. Eleven of these were located in the reactor, auxiliary, and turbine buildings, with the remaining one located at the old Main Gate. These, however, were not dedicated for radiological emergency use (but for fire protection).

Respiratory equipment was maintained and decontaminated, with records kept by the Chief of the site Fire Brigade. A compressor, located on the ground floor of the Warehouse, was used for refilling SCBA air tanks. There was a capability of refilling 10 to 15 air bottles per hour with one person conducting this activity. Plans were underway to have a backup compressor in Plymouth at the local fire company for emergency use. Only seven spare filled tanks were available for use at the Warehouse for site use at the time of the appraisal.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Re-evaluate the emergency response needs for SCBA devices and provide sufficient, appropriately located SCBA equipment, including spare tanks for emergency use. (293/81-15-28)

4.2.2.2 Protective Clothing

The auditors inventoried the emergency protective clothing and determined that sufficient stores of protective clothing were dedicated for emergency use. Supplies sufficient for emergency use outside the protected area were located in the Logistics Trailer at the EOF.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.2.3 Emergency Communications Equipment

The auditors reviewed BECO Procedure 5.7.1.0, "Description of Emergency Organization and Facilities"; Emergency Plan, Section N.7.4, "Communication Systems"; and Section N.8.1.2.2.4, "Communication Drill."

The onsite and offsite communications equipment specified in the Emergency Plan and procedures was located as stated. There were specified alarms with specific meanings, for example, radiation alarms, evacuation alarms, and fire alarms. Although not all alarms and communication devices were tested, it appeared that the devices were in operable condition. Alarms were audible in high noise areas. Whenever an alarm was sounded, it was followed with a page announcement with instructions on what should be done.

There were provisions for routinely checking the operability of emergency communications devices, and equipment. The various alarms are tested every Friday in the afternoon.

There was a 24-hour per day capability to notify the NRC, state, and local authorities. There were primary and backup communication networks to cover the following communications: between the nuclear facility and the licensee's nearsite EOF; between the nuclear facility and the local emergency operation centers; between the nuclear facility and the radiological monitoring teams; and between the nuclear facility and state emergency operation center and with contiguous states, with contiguous local governments within the emergency planning zones, with federal emergency response organizations, and with NRC headquarters and NRC regional offsite emergency operation centers. Security radios at the TSC were available for use as backup to local offsite agencies field monitoring teams.

The EOF had dedicated voice communications with the TSC and the Control Room. There appeared to be a sufficient number of nondedicated voice communication links to provide access to the NRC, other federal, state and local agencies and emergency support organizations. Mobile radio communication units (walkie-talkies) had been provided for communication by field monitoring teams, however, upon using the "walkie-talkie" to relay monitoring results to the EOF, difficulty was observed. The range of the units was limited to about 2 miles and, therefore, the EOF Communicator had to request "repeats" of messages and the team searched for higher ground on which to transmit its information. There were at least two designated commercial telephones for NRC use in the EOF.

There was no ENS extension at the NRC-assigned EOF work location. There was a working HPN extension in the EOF Radiological and Environmental Assessment Trailer; however, this was not in the NRC-assigned work area either. No HPN extension was installed in the TSC. (See also Section 6.1 of this report, "Coordination With Offsite Agencies.")

The auditors reviewed the licensee's planned communications system for the OSC. The Emergency Plan (Section N.5.2.3.3) stated that the OSC would be provided with a communications system consisting of one dedicated extension to the Control Room, one dedicated extension to the TSC, with one telephone capable of reaching onsite and offsite locations. In discussions with the Chief Maintenance Engineer, the auditors were informed that no dedicated lines were available at the OSC. Upon visiting the OSC, the auditors noted that seven normal telephone lines and one pay phone were in operation. No walkie-talkies or other portable radios were provided for the OSC staff.

During the offsite monitoring team walk-through (See Section 7.2.3 of this report) the auditors found that the monitoring team kit did not contain the phone numbers of the EOF or TSC and the switchboard operator did not have the phone numbers of the emergency facilities.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Provide dedicated voice communication links between the OSC and the Control Room and between the OSC and the TSC, and provide readily available radio equipment for use by the OSC staff. (293/81-15-29)

- Provide phone numbers for the onsite emergency centers in the offsite emergency monitoring kits and to the switchboard operator. (293/81-15-30)

4.2.4 Damage Control/Corrective Action and Maintenance Equipment and Supplies

The licensee did not maintain reserves of equipment for damage control, corrective actions, and/or emergency maintenance of equipment. The licensee stated that he relied upon the availability of the routine stocks of instrumentation, equipment and supplies for use during emergencies. This aspect was not addressed in the licensee's current emergency planning effort.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Evaluate the equipment needs including SCBA devices for supporting repair and corrective action teams and the positioning of this equipment at specified locations for emergency use by the teams. (293/81-15-31)

4.2.5 Reserve Emergency Supplies and Equipment

Sufficient equipment and supplies were available for the emergency environmental monitoring program. Protective clothing, monitoring equipment, and respiratory protection equipment were found at the Health Physics Control Unit and the Control Room. The auditors found, however, that inventories of monitoring instruments were not verified routinely at the Health Physics Control Point, as discussed in Section 4.2.1.1 of this report.

The OSC was in close proximity to the Health Physics Control Point. In the event of an emergency equipment from the Health Physics Control Point would be used by the OSC staff.

In addition to the instrumentation in the kits, G-M instruments, two teletectors, and two high-range ion chambers were in the EOF. A SAM-II system was also available for radioiodine measurement at the EOF.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

4.2.6 Transportation

The auditors reviewed BECO Procedure 5.6.1, "Medical Treatment"; and Procedures 5.7.2.9, 5.7.2.10, and 5.7.2.9.11 for the "Red," "Blue," and "Green Environmental Monitoring Teams," respectively.

There were no vehicles dedicated for use in supporting the emergency response such as team transportation or relocation of the EOF. It was reported to the auditors that the Emergency Director or the Emergency Team Coordinator would assign vehicles on a priority basis, depending on the nature of the request for such vehicles. It was also reported to the auditors that keys for the vehicles are accessible to users through the Emergency Team Coordinator. Licensee staff stated that there are approximately 15 company vehicles on site during the day shift, and that these vehicles would be at the disposition of the Emergency Team Coordinator in the event of an emergency. However, during the EOF walk-through (See Section 7.2 of this report), it was necessary for the team to use a personal vehicle. As discussed in Section 7.1, two site drill/exercise critiques had also identified the lack of dedicated monitoring team transportation as a problem.

Based on the above findings, improvement in the following area is required to achieve an acceptable program:

- Evaluate the availability of vehicles, appropriate for various climatic and road conditions, equipped with appropriate radio communications for use during emergencies by monitoring teams and assure that such vehicles will be readily available for emergency use. (293/81-15-32)

5.0 PROCEDURES

5.1 General Content and Format

Procedures to implement the Emergency Plan consisted of Series 5 of the Station's Procedures and Series 23 of Nuclear Operations Support Procedures for the Recovery Organization. In most cases, the procedures specified the individual or organizational elements having the authority and responsibility for performing tasks covered by the procedure. Action levels were generally displayed in a sequential manner and procedural steps, which require other functions or jobs to be performed, contained appropriate references to the interfacing procedures where such procedures exist. Caution statements were easily discernible (boldface uppercase letters) from the instructional steps.

The auditors noted that procedure content and format were weak in the area of prerequisites and precautions. The lack of prerequisites and precautions in the area of radiation protection was most obvious. The implementing procedures did not provide guidance or address those areas where user judgment was expected or permitted. This was particularly evident in the interpretation of emergency action levels and the application of protective action guides. In addition, the procedures developed to implement the Recovery Plan were general in nature, choosing to assign the responsibilities but not containing the action statements to complete the various tasks. The specific findings detailing the inadequacies of the procedures are addressed in the subsequent paragraphs.

5.2 Emergency, Alarm and Abnormal Occurrence Procedures

5.2.1 EAL Integration with Alarm and Abnormal Occurrence Procedures

The auditors selected several emergency action levels from the Emergency Plan and procedures and determined whether these emergency action levels were identified in the appropriate alarm and abnormal occurrence procedures. The selected emergency action levels are discussed in the following paragraphs.

The first emergency action level reviewed was "Greater than 5 Ci/sec. at the air ejector for 15 minutes or more." High radioactivity at the steam jet air ejector was discussed in Abnormal Occurrence Procedure 2.4.40. The auditors did not find a step in the "Immediate Action Section" or "Followup Action Section" of the abnormal occurrence procedures which requires evaluation of the high steam jet air activity relative to Emergency Plan EALs.

