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Licensee: Philadelphia Electric Company

Facility Name: Limerick Generating Station

Inspection At: Limerick, Pennsylvania

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SUMMARY

The appraisal of the onsite emergency preparedness program at Philadelphia Electric Company's (PECO) Limerick Generating Station involved seven general areas: administration of the emergency preparedness program, emergency organization, emergency training, emergency facilities and equipment, procedures which implement the emergency plan, coordination with offsite agencies, and walkthroughs of emergency duties.

The development of the licensee's Emergency Preparedness Program was administered by site and corporate personnel.

A review of the licensee's emergency organization description showed that although the licensee had identified organizational response elements, improvements were needed to further clarify duties and responsibilities, and to provide an organizational structure consistent with each emergency response task.

The emergency preparedness training program had been initiated but was incomplete. Specifically, a training coordinator had not been assigned, and criteria for qualifying instructors and emergency personnel were not in place. The implementation of the training program was also incomplete in that many organizational elements had not received training consistent with their duties during emergencies.

Those aspects of Emergency Response Facilities that had been completed were basically satisfactory, but facilities were still in various stages of development, and equipment and supplies were not always in-place, nor operationally tested or calibrated.

Specific deficiencies were found in the Emergency Plan Implementing Procedures including unclear assignment of specific responsibilities, ambiguities, inconsistencies, errors, missing specific cross references, and unnecessary extraneous materials. Other emergency procedures necessary for adequate emergency response were incomplete or lacking.

The significant deficiencies identified in this report need to be corrected, for the licensee to increase the ability to detect, classify, manage, and mitigate emergencies.

1.0 Administration of Emergency Preparedness

Effective August 23, 1982, the Superintendent of Philadelphia Electric Company's (PECO) Nuclear Generating Division officially appointed a Director for Emergency Preparedness who is responsible for the overall direction of PECO's emergency preparedness program at the both the Peach Bottom Atomic Power Station (PBAPS) and the Limerick Generating Station (LGS). This position is within the corporate structure and was approved by the vice-president, Electrical Production.

On August 12, 1983, the LGS Station Superintendent assigned two test engineers as onsite Emergency Preparedness Coordinators (EPC). This assignment was made by means of an informal memorandum addressed to senior engineers and shift supervision. As EPCs they report to the Results Engineer, one level of management below the Technical Engineer. According to the LGS Functional Organization Chart, the Technical Engineer reports to the Assistant Superintendent. Therefore, instead of reporting to the Site Superintendent or higher, the EPCs report at least two management levels below. There is evidence, however, that the EPCs had scheduled regular meetings with the Site Superintendent. The auditors reviewed the education and experience of LGS EPCs and noted that both individuals had minimal experience directly related to Emergency Preparedness or in a supervisory capacity. It was not clear to the auditors how these individuals met qualification requirements equivalent to those for supervisors in ANSI N-3.1. Notwithstanding this lack of experience, the site EPCs stated that they were responsible for coordinating on-site emergency preparedness activities and for writing procedures for the LGS.

In November 1983, PECO contracted the firm of Stone & Webster to write and administer emergency training lesson plans.

In addition, the licensee's staff could not provide the auditors a document showing strategies and landmarks used to implement an efficiently coordinated onsite emergency preparedness program which includes indication of responsibilities and authorities of the individuals involved; the extent of participation of onsite technical groups in the development and implementation of training; implementation of procedures; and selection of equipment and supplies.

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

- Formally assign an onsite Emergency Preparedness Coordinator (EPC) using selection criteria equivalent to those for Supervisors in ANSI N.3.1. This individual should report to the Station Superintendent and be given direct working level responsibility and authority over all aspects of the development and maintenance of the LGS Emergency Preparedness Program (EPP). Revise normal organizational charts, position analysis descriptions, and other related documents to reflect the EPC assignment in addition to describing the scope of duties, authority, and reporting chain. (50-352/84-18-01).

- Develop and identify tasks, strategies, and landmarks to implement and efficiently coordinate the onsite EPP to include as a minimum: indication of the responsibilities and authorities of the individuals involved; the extent of participation of onsite technical groups in the development and implementation of training; implementation of procedures; and the selection of equipment and supplies. (50-352/84-18-02).