The next emergency action level considered was "Loss of all offsite power coincident with loss of both emergency diesel generators." The auditors could not find an abnormal or emergency operating procedure that addressed this situation. However, Procedure 5.3.6 covers a loss of vital AC power. This procedure directed the operator to Procedure 5.7.1.1 as a followup action. Procedure 5.7.1.1 was essentially a list of all the emergency action levels found in the Emergency Plan. The operator in the Control Room would be required to read through all emergency action levels to determine the classification of

the situation. The auditors concluded that this was not an appropriate method of referencing the proper implementing instruction, in that many events contain common initial elements and it could be very time-consuming to search through the entire listing of EALs. Control Room personnel indicated, during interviews with the auditors, that they agreed with this conclusion.

Procedure 5.3.15 addressed closure of the MSIVs without a scram (ATWS situation). Procedure 5.3.15 also referred to Procedure 5.7.1.1, "To Determine if an Emergency Category Requires Implementation." The auditors concluded that this was a clear example of a procedure which should reference the procedure containing implementing instructions or contain instructions for classifying the situation since this would clearly be a "General Emergency."

Another emergency action level considered was the "Loss of All Onsite DC Power for 15 Minutes or More." The auditors determined that while separate procedures for the loss of each vital DC bus exist, no abnormal occurrence procedure addressed loss of all DC power. The auditors examined Procedure 5.3.11, "Loss of Vital DC Bus D-4." This procedure referenced Procedure 5.7.1.1. Comments regarding Procedure 5.7.1.1 are found above.

The last emergency action level that was examined by the auditors was "Earthquake that Causes Substantial Observed Process Building Damage." Earthquakes were considered in Procedure 5.2.1 which directed the control room operators either to perform an immediate surveillance of important process equipment (if no damage is immediately observed) or to respond to damage that is observed from the Control Room according to pertinent procedures. Procedure 5.2.1 also referenced Procedure 5.7.1.1. (It should be noted that Step IIIA of Procedure 5.2.1 could reference implementing instruction Procedure 5.7.1.3, "Alert," directly since this condition was nearly an exact restatement of the emergency action level for the Alert classification.) The failure of Procedure 5.2.1 to reference the proper implementing instruction or instruct the control room operator in classifying the situation was characteristic of all the abnormal occurrence procedures which the auditors examined.

The above stated deficiencies in the Abnormal Occurrence Procedures were symptoms of a lack of integration of the Emergency Plan and the Emergency Operating Procedures.

The auditors' discussions with control room personnel indicated that these personnel felt they would have problems using the current procedures to rapidly classify an event. The control room personnel pointed out that station abnormal procedures used in response to accidents did not address all the situations specified in the EALs. In addition, the licensee stated that, except for a few cases, direct classification from these procedures would be very difficult. Therefore, integration of the abnormal and alarm procedures with the EALs in the Emergency Plan would not totally solve the problem of rapid assessment. They indicated that some type of "Job Aid" (e.g., flow chart) was required for use in promptly classifying events.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following areas should be considered for improvement.

- Review each of the alarm, abnormal occurrence, and emergency operating procedures and for those which lend themselves to ready classification, incorporate initial emergency classification statements into the procedures. (293/81-15-33)

- Develop and implement a system for use by the control room staff to aid in promptly classifying events. (293/81-15-34)

5.2.2 Emergency Action Levels

The auditors reviewed the emergency action levels (EALs) in the Emergency Plan and in Procedures 5.7.1.1 through 5.7.1.5. Several deficiencies were identified in this area relative to either a failure to address a specific initiating condition in Appendix 1 of Revision 1 of NUREG-0654 or, a failure to provide specific and observable EALs (i.e., based directly on specific instrument readings) for initiating conditions that were addressed. More specifically, the auditors noted the following.

For Unusual Event:

NUREG-0654, Appendix 1 Initiating Conditions 1, 12, 13b, 14b, 14e, and 15 were not addressed;

The EALs for Initiating Conditions 5, 6, and 7 did not include specific instrument readings;

The EALs for Initiating Condition 2 (Radiological effluent technical specification limits exceeded) did not also address liquid effluents;

Exceeding the allowed rate of temperature change of the reactor coolant and abnormal fuel temperatures was not included with the EALs for Initiating Condition 4; and

The EALs for Initiating Condition No. 7 did not address loss of onsite AC power.

For Alert:

NUREG-0654, Appendix 1 Initiating Conditions 4, 9, 10, 12, 17b, 17c, 18b, 18c, 18e, 19, and 20 were not addressed;

Specific instrumentation readings were not provided for Initiating Conditions 5, 6, 7, 8, and 11; and

Initiating Condition 15 (Radioactive effluents in excess of ten times technical specifications) did not address liquid effluents, as well as airborne effluents.

The EALs proposed by the licensee for the Site Area Emergency and General Emergency classifications were reviewed by the auditors and appeared to be acceptable.

As discussed in Section 4.2.1.2 of this report the emergency action levels associated with the factor of 1000 increase in readings of the area radiation

monitors and process radiation monitors do not appear to be appropriate because only 6 of 14 monitors examined possessed sufficient dynamic range to remain onscale following a thousandfold increase in reading.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Provide EALs which address all the pertinent Initiating Conditions contained in Appendix 1 of NUREG-0654 and include specific and observable control room instrument readings for each EAL corresponding to the respective Initiating Condition. (293/81-15-35)

5.3 Implementing Instructions

The licensee had one implementing instruction for each class of emergency. These implementing instructions were Procedure 5.7.1.2, "Unusual Event"; Procedure 5.7.1.3, "Alert Class Emergency"; Procedure 5.7.1.4, "Site Emergency"; and Procedure 5.7.1.5, "General Emergency." The implementing instructions were written for use by the Watch Engineer, the Nuclear Operations Manager, and the Emergency Director. This was appropriate since these individuals would act as the Emergency Director according to the nature, severity, classification and timing of the accident. The authority and responsibilities of the Emergency Director were specified in each implementing instruction. The implementing instructions also specified which tasks were to be performed by the Emergency Director, i.e., were not to be delegated.

The implementing instructions specified appropriate emergency action levels and planned response actions. The emergency action levels, as discussed in Section 5.2.2 of this report, were not always based on observable information, readily available to the individuals responsible for emergency detection, classification, and assessment. The implementing instructions orchestrated the implementation of other, more specific, procedures which must be implemented by the Emergency Director.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

5.4 Emergency Plan Implementing Procedures

5.4.1 Notifications

The procedures discussed in Section 5.3 of this report, provided the sequence of notifications to alert, mobilize, or augment the onsite emergency organization and the supporting offsite agencies. For example, Procedure 5.7.1.2, "Alert," contained Action Step 1E requiring the Watch Engineer to designate an individual as Control Room Emergency Communicator. This Emergency Communicator was instructed to implement Procedure 5.7.2.8, "Control Room Emergency Communicator." This procedure instructed the Emergency Communicator to notify the Massachusetts State Police, the Plymouth Police, the Boston Edison Company Public Information Officer, the U.S. Coast Guard, and the Nuclear Regulatory Commission. Action Steps 1G and 1H of Procedure 5.7.1.2 required the Watch Engineer to notify the station's onsite personnel of the emergency. All non-shift personnel, subcontractor personnel,

and visitors would be instructed to evacuate the station and proceed to the plant parking area. Emergency Team members would report to the Emergency Operations Facility, the Technical Support Center, and the Operational Support Center. Further, Action Step 1J required that the public shorefront area be evacuated, and Action Step 1I instructed the Watch Engineer to request that the Security Supervisor notify and activate the remainder of the Emergency Organization according to Procedure 5.7.1.6, "Activation of Emergency Organization." Procedure 5.7.1.6 and an associated list of telephone numbers provided a delineation of the positions in the Emergency Organization, the primary and alternate staff members for each position, and their home telephone numbers. The auditors concluded that the immediate notifications that were the responsibility of the Watch Engineer have been incorporated into the implementing instructions and the emergency procedures.

The action levels for notifying the onsite emergency organization, corporate management, local services, offsite government agencies, and the general public were the same emergency action levels that were used to classify the emergencies as discussed in Section 5.2.2 of this report. The licensee had included planned messages and announcements in the relevant emergency implementing procedures. These planned messages were adequate for notifying the station personnel and visitors to the public shorefront area.

The General Emergency implementing instruction Procedure 5.7.1.5, referenced the Emergency Communicator's Procedure 5.7.2.8. This procedure instructed the Emergency Director to advise the Massachusetts State Police that a General Emergency had been declared at Pilgrim Station and that protective action for the general public was recommended. However, the same procedure advises the Plymouth Police that a General Emergency had been declared at Pilgrim Station but NO protective action for the general public was recommended. In addition, the procedures did not specify which protective actions were recommended.

The Pilgrim Station staff informed the auditors that an authentication scheme exists and would be used in the event of an emergency.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Revise the offsite notification procedures to specify protective action recommendations in the notification messages, and reconcile contradictory messages. (293/81-15-36)

5.4.2 Assessment Actions

The Pilgrim Nuclear Power Station did not have one overall procedure which orchestrates the implementation or the accident assessment scheme. Procedure 5.7.2.2, "Radiation Emergency Team Coordinator" (RETC) listed the responsibilities, duties, and actions that would be taken by the RETC.

There were no provisions for use in assessment of neither the containment source term based on a containment monitor readings nor post-accident sampling

results. The licensee had not made provisions for alternate means of assessing effluents in the event installed Control Room instrumentation was offscale or inoperable.

There were no provisions for trend analyses of assessment data. There were no provisions to assure continuous update of assessment information to offsite agencies responsible for implementing assessment and protective actions, in behalf of the general population. The fact that the majority of the communications equipment was not located in the EOF Environmental Assessment Trailer may make continuous updates difficult.

Offsite protective actions to be recommended were determined by use of Procedure 5.7.2.18, "Offsite Dose Projections and Protective Action Guides for the General Public." Protective actions were determined solely based on projected doses as they related to the EPA PAGs. These recommendations were also limited to a downwind direction and did not consider nearby populations around the plant. There were no provisions for recommending protective actions based on plant or core/containment conditions or consideration of evacuation times, special populations or other factors that would impact on the choice of the most effective protective actions. Discussion with licensee personnel indicated that the procedures were to be changed to recommend shelter out to 5 miles in the case of a General Emergency and await a decision by the offsite officials on further actions.

A simple default of shelter to 5 miles is unacceptable since for core-melt conditions evacuation of the first few miles around the plant with shelter for the remainder of the plume EPZ should be recommended.

In addition, as discussed in Section E of the EPER and confirmed by auditor discussions with offsite officials, the current system for recommending protective actions through State officials does not demonstrate that protective action decisions can be made promptly (15 minutes) by the responsible authorities (local) for a range of conditions as required by 10 CFR 50, Appendix E. Procedure 5.7.2.18, "Offsite Dose Projections and Protective Action Guides for the General Public," discussed four basic actions: initial dose projections, whole-body dose projections, thyroid dose projections, and protective action recommendations for the general public based on radiological releases.

The procedure directed the environmental assessment personnel to perform initial dose projections using the Environmental Dose Assessment System (EDAS) until environmental survey data are available. The environmental assessment personnel consisted of the Environmental Assessment Engineer and assistants. These personnel were located in the Emergency Operations Facility during an emergency. There are three methods of estimating offsite doses. These consisted of the EDAS implemented on the NOVA and HP-85 computers and nomograms. These are discussed below.

Environmental assessment personnel were instructed to use one of the dose assessment computers or the set of nomograms to project radiation doses in the downwind 22½ degree sector for various distances from the plant. The assessment personnel were instructed to select specific locations for environmental monitoring teams based upon the dose projections and to recommend these locations to the Radiological Environmental Team Coordinator (RETC). The procedure

did not provide guidance for environmental assessment personnel concerning methods for choosing the specific locations where the environmental monitoring teams would perform their measurements (e.g., how to locate plume centerline), nor did the procedure discuss the uncertainties that are associated with measuring wind direction, and in predicting wind direction at points away from the meteorological measurements tower.

Procedure 5.7.2.18 also contained directions for projecting whole-body doses based upon the results of environmental monitoring team data. The environmental assessment personnel were directed to obtain general area dose rates from the monitoring teams and estimated durations of the release. The procedure did not indicate where or how the environmental assessment personnel would obtain estimated durations of release. The procedure noted that wind persistence data had been included as attachment D of the procedure, but there were no directions or guidance for the use of this data. (The use of wind persistence data for dose projection was considered by the auditors to be a well-founded technique.) The procedure did not consider the transport time between the time of release and the time of measurement in the environment must be considered in the analysis. That is, the environmental dose rate can only be correlated with the release if sufficient time has elapsed for the release material to arrive at the point of measurement. The procedure indicated that if the dose rate (sic) exceeds 100 millirems at the site boundary, the RETC should dispatch an environmental monitoring team to survey beyond the plant boundary in the same direction.

This procedure contained directions for performing thyroid dose projections based upon environmental monitoring data. The specific instructions parallel the instructions for whole-body dose that were discussed above. The auditors noted that both sets of instructions emphasized monitoring at varying distances from the plant, but there was no suggestion that the monitoring team should traverse an arc through the affected sector or sectors in order to verify that they are measuring the highest offsite doses or dose rates. (In fact this methodology appears to have been implemented as discussed in Section 7.2.4 but was not incorporated in procedures.)

Emergency Dose Assessment System (EDAS-NOVA Computer)

Procedure 5.7.2.22, "Use of the Emergency Dose Assessment System (EDAS)," described a dose assessment system using a NOVA minicomputer. This system had been designed to perform rapid environmental dose calculations based upon predetermined release conditions and actual meteorological data. The system was being installed at the EOF at the time of the appraisal and was not yet fully operational. The dose assessment methodology appeared to be based on accepted models and techniques for projecting doses and dose rates.

Emergency Dose Assessment System (EDAS HP-85A)

Procedure 5.7.2.25, "Use of the HP-85A Offsite Dose Calculator," described the use of the HP-85A calculator for estimating the release rates of halogens and noble gases and the resulting offsite dose rates and projected doses. The procedure contained detailed instructions for operating the computer and the computer program which calculates radiological doses. The auditors observed that the computer program on the HP-85A provides comprehensive information on

radiological doses, yet the operation of the computer system was relatively simple. This simplicity of operation allowed the environmental assessment personnel to perform rapid environmental dose calculations. This dose assessment system was successfully demonstrated by several licensee personnel.

Use of Offsite Dose Rate Nomograms

Procedure 5.7.2.23, "Use of Offsite Dose Rate Nomograms," described the use of the radioactive effluent monitor nomograms. These nomograms allowed the estimation of the release rates of halogens and noble gases and the resulting offsite dose rates to the whole-body and the thyroid. These nomograms had been prepared as a means of estimating offsite dose rates as a backup to the EDAS computer systems. The nomograms were used for releases from the main stack, the reactor building vent, or the turbine building. The nomograms were capable of incorporating inputs from either routine or high level effluent monitors. The procedure contained a comprehensive compilation of data needed for complete dose calculations. The auditors tested the procedures and found the procedure to be adequate. The auditors verified that an adequate supply of nomograms were available in the EOF.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Expand the assessment scheme to include post-accident sample results and provisions to project offsite dose rates or doses if effluent monitors are offscale or inoperable. (293/81-15-37)

- Provide recommended protective actions based on actual and projected core/containment conditions and offsite factors which may impact on the effectiveness of the recommendations and consider the near site population. (293/81-15-38)

In addition to the above findings, the following matters should be considered for improvement:

- Revise the dose projection procedures to include the uncertainties associated with wind direction; estimation of release durations; impact of transport time and plume centerline location; and trend analyses of assessment data. (293/81-15-39)

5.4.2.1 Offsite Radiological Surveys

The methods and equipment to be used to perform emergency offsite radiological surveys were specified in procedures. The procedures were written as directions to the persons performing the actual survey. The survey team kits contained road maps which show prepositioned survey points. The RETC would direct teams to the desired monitoring points by providing the team leader with given distances and directions from known landmarks or road intersections.

The procedure contained environmental survey data sheets which provided a means for team members to record the date and time of each survey, the location of each survey, the names of the individuals who performed the

survey, the instruments used, the air sampler flow rates, background radiation levels, and the sample count (analysis) times.

The procedure requires that the monitors label each sample with the sample location and the collection time in minutes. In addition the date and time of the sample collection should be noted.

The primary method of communication between the field monitoring teams and the EOF was via a portable hand-held radio. During a walk-through (See Section 7.2.4 of this report) it was observed that messages received from field monitoring teams were not repeated and as a result errors were not identified. As discussed in Section 4.2.3 of this report, these radios appear to have limited capability to perform their intended function. Commercial telephones would be used as a backup means of communication.

Specific written provisions for the ground transportion of the monitoring teams were not evident, as discussed in Section 4.2.6. The U.S. Coast Guard was to provide transportation for the airborne and marine teams, however, there was a problem concerning the airborne support. (This is discussed in Section 6.1 of this report.)