2.0 EMERGENCY ORGANIZATION

The auditors reviewed the Limerick Generating Station (LGS) Emergency Plan, dated April 4, 1984 (hereafter referred to as the Emergency Plan or EP. In addition, the auditors reviewed Emergency Plan Implementing Procedures (EPIPs), and their revisions up to June 1984, and held discussions with licensee personnel to evaluate the emergency organization.

Three basic augmentation phases (i.e., staffing levels) were considered: initial, intermediate, and final augmentation. The initial phase consists of the minimum staff operating the plant (i.e., in particular during back shifts). The intermediate phase comprises the full fledged onsite emergency organization forming within a reasonably rapid time frame (60 minutes). The final augmentation phase includes the first two staffing levels, additional corporate staff and other support groups. A recovery phase would be entered after the reactor has stabilized and significant releases of radioactivity to the environment and any further potential for releases have ceased. At that point, the licensee will implement an organization designed to recover from the accident. The recovery phase will be further discussed in Section 5.4.6.

The applicant's emergency organization is identified in Section 5 of the Emergency Plan. This included a description of various phases of augmentation, including organizational charts, and lists of duties and responsibilities for some of the organizational elements.

The auditors noted the following:

- The licensee specified the Shift Superintendent as being available onsite at all times. The Shift Superintendent has the responsibility and authority to initiate any emergency actions including notifying and making protective action recommendations to offsite authorities.

- The EP described the general duties and the non-delegatable responsibilities of the Shift Superintendent acting as Interim Emergency Director.

- The EP failed to describe the functional breakdown of the initial phase of the emergency organization consisting of the minimal staff operating the plant. Emergency titles and specific duties of the various organizational elements including non-supervisory positions were lacking.

- The licensee's organizational description did not include a block diagram showing the chain of command and information flow for the initial emergency phase.

- The EP described the general duties and non-delegatable responsibilities of the Emergency Director (Station Superintendent) who after proper briefing would relieve the Interim Emergency Director (Shift Superintendent).

- Although the EP described the general duties of some supervisory elements, i.e., Operational Support Center (OSC) Coordinators, specific details on the organizational structure of the intermediate augmentation phase including the functional breakdown for supervisory and non-supervisory elements was not provided.

- The EP did not adequately represent the organizational structure of the intermediate phase, including lines of command, information flow, and interrelationships among organizational elements.

- The block diagram labeled "Initial Organization" actually represented the final augmentation phase due to its inclusion of corporate support and EOF activation. Again, the description of the organization was limited to the supervisory elements while the functional breakdown was not specified.

- The individual identified as the Operations-Engineer, was confirmed by the auditors as being a critical element of the operating staff. The Operations-Engineer routinely supervises the Shift Superintendent during normal work hours but was not given any role within the initial emergency organization. Further discussions with plant staff also confirmed that this individual would occupy a vital role during emergencies as the Senior Techical Supervisor of Operations but this position was not specified within the EP.

- Since each element of the emergency organization was not defined (including non-supervisory elements), specific responsibilities could not be assigned to individuals for performance of various actions and tasks that could be expected during any accident scenario (e.g., which personnel will select emergency team members, who will brief and provide equipment to them, etc.)

- Emergency Plan Implementing Procedures (EPIPs) were not evaluated to verify that the performance of the various tasks was carried out in a manner consistent with the organizational structure during any emergency phases. Specifically, lines of command and information flow were not clearly identified, thereby precluding tasks from being carried out in an effective manner.

- The applicant failed to specify the organizational structure within the OSC as necessary to support its response functions (See Section 4.1.1.3).

- The selection and number of emergency titles tends to obscure the overall response organization. For example, the title Interim Emergency Director was used during the initial phases of an emergency to provide immediate direction for response. Subsequently, the title Emergency Director was used to designate that organizational element which will be directing all aspects of the emergency response after emergency escalation. This title was retained by the person coordinating the onsite effort after relinquishing overall direction and responsibility (e.g., for making protective action recommendations) to the Site Emergency Coordinator in the EOF. Simultaneous use of titles Interim Emergency Director, Emergency Director and Site Emergency Coordinator results in ambiguous designation of authority. Another organizational inconsistency concerns Figure 5-6 "Recovery Phase Organization" in that the Site Emergency Coordinator (who supervises the Emergency Director) reports to a higher authority, namely the Recovery Manager. Paragraph 5.4 of the EP, however, explains that this would happen only during the Recovery Phase, that is, after the reactor is under control and emissions of radioactivity to the environment have ceased. It is not clear why the emergency response organization remains invariant after the recovery phase is entered.