Based on the above findings this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

- Provide labels for each sample that include all the information necessary for subsequent analysis and use of results. (293/81-15-40)

- Revise the communication procedures to ensure correct transmission. (293/81-15-41)

5.4.2.2 Onsite (Out-of-Plant) Radiological Surveys

The auditors found that neither procedures nor Plan address conducting surveys within the security area. The environmental monitoring teams from the EOF could be used for this purpose but this would require passage through security. The on-shift HP technician could perform this function, however, as discussed in Section 4.2.1.1 of this report, there were no radioiodine measurement systems within the security area. In addition, the detailed site maps and other aids required to perform onsite radiolgical surveys were not provided.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Incorporate onsite monitoring capability into the Emergency Plan and procedures to include the required survey maps, instrumentation, and assignment of personnel. (293/81-15-42)

5.4.2.3 In-Plant Radiological Surveys

As discussed in Section 5.4.3.5 of this report, the general Procedure 5.7.2.16, "Re-Entry," specified that HP support be provided to search, rescue, or repair and corrective action teams that would enter plant radiation areas. The HP personnel to perform this function would be provided from the OSC staff.

However, there were no procedures developed for conducting in-plant surveys.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Incorporate in-plant survey capability into the Emergency Plan and procedures to include the necessary survey forms, high radiation precautions, protective equipment, instruments, and assignment of personnel. (293/81-15-43).

5.4.2.4 Post-accident Primary Coolant Sampling

5.4.2.5 Post-accident Primary Coolant Analysis

5.4.2.6 Post-accident Containment Air Sampling

5.4.2.7 Post-accident Containment Air Sample Analysis

5.4.2.8 Post-accident Gaseous and Particulate Effluent Sampling

5.4.2.9 Post-accident Gaseous and Particulate Effluent Sample Analysis

The appraisal team did not examine the areas associated with Sections 5.4.2.4, 5.4.2.5, 5.4.2.6, 5.4.2.7, 5.4.2.8, and 5.4.2.9. These areas were reviewed during a separate onsite inspection conducted on June 21-26, 1981. See Inspection Report 50-293/81-14.

5.4.2.10 Liquid Effluent Sampling

The auditors held discussions with the Senior Chemical Engineer to evaluate the licensee's provisions for performing liquid effluent sampling and analysis. The licensee representative stated that no consideration was given to developing special sampling procedures, because all generated liquid wastes would be stored and would not be released. (See Section 4.1.1.8 of this report.)

However, the auditors noted that special precautions for HP surveying teams entering the Rad Waste Building would be applicable during emergency situations where large volumes of high activity liquid wastes were being stored. No emergency procedure was provided by the licensee if the discharge tanks had to be sampled or for sampling and analysis of these wastes prior to subsequent treatment and release.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- See item 293/81-15-18 of Section 4.1.1.8 of this report.

5.4.2.11 Liquid Effluent Sample Analysis

The auditors reviewed available procedures and held discussions with the Senior Chemical Engineer to evaluate the licensee's provisions for performing liquid effluent sample analysis under emergency conditions. The auditors noted that no special procedures were developed for emergency conditions,

since the licensee had intended to store accident-generated liquid wastes. (See Section 4.1.1.8 of this report.)

However, in the event that the liquid waste had to be sampled (leak of isolation discharge valve, preparation for treatment and discharge, etc.), the routine procedure could not be utilized for an analytical method. The Procedure 7.3.13, "Liquid Waste Discharge - Activity Determination," Rev. 7, did not address analytical procedures for high activity samples, dilution techniques, and precautions and cautions for laboratory personnel working with high level samples. Additionally, the results of the analyses would not be channelled into dose-assessment systems. (See Section 5.4.2 of this report.)

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- See item 293/81-15-18 of Section 4.1.1.8 of this report.

5.4.2.12 Radiological and Environmental Monitoring Program

The auditor reviewed the BECO "Radiological Environmental Monitoring Program (REMP) Procedures Manual," Volume 1, and "Meteorological Data Acquisition Program (MEDAP) Procedures Manual," Volume 2. These manuals had been prepared by the Environmental and Radiological Health and Safety Group at corporate headquarters.

There were provisions for REMP program to be implemented during emergencies, including the assignment of duties for collection and evaluation of data relative to environmental TLDs, soil samples, water samples, etc. The licensee appeared to have a management-coordinated structure for emergency environmental monitoring. The licensee also appeared capable of conducting an emergency program with appropriate instrumentation and equipment, and would be able to obtain additional laboratory analytical support from such groups as the Yankee Environmental Laboratory. (See Section 4.1.9 of this report.)

Based on the above findings, this portion of the licensee's program appears to be acceptable.

5.4.3 Protective Actions

5.4.3.1 Radiation Protection During Emergencies

The auditors reviewed BECO Procedure 5.7.2.15, "Exposure Control Program for Emergency Conditions," Procedure 5.7.2.16, "Re-entry," and the Emergency Plan.

It was noted that the Emergency Plan did not reference the routine radiation protection procedures used during an emergency. It was reported to the auditors that this decision was made for administrative purposes. During emergencies, the emergency procedures provide for control of personnel dosimetry, exposure records, positive access controls, instruction to emergency workers, and briefing of monitoring teams or persons and agencies augmenting the onsite emergency organization. They also included dose assessment activities and provisions for preventing the re-exposure of individuals or limiting their future exposures. In addition, special controls were implemented for the various emergency conditions.

Procedure 5.7.2.15 was used for structuring the emergency radiation protection program based on the consideration of various factors, such as changing radiation doses and plant conditions. In addition, the procedures described how the health physics functions will be performed and assigned priority to various activities during emergency situations.

Based on the above findings, this portion of the licensee's program appears acceptable.

5.4.3.2 Evacuation of Owner-controlled Areas

Provisions for the evacuation of owner-controlled areas were described in Procedure 5.7.2.17, "Evacuation of Onsite Areas and Emergency Response Center." This procedure in conjunction with the judgment of the Emergency Director and the emergency classification specified in Procedure 5.7.1.1, "Emergency Categories and Associated Emergency Action Levels," comprised the evacuation action levels.

A Site or General Emergency would result in the evacuation of non-essential personnel from the protected area to the plant parking lot. Procedure 5.7.2.17 established evacuation levels for the primary emergency response centers (i.e., TSC, OSC, and EOF).

The auditors found that an audible signal and announcements would be made over the plant public address system in the event of a Site or General Emergency. The auditors also found that primary and secondary evacuation routes were well marked in the Reactor, Auxiliary, and Turbine Buildings. Evacuation routes outside the buildings in the protected area were not marked since there was only one access point to the protected area, through the main guard station.

Procedure 5.7.2.17 stated that if it was necessary to evacuate persons assembled in the plant parking lot, they would reassemble upwind, east or west on the Rocky Hill Road or out on the access road. If evacuation of these areas were necessary, no reassembly area outside the EPZ was identified.

Provisions should be made to reassemble at areas to be used by local populations (i.e., provisions to link up with state and local evacuation plans). (See Section 4.1.2.1.)

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matter should be considered for improvement:

- See items 293/81-15-19 and 20 of Section 4.1.2.1 of this report.

5.4.3.3 Personnel Accountability

Procedures governing personnel accountability were in Nuclear Operations Department, Procedure 303, "Security Radiological Emergency"; Procedure 5.7.2.7, "Emergency Security Coordinator"; Procedure 5.7.2.3, "Technical Support Center Supervisor"; and Procedure 5.7.2.4, "Operations Support Center Supervisor."

These procedures specified that a computerized key card system would be used to control access and pinpoint the last location accessed by specific individuals. During an emergency situation, all personnel could be accounted for using this system. In addition, access to specific areas within controlled areas, such as the Control Room, is restricted. The shorefront area was to be checked by security to ensure all the public had evacuated following an evacuation order.

All individuals entering the protected area without a badge would be escorted by a security officer. Records of entries and exits are maintained in the main guard house. The auditor found that, in addition to the computerized key card system, all badges were accounted for manually and compared against the hard copy computer printout. If during an emergency situation the badges could not be collected at the main guard house due to radiological conditions, they would be collected at the exit to the plant parking lot and/or at the reassembly areas.

Procedure 5.7.2.4, "Operations Support Center Supervisor," specified that the OSC Supervisor shall be responsible for the accountability of personnel assembled at the OSC. Procedure 5.7.2.3, "Technical Support Center Supervisor," specified that the TSC Supervisor shall be responsible for the accountability of personnel assembled at the TSC.

The auditors found that during observation of a drill conducted during the appraisal, complete personnel accountability had been accomplished in less than 45 minutes.

Individuals whose whereabouts were unknown after this time period would be considered unaccounted for and depending upon the situation, a search would be initiated.

Based on the above findings, this portion of the licensee's program appears acceptable, however, the following matter should be considered for improvement:

- Provide further drills/training to reduce the time to accomplish accountability. (293/81-15-44)

5.4.3.4 Personnel Monitoring and Decontamination

The auditors reviewed the following procedures to verify that the licensee had established provisions for monitoring and decontaminating individuals and equipment leaving restricted areas and at assembly/reassembly areas.

Emergency Procedure 5.7.2.12, Yellow Personnel Monitoring Team, Rev. 0

Emergency Procedure 5.7.2.13, Brown Personnel Monitoring Team, Rev. 0

Routine Procedure 6.2.162, "Personnel Decontamination, Rev. 0

Routine Procedure 6.5.110, Contamination Survey Technique, Rev. 1

The licensee informed the auditors that Procedure 6.2.162 was a new procedure developed to separate medical steps from decontamination steps, but that it had not yet been through the complete review and approval process.

Procedures for monitoring personnel leaving restricted areas were the routine monitoring procedures in effect day to day. If contamination was site-wide, personnel in the assembly areas or shorefront (area outside the protected area but on publicly accessible owner-controlled property) would be monitored by the Yellow or Brown Monitoring Teams. The auditors noted that there were no procedural provisions for monitoring or decontaminating personnel at reassembly areas or vehicles leaving the site.

The emergency monitoring and decontamination procedures provided a means to record names of contaminated individuals, survey results, sketches to facilitate descriptions of the body areas(s) affected and a place to record the results of any decontamination efforts.

The auditors noted that a contamination action level will not be specified by the RETC until he was informed of the background. The contamination action levels would be a function of the background and instrument. The teams were prompted to report changing background conditions to the RETC and to receive further instructions. The procedure provided instructions to separate contaminated and noncontaminated personnel, but as noted, the team would have to call RETC for instructions concerning decontamination.

Procedure 6.2.162 did not specify levels above which further assessment, such as whole body counting and bioassay, were required. In addition, there was no procedure that addressed decontamination of a large group of contaminated persons. The Chief Radiological Engineer stated that instructions would be given at the time of the incident.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Develop monitoring and decontamination procedures that include decontamination action levels as a function of background and instruments; action levels for further assessment; monitoring large groups of potentially contaminated persons; and include the reassembly area (293/81-15-45).

5.4.3.5 Onsite First Aid/Search and Rescue

Procedures for onsite first aid/search and rescue were specified in Procedure 5.7.2.16, "Re-Entry." The procedure specified that the Emergency Director shall determine the necessity and feasibility of sending a search and rescue team into a high radiation/dangerous area.

The procedure provided guidance for search and rescue and specified the maximum dose that an individual may accumulate in the performance of these activities. It also specified the responsibilities of the Radiation Emergency Team Coordinator and outlined the qualifications for the search and rescue team members.

Contaminated injured personnel on site would be decontaminated at the Health Physics Control Point prior to removal to the Medical Trailer at the EOF. Severely injured patients would be moved immediately to the Medical Trailer or Jordan Hospital where they would be treated and decontaminated. If injuries were severe, doctors from Jordan Hospital, who were trained in radiological health, could also travel to the site and administer to the patient there.

A Physician's Assistant was on duty on site for 8 hours a day, 5 days a week. An HP Technician or the Watch Engineer provided backup first-aid support when the Physician's Assistant was not on duty.

The licensee's medical treatment procedures were contained in Procedure 5.6.1. This procedure did not specify the location of first aid supplies. In addition, the procedures did not specify what instruments, equipment, precautions, and dosimetry would be used for handling contaminated injured personnel. In addition, auditors found that no one on site, including the HP Technicians, had been trained and/or drilled to perform search and rescue operation in high radiation fields. (See Section 3.2 of this report.)

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Include the first-aid supplies, instruments, equipment, precautions, and dosimetry used for handling and treating contaminated injured personnel in the medical procedures. (293/81-15-46)

5.4.4 Security During Emergencies

Security measures to be used during emergencies were addressed in Procedure 5.7.2.7, "Emergency Security Coordinator," and Nuclear Operations Department, Security Procedure 303, "Security Radiological Emergency." Actions and duties during personnel accountability and evacuation were clearly described in these procedures. In addition, specific compensatory security measures in the event that the main guard house had to be evacuated, were considered.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

5.4.5 Repair and Corrective Action

Discussions with licensee personnel indicated that no procedures were developed governing the concept of operation of repair and corrective action teams. The Chief Maintenance Engineer, who would probably function as the OSC Supervisor during an emergency situation, stated that the routine maintenance procedures (Volume 3M) used with an HP technician's guidance would be used for the repair and corrective action team.

Several technicians stated that after surveying the area and briefing the workers they would leave the area until the job was complete. Since radiation levels are not constant during an emergency situation, the area would have to be monitored for the duration of the corrective action.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Develop procedures for use during emergencies which describe the concept of operations of the emergency repair and corrective action teams, including reporting chains and precautions appropriate for the situation. (293/81-15-47)

5.4.6 Recovery

The auditors reviewed the Emergency Plan and Recovery Procedure (Series 237 of the Nuclear Operations Support Procedures).

The Emergency Plan, Section N.9, "Recovery," indicated that the decision to change the emergency class and enter the recovery phase would be the joint responsibility of the Emergency Director and the Recovery Manager. The auditors noted that the Nuclear Operations Support Procedures, which would be used by the BECO Recovery Organization, stated that the Emergency Director would inform the Recovery Manager when the decision was reached to enter the recovery phase.

Generic criteria were provided in the Emergency Plan to indicate when the recovery phase would begin, however, the specific assignment of authority and responsibility for declaring the start of the recovery phase was not provided.

The Recovery Management Organization provided emergency response assistance to the station for accident assessment, logistical support, and public media support, besides nuclear operations technical support.

The auditors noted that most notifications to federal and local agencies would be the responsibility of the Emergency Director; however, the Recovery Organization would also be required to make various communications, both on site and at the corporate office.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Clarify in the recovery procedures and Emergency Plan, the organizational authority responsible for the decision to enter the recovery phase. (293/81-15-48)

5.4.7 Public Information

The auditors reviewed the Nuclear Operations Support Procedures for the Director of Public Information, Procedure 23.07; the Public Information Executive, Procedure 23.08; the Manager of the Information Center, Procedure 23.09; the District Manager, Plymouth, Procedure 23.10; the Assistant District Manager, Plymouth, Procedure 23.11; the Public Information Officer on-call, Procedure 23.12; and the Public Affairs Director, Procedure 23.13. The auditors also interviewed the District Public Relations Manager.

The Director of Public Information would be the Senior Vice President of Corporate Relations located at the BECO, Prudential Control Center, Boston. In the event of an emergency he would report to the EOF. He would be

responsible for obtaining direct information on the accident and would be the BECO spokesperson at the site. All press releases would be cleared by the Director of Public Information.

The Manager of the Information Center in Plymouth would be the Public Information Department Head and be the spokesperson at the Information Center. He would direct the Information Center and coordinate communications activities with the federal, state, and local public information staffs at the Information Center. Information for release would be coordinated with the Director of Public Information prior to release.

The on-call Public Information Officer would be notified by the Control Room when there was an emergency and would be responsible for activation of the public information organization and manning the Plymouth Information Center within ninety minutes.

The Public Information Office in Boston would answer phone inquiries from the public, and would interface with the Director of Public Information to obtain information and to address rumors.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

5.5 Supplementary Procedures

5.5.1 Inventory, Operational Check and Calibration of Emergency Equipment, Facilities, and Supplies

Procedure 5.8.2, "Emergency Facilities and Equipment Audits," provided a specific listing of all equipment reserved for use during emergencies and specified the location of the equipment.

The frequency at which emergency equipment was inventoried and/or calibrated was quarterly, while operability checks were conducted monthly. Procedure 5.8.2 provided audit sheets, in table-format, listing the specific emergency equipment model and type according to location.

The responsibility for the performance of the emergency equipment readiness checks was assigned to a multi-group staff (i.e., Health Physics, Medical, and Security). All reports were submitted to the Site Emergency Coordinator, who noted the deficiencies and coordinated with the various groups to correct any problems. The licensee representative stated that both the TSC and EOF were rigged with "intrusion alarms" to ensure facility readiness.

The auditors observed the calibration and operability checks conducted by the Health Physics Group. The calibration and operability checks were performed following Series 6 Station Procedures.

As discussed previously, the OSC staff was to obtain its instrumentation and protective equipment from the HP Control Point, however, licensee personnel stated that there was little inventory control of the instruments at the HP Control Point. (See also Section 7.2 - Medical and Decontamination Walk-Through.) This item was addressed in Section 4.2.1.1 of this report.

During a walk-through (See Section 7.2.4 of this report.), the auditors observed that there was no gasoline available for a generator used by offsite monitoring teams because gasoline was not part of the audit/inventory procedure.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matter should be considered for improvement:

- Include the generator gasoline supply in the inventory procedures. (293/81-15-49)

5.5.2 Drills and Exercises

The auditors reviewed Emergency Plan Section N.8.1.2.1, and Procedure 5.8.1, "Drills and Exercises."

The Emergency Preparedness Coordinator was assigned responsibility for coordination with offsite agencies, ensuring drills and exercises conform to regulations, and ensuring that any improvements or modifications recommended following an exercise or drill were duly considered and implemented.

A Drill Coordinator would be assigned responsibility for planning and execution of the drills and exercises. This would include conducting post-exercise or post-drill critiques with participants and preparation of written reports containing conclusions and recommendations. These reports would be submitted to the Nuclear Operations Manager for review. The Drill Coordinator would prepare a drill or exercise plan that includes simulated events, date, time period, place, participating organizations, and restrictions.

The exercise/drill observers would prepare observer evaluation forms and submit them to the Drill Coordinator.

A Senior Radiation Protection Engineer stated that actual occurrences were treated as drills for the purpose of problem identification and that a critique of plant response to a recent Unusual Event was in preparation, however, this was not reviewed by the auditors.

The procedures did not specifically provide for backshift drills or exercises, however, the Emergency Plan did specify that backshift exercises would be conducted every 6 years. The licensee had conducted a backshift drill within the last few months.

The following drills were provided for and described by Procedure 5.8.1.

° Communications

Monthly (Plume EPZ governments, Control Room, TSC, and EOF)

Quarterly (Federal response agencies and ingestion pathway states)

Annually (State and local response centers and field teams)

- Annual (Medical Drills)

- Annual (Radiological Monitoring)

- Semiannual (Health Physics)

The Emergency Plan did not provide for all of the above listed drills.

The procedure stated that an annual exercise would be conducted but did not describe the scope. The procedure stated that the Drill Coordinator was responsible for notification of offsite officials and the NRC Region I principal inspector of upcoming exercises. However, the procedure did not provide for submitting the annual exercise objectives and scenario to NRC on a schedule to allow for comments and recommendations on the exercise.

Based on the above findings, this portion of the licensee's program appears acceptable, but the following matter should be considered for improvement:

- Revise Procedure 5.8.1, "Drills and Exercises," to define the scope of the annual exercise, to provide for backshift drills, and to provide for submitting annual exercise objectives and scenario to the NRC on a schedule which would permit timely comments and incorporation of recommendations into the exercise. (293/81-15-50)

5.5.3 Review, Revision, and Distribution

The auditors interviewed the working level corporate person responsible for distribution of the Recovery Plan, and reviewed the procedures discussed below.

Procedure 5.7.1.6, "Activation of the Emergency Organization," states that the PNPS Emergency Notification List would be updated quarterly. The notification list was reviewed by the auditors and several of the phone numbers were called. The list appeared to be up-to-date.

Procedure 1.3.4, "Procedures," stated, "procedures governing Emergency Plans and implementation thereof were reviewed annually by an individual knowledgeable in the affected area. This review was to be perfomed under the cognizance of the ORC." The auditors found that Procedure 5.7.2.22, "Use of the Emergency Dose Assessment," did not correspond to the computer code in use during the appraisal. The code had been modified but the procedure had not, indicating that there were not adequate controls to ensure, that at least in this case, procedures were revised in advance of changes in the methods of operation.

The Recovery Organization Procedures (Nuclear Operation Support Procedures, Series 23) were maintained in accordance with Nuclear Operation Support Procedure 2.01, "Preparation, Issuance and Control of Department Procedures." Procedure 2.01 assigned responsibility for distribution and control of corporate procedures, but did not address annual review of these procedures or their interface with onsite emergency procedures. A review of the distribution list for the Recovery Organization Procedures showed that the distribution was appropriate.

Procedure 5.8.2, "Emergency Facilities and Equipment Audits," ensured that copies of the appropriate procedures were in the EOF, TSC, and emergency kits, however, this procedure did not cover the Information Center or the Alternate EOF.

The 23.00 Series Nuclear Operation Support Procedures were reviewed and signed off in accordance with the corporate procedure.

The Emergency Plan and implementing procedures were reviewed and distributed in accordance with Procedure 1.3.8. Control copies of these documents were distributed to specified individuals on site and to appropriate state and local offsite agencies, such as the Town of Plymouth Fire Department and the Rhode Island Defense Civil Preparedness Agency.

The auditors found up-to-date copies of the procedures in the Control Room, EOF, and kits.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Provide distribution and control of procedures at the alternate EOF and Information Center; provide annual review of the Series 23 Nuclear Operations Support Procedures; and ensure that changes in equipment, facilities, or method of operation are not implemented until the procedures have been revised, reviewed, approved, and distributed. (293/81-15-51)

5.5.4 Audits

Audits were performed by QA personnel.

Section 18 of the BECO QA Manual, "Audits," provided for semiannual audits of the Emergency Plan and procedures relating to plant operations. It was not clear that the Recovery Organization Procedures would be audited. A review of last year's audit report showed that personnel were interviewed and equipment checked. The audit also included interviews with offsite officials, such as Plymouth Fire Department and Police Department. The audit did not include observation of drills or exercises.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Provide routine audits of the Recovery Organization Plan, procedures and their implementation, and the observation of drills and exercises. (293/81-15-52)

6.0 COORDINATION WITH OFFSITE GROUPS

6.1 Offsite Agencies

The auditors conducted interviews with Plymouth Civil Defense, Police and Fire officials, Coast Guard officials, and Duxbury Police and Fire officials. As was discussed in Section 3.2 of this report, town fire and police personnel had not received site specific training.

The town officials had received copies of the Emergency Plan and procedures, however, they stated that these documents were too voluminous to be useful. They requested that the licensee provide them with a document that outlined only their roles, points of contact, etc.

Licensee staff indicated that the letters of agreement were being updated and discussions by the auditors with offsite agencies indicated that the contacted agencies were aware of their roles and except for the Coast Guard would respond in accordance with the current agreements.

Coast Guard officials indicated that since it may be impossible to provide their aircraft crews with respiratory protection, the crews would be reluctant to track the plume with a monitoring team as specified in a current letter of agreement. They indicated that they were in the process of informing the licensee of this fact. In addition, the Coast Guard had made a oral request to the licensee several months ago to provide protective clothing, respiratory protection, and dosimetry to the cutter crew at the time the cutter picked up the marine monitoring team. However, to date no provisions had been made by the licensee to provide this support.

Discussions with licensee staff and NRC Region 1 personnel indicated that the licensee had not contacted the NRC to coordinate the emergency response of the two organizations. Further, as discussed in Section 4.2.3 of this report, the location of the NRC ENS and HPN dedicated telephone handsets had not been coordinated with NRC Region I response personnel to ensure optimum utility.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

- Develop coordination between the PNPS site and the NRC to assure appropriate interface of the respective emergency organizations during an emergency. (293/81-15-53)

In addition to the above findings the following matters should be considered for improvement:

- Develop agreements with offsite agencies to assure the availability of appropriate equipment and supplies such that these support agencies are equipped to fulfill their requested support roles; maintain current letters of agreement; and provide a summary document to offsite officials that describes their respective roles, points of contact, etc. (293/81-15-54)

6.2 General Public

The auditors interviewed the BECO District Public Relations representative and the BECO Corporate Emergency Planning Coordinator. The licensee personnel stated that the Massachusetts Department of Public Health with the assistance of BECO mailed out late in 1980 the pamphlet, "Nuclear Emergency Questions and Answers," to the people within 10 miles of the site.

This document contained general information on nuclear power plants, accident risks, radiation and radiation units, and the general actions to be taken if shelter or evacuation were directed. It also provided contact points for further information.

The document did not discuss why it would be important to take the protective actions recommended, the relationship of the consequences of the accidents to the protective actions recommended, nor improvised means of repiratory protection. The document did not provide site-specific information on evacuation routes or radio/TV stations that would provide additional information. In addition, the document was not in a form that would likely be available in the event of an emergency (e.g., phonebook).

The auditors also noted that no emergency information was posted at the beaches or provided in other public places in the plume EPZ.

The licensee personnel interviewed stated that posting and distribution of public emergency information was the responsibility of the Commonwealth. They also stated that the Commonwealth was going to publish an additional document late in 1981 that addresses site-specific public emergency response. In addition, they stated that since the public warning system, as proposed, will include public announcement capabilities on the beach, posting of emergency information in public areas was not necessary. Discussion with local civil defense officials indicated that they felt that information should be posted. The public warning system and information system will not be installed until April 14, 1982 according to a January 7, 1982 licensee submittal (See the Emergency Preparedness Evaluation Report.)

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

- Provide dissemination and posting of site-specific emergency response information to the public, including all segments of the plume EPZ transient population (beach, motel, etc.) in a form that is likely to be available in the event of an emergency, and which includes a discussion of the relationship of accidents to protective actions and improvised methods for obtaining respiratory protection. (293/81-15-55)

6.3 News Media

The auditors conducted an interview with the BECO District Public Relations representative and other public relations personnel and reviewed the handout material to be used as part of the press emergency preparedness familiarization program.

The licensee personnel stated that a program to familiarize the press was scheduled for August 6, 1981, and that 161 media personnel from the area of the plant were to be invited.

The press familarization was to discuss contacts for further information and general information on the power plant and radiation.

The handout material did not include any information on protective actions or the reasons why specific protective actions would be recommended. The BECO personnel stated that this would be included in the presentation.

The annual press familiarization was not covered by any BECO procedure.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following item should be considered for improvement.

- Provide a procedure for the annual press familiarization program and include provisions for discussion of protective actions that may be recommended during an emergency and the bases for these recommendations. (293/81-15-56)

7.0 DRILLS, EXERCISES AND WALK-THROUGHS

7.1 Program Implementation

The auditors reviewed the drill reports for the semi-annual health physics drill conducted on the June 3, 1981 backshift, the semiannual health physics drill conducted on May 20, 1981, and the 1980 Radiation Emergency Exercise conducted on December 22, 1980. The auditors also interviewed the Corporate Emergency Planning Coordinator, a drill coordinator and some of the drill observers.

The drills appear to have been conducted in accordance with Procedure 5.8.1, "Emergency Drills and Exercises," which required prior planning and documented observer evaluations. Licensee personnel indicated that most of the deficiencies identified in the drill reports had been corrected and a spot check of items by the auditors confirmed that the corrective actions described by the licensee staff had been taken.

The exercise and drill reports all recommended that dedicated vehicles (besides the BECO station wagons) to be used by emergency response teams be provided. Licensee personnel stated this recommendation was still under consideration.

The June 3 health physics and communication drill included notification of offsite agencies and a review of offsite response.

Based on the above findings, this portion of the licensee's program appears to be acceptable.

7.2 Walk-Through Observations

7.2.1 Control Room

The auditors conducted a backshift (4:30 AM) walk-through of emergency classification and offsite notifications.

The Watch Engineer was asked by the auditors to talk-through his response to an emergency in which there was a projection dose of 10 rem at the plant boundary based on a dose calculation done in the Control Room. The Watch Engineer immediately stated that condition represented a General Emergency and he proceeded to Procedure 5.7.1.3, "General Emergency," and explained what actions he would take. The auditors asked at what point the Watch Engineer transferred the responsibility to the EOF. He responded that this transfer would occur when the EOF was manned and ready to accept the transfer. The auditors asked if he would make protective action recommendations to off site officials responsible for implementing protective actions. He stated he would and that Procedure 5.7.2.18, "Offsite Dose Projection PAGs," would be used. He stated that these recommendations would be made to the Massachusetts Public Health Department (MPHD) when MPHD called the Control Room in response to the initial notification. The auditors asked who would be assigned to be the Control Room Emergency Communicator. The Watch Engineer stated he would use the Health Physics Clerk stationed at the Security Building (24-hour post).

The auditors asked what actions would be required if there were an indication that the core was uncovered. He stated that unless it could be recovered in a very short period a General Emergency would be declared. The auditors asked if a General Emergency were declared, based on an uncovered core and the containment isolated with no doses projected offsite, what protective action would be recommended to MPHD. The Watch Engineer could not provide an answer since the plant procedure for protective action determination was based solely on projected doses.

The auditors asked how the Watch Engineer would use the on-shift HP Technician The Watch Engineer stated he would have him conduct a rapid on site, out-of-plant survey to determine/confirm the extent of any releases but that he would not wait for these results before classifying the emergency.

It appeared to the auditors that this Watch Engineer showed a good understanding of the emergency classification system, his duties and responsibilities, and the importance of prompt protective action recommendations to offsite authorities and the bases for these recommendations. However, this and other walk-throughs demonstrated the lack of a procedure and associated training to relate plant conditions to offsite protective actions.

The auditors conducted a second Control Room walk-through of dose assessment, event classification, and offsite notification on the backshift (5:00 P.M.). A second Watch Engineer was presented with monitor readings corresponding to a projected dose of 20 rem at the site boundary. The Watch Engineer directed the Shift Technical Assistant (STA) to conduct the assessment using the HP-85A computer in the Control Room. The STA incorrectly estimated the offsite dose rate at the boundary to be 20 R/hr.

The Watch Engineer had little difficulty determining that this condition was a General Emergency since at this time he believed it represented a total projected dose of 120 rem at the boundary. The Watch Engineer proceeded through the steps in Procedure 5.7.1.5 "General Emergency," and stopped at the step calling for activation of the remainder of the emergency organization and stated he would not implement Procedure 5.7.2.18, "Offsite Dose Projections and PAGs," since this would be performed by the EOF staff once the EOF was activated. The Watch Engineer was asked what offsite calls he would expect to receive. He stated that he would request the security staff to screen the calls and only allow calls from plant management into the Control Room. When asked if he would talk to MPHD, he stated, "No."

This walk-through and discussions with other members of the Control Room staff indicate that the training and drills conducted by the site for Watch Engineers had stressed the actions to be taken up to the point at which offsite augmentation was requested. As a result the Watch Engineer did not believe that it was his responsibility to recommend protective actions for off site, even though the procedure did provide for him making such recommendation until relieved.

The findings and observations summarized above were evaluated as part of the findings in Sections 3.1, 3.2, and 5.4.1 of this report.

7.2.2 Medical and Decontamination

The following scenario was given to the Senior Chem/Rad Technician.

The Senior Chem/Rad Technician was injured in the Turbine Building with a simple fracture of the left leg and was grossly contaminated. He was asked what he would do. He said he would phone or page the Control Room and report his injuries and ask for the Health Physics Supervisor or an ambulance. There was no medical assistance on the backshift. The Chem/Rad Tech then said that all operators are trained in first aid. A Chemistry Technician entered the Health Physics Control Point at this time and heard the conversation. He volunteered that the Chemistry Technicians have not received updated first aid training. The Senior Chem/Rad Technician called the Control Room to report his injuries. The Watch Engineer was on the phone for 6 minutes trying to determine what action to take. He finally came to the Health Physics Control Point with a Senior Control Room Operator trained in first aid.

The Senior Control Room Operator who had received first aid training said he would try to calm the injured man, check him for bleeding, proper breathing, and contamination. He would then immobilze him and determine his condition. He would then report to the Control Room and request professional help. He would then strip the injured man, place his clothes in a plastic bag and wash him with soap and water, then dry him with paper towels, treating them as radioactive waste and would collect the wash water and treat it as rad waste. The Watch Engineer in the meantime would have called an ambulance and an HP Technician to accompany the injured man and notify one of the physicians at Jordan Hospital trained in radiological health. He would then notify the Station Manager, the Physician's Assistant, Chief Radiological Safety Engineer and Security. He would then write an accident report in accordance with Procedure 5.6.1.

The findings and observations summarized above were evaluated as part of the findings in Section 3.2 of this report.

7.2.3 Offsite Monitoring

The auditors conducted a walk-through of the Emergency Operation Facility involving an Emergency Director, a Communicator, an Environmental Assessment Engineer, two Team Leaders with their respective team members. The auditors observed the activities of the Blue Team beginning when the team members picking up their kits, checking their instruments and equipment in the Blue kit. The Team Leader indicated that he had reviewed the procedures for his team in its draft form only and had not read or seen the final procedures until this particular exercise.

Since a company vehicle was not available, the team member used his own van for this exercise. The Emergency Director provided the Team Leader with instructions on where to collect samples. The driver and Team Leader, using a road map, missed the road leading to the sampling site and had to backtrack approximately one-half mile. They set up their sampling equipment and followed their procedures. Team members reviewed the procedure for every step.

The radios used by the team were not powerful enough to clearly reach the EOF from this particluar sampling location. The useful range of these radios was about 2 miles.

The team proceeded to take samples and also to call the EOF at 5-minute intervals with readings of external radiation dose rates. The auditors did not observe any problems with the manner in which the team conducted its activities in collecting the samples.

The auditors then requested that the team go to the nearest public telephone to attempt to reach the Emergency Operation Facility. Upon arrival at the Yankee Traveler Motel where a public telephone was available, it was noted that there were no telephone numbers of the emergency organization in the Blue Team procedures book. The Team Leader then called the plant's main switchboard and the operator was unable to connect the team leader to the EOF extension. It appeared that the switchboard operator did not have the emergency plan numbers and therefore it was necessary for the Team Leader to have the switchboard operator call the Control Room. The Team Leader then received telephone numbers of the various trailers within the EOF complex.

In addition to the above mentioned personnel, there were two other individuals in the area where the Emergency Director would carry out his activities. It appeared that the noise level, as the result of the conversations of the people within the immediate area as well as that noise from the air conditioner, may prevent the transmission of vital information between the communicator, the Emergency Director and his immediate staff. The monitoring team appeared well trained and the survey equipment was operable.

The findings and observations summarized above were evaluated as part of the findings in Sections 4.1.1.4, 4.2.3, and 4.2.6 of this report.

7.2.4 EOF - Assessment

The auditors conducted a walk-through of environmental assessment capabilities with the EOF staff. The licensee was asked to field two teams of environmental monitors. These were the Red and Blue teams. The licensee also provided a communications staff member, an environmental assessment engineer, and a Radiation Engineering Team Coordinator (RETC). The licensee was asked to assume that a qualified RETC was not available. This position was then filled by a person trained as an emergency Environmental Assessment Engineer.

The RETC and Environmental Assessment Engineer were told that a Site Emergency had been declared. The high level monitor on the main plant stack was reading 1 R/hr. The wind direction was from 100 degrees. The Environmental Assessment Engineer rapidly performed dose projections using the HP-85A computer. The Environmental Assessment Engineer and the RETC conferred and agreed on locations for the survey teams. Since an elevated release was assumed, the greatest whole-body dose rates were near the plant boundary and the greatest thyroid dose projections were distant from the plant site boundary under the observed meteorological conditions. The RETC decided to send one team to the site boundary and one team to a position along the sector with the highest ground level concentration of radioiodine. The teams were instructed to survey the area and find the location of the highest external dose rate.

The RETC was asked to describe his response to a shift in wind direction. He indicated that he would send one team in the new downwind direction and keep

one team in the previous downwind direction in order to be prepared for subsequent wind shifts since the ambient meteorological conditions were light and variable winds.

The Environmental Assessment Engineer posted the following data on the status board: release point, effluent monitor reading, stack flow rate, total release rate, radioiodine release rate, affected sector designation, and projected whole-body and thyroid doses (based on projected release and wind direction durations). The RETC noted that the projected doses did not exceed the EPA protective guides for evacuation.

Although the EOF was equipped with several different maps of the emergency planning zone, none of the maps seemed to have sufficient detail for directing the teams. The licensee had one road map which did not have sector designations or distances clearly marked on it. Other maps provided a general outline of the major geographical features and roadways. However, these maps did not contain sufficient detail to direct placement of the monitoring teams.

The procedures for environmental monitoring implied that the monitoring teams would be directed to specific locations to perform radiation measurements. In fact, the RETC directed the monitoring teams to traverse sectors or sections of roadway in order to determine the location of the highest dose rate. Although this concept of monitoring was not explicitly required in the procedures, the auditors agreed that it was a prudent method.

The auditors requested that the Environmental Assessment Engineer explain his response to a simulated report from the radiochemistry laboratory. The Environmental Assessment Engineer was told to recalculate projected offsite doses assuming that the onsite laboratory reported that the effluent consisted of a mixture of 10% iodines and 90% noble gases. The previous maximum projected thyroid dose was approximately 3 rem. The Environmental Assessment Engineer indicated that the new information would reduce this projection to approximately 1.2 rem. When questioned about the validity of this dose projection, the original Environmental Assessment Engineer realized that he had assumed the release to consist of 25% radioiodines, whereas an examination of the output of the HP-85A calculator indicated that the 3 rem dose projection was based upon a 2% content of radioiodines in the effluent. Thus the true impact of a 10% radioiodine content would be a five-fold increase in the projected thyroid dose, rather than a 60% decrease.

The auditors compared the original data sheet returned by the Red Team with the emergency communication record of the Red Team's data transmission. The communicator recorded sample count rates that were 100 times less than the count rates reported by the Red team. Moreover, the communicator recorded the count rate of the silver zeolite cartridge twice, confusing this count rate with the second background reading of the SAM-II instrument. This communication error implies an improper verification procedure. The communicator should repeat his own copy of the field teams' transmission rather than requesting a second transmission from the field team. This is especially prudent because the transmission signal from the EOF was much stronger than the signal to the EOF.

The auditor verified that the lower limits of detection for airborne I-131 were 6 E-09 and 2 E-09 microcuries per cc of air for the Red and Blue teams, respectively.

The Environmental Assessment Engineer demonstrated proficiency in performing projections with thyroid dose based upon field team data according to Procedure 5.7.2.18.

The monitoring teams were not able to use the gasoline generator because very little gasoline was found at the storage location in the EOF. The gasoline for the generator was not part of the inventory procedure.

The assessment personnel in general demonstrated a good understanding of the concepts of dose assessment. In fact the personnel overcame the problems associated with the assessment procedures.

The findings and observations summarized above were evaluated as part of the findings of Sections 4.1.1.4, 5.4.2, 5.4.2.1, and 5.2.2 of this report.

7.2.5 Control Room Dose Projections Walk-Through

The auditors observed the operation of the HP-85A dose projection calculator by two of the Shift Technical Advisors (STAs) in the Control Room. The auditors also discussed procedures for performing these calculations with one of the STAs and three of the licensee staff who were qualified as Environmental Assessment Engineers. Both STAs were able to operate the dose assessment computer and obtain dose projections in a timely fashion. Neither of the STAs were familiar with the location of the readout for the reactor building vent flow rate. The STAs had a working knowledge of the EPA protective action guidance and were able to assist the Watch Engineer in determining an appropriate emergency category.

Followup discussions with one STA and three of the Environmental Assessment Engineers indicated a lack of knowledge of the fraction of radioiodine that is assumed to be present under the default conditions that have been incorporated into the dose assessment calculator. The staff seemed to confuse the fraction of the radioiodine inventory of the core that is available for release from the containment with a fraction of the effluent that consists of radioiodines. Licensee staff was not immediately aware that the assumed fraction of radioiodines in the effluent was programmed into the HP-85A. In a broad sense, this deficiency is related to the fact that the licensee had not yet implemented a post-accident effluent sampling and analysis program. The Environmental Assessment Engineers relied on the assumed conditions of a design basis accident as specified in USNRC Regulatory Guide 1.3. These assumptions bear no similarity to the actual conditions during an emergency.

The auditors noted that the HP-85A in the Control Room was marked with the telephone pager number of the Corporate Environmental Assessment Engineer. The auditors tested this telephone number and verified that it would indeed activate the correct pager.

The findings and observations summarized above were evaluated as part of the findings in Section 5.4.2 of this report.

INDIVIDUALS CONTACTED

1. Licensee Personnel

*J. Aboltin, Sr. Reactor Engineer
C. Aldred, Nuclear Plant Operator
*C. Bowman, Sr. Radiological Engineer
*R. Cunningham, Emergency Planning Coordinator
L. Dooley, H.P. Engineer
*W. Hoey, Sr. Radiation Protection Engineer
*J. Howard, Vice President Nuclear
B. Lunn, Chem & Radiation Prot. Tech.
*R. Machon, Nuclear Operations Manager
P. Mastrangelo, Nuclear Watch Engineer
*C. Mathis, Nuclear Operations Deputy Manager
Marinella, Security Shift Supervisor
B. Maure, H. P. Tech. Trainee
*J. McEachern, Security Supervisor
M. McLoughlin, Sr. Compliance Engineer
D. Proksell, Chem & Rad Prot. Tech
K. Roberts, Maintenance Group Manager
R. Smith, Nuclear Plant Attendant
*T. Sowden, Leader ERHS Group
D. Sukanek, Sr. Maintenance Engineer
P. Tache, H.P. Supervisor
*K. Taylor, Nuclear Watch Engineer
*R. Tis, Dist. Manager Public Relations
*A. Trudeau, Radiation Group Manager

2. In addition to the above, members of the appraisal team interviewed licensee members of the plant operations, radiological management services, maintenance, technical, security and training groups as well as Federal, State, hospitals, and town officials.

*Denotes those also present at the exit meeting.