- The number of persons reporting to the Emergency Director (ED) and Site Emergency Coordinator (SEC) appear to be excessive. This, according to members of the licensee's staff, was also observed during drills. A study of the information flow to these individuals would be needed to ensure that information pathways converge in the direction of the ED and SEC in order to prevent an excessive number of simultaneous information inputs that could result in deficient coordination and control.

- The line of succession for the various supervisory elements in the emergency organization (e.g., Emergency Director, Site Emergency Coordinator, etc.) only showed one alternate for each position. For prolonged accidents i.e., lasting over 24 hours, a greater depth in the line of succession may be necessary, since there is the likelihood that either the principal or his alternate may be unavailable (i.e., sick or absent).

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

- Review the description of your emergency organization and revise it as necessary to provide for a clear depiction of all emergency functions required during initial, intermediate, and final phases of augmentation and recovery; update the site and corporate Emergency Plans to describe the revised organization; revise and issue implementing procedures which have been human engineered so that all emergency

response tasks can be carri i out using the command and information pathways of the organization. The updated description of your emergency organization should include a sufficient level of detail, unambiguously delineate the command hierarchy, clearly specify its structure, reporting chains and interrelationships at any phase of augmentation, and include supervisory as well as non-supervisory elements. (50-352/84-18-03)

- Provide greater depth in the line of succession for the various supervisory elements of the emergency organization (50-352/84-18-04)

3.0 Emergency Plan Training/Retraining

3.1 Program Establishment

The auditors reviewed the applicant's program for training/retraining site personnel and individuals assigned emergency duties and responsibilities as outlined in Section 8 of the Emergency Plan and described in the LGS Emergency Plan Training Program. The auditors noted that although the Emergency Plan failed to clearly specify the requirements for General Employee Training (GET) for all radiation workers, and referred to GET only obliquely, GET was being conducted. However, there were no specific provisions in the Emergency Plan for providing retraining in GET.

The training listed in Table 8-1 of the Emergency Plan agreed with the training matrix included in the licensee's Training Manual. The Emergency Plan stated in Section 8.1.1, that training and qualifications for normal job positions were recognized as a base upon which specific Emergency Plan training may be built. Practical training and hands-on demonstration of required job skills were assumed to form part of the training and qualification for normal job positions, but such skill demonstrations were not considered as training criteria in Table 8-1.

The auditors noted that because of this approach, Emergency Planning managers erroneously assumed that personnel assigned to emergency response functions had required skills. The auditors could not find information defining what these skills were, as applied to emergency response qualification criteria, i.e., qualification standards against which training could be measured had not been developed.

The Training Program for site and corporate emergency response personnel outlined: (a) classroom instruction based primarily on emergency procedures, (b) hands-on ("practicality") training conducted by specialized instructors and (c) drills and exercises. Offsite and non-licensee personnel were being trained through contracted training firms..

The Emergency Plan and training program provide for annual retraining (except GET) of emergency workers. Contracted instructors appeared to be competent, although instructor qualification requirements had not been formally established.

The auditors noted that training records were not consolidated into a single location and that records of drills were not maintained in a manner which identified information relevant to training, i.e., who participated in drills and which roles they played. Moreover, no single individual had been designated for coordinating the overall training program.

A number of categories of specialized training for emergencies were listed in the Training Manual: Classification System and Immediate Response, Emergency Facilities and Activation, Emergency Teams and Activation, Plant Survey Group, Field Radiological Surveys, etc.

The auditors reviewed lesson plans which covered the above categories, and noted that they only identified general performance objectives. In addition, lesson plans for "practicality" (i.e., hands on) training indicated that demonstrable objectives were not specified.

Written examinations following lecture type classroom instruction were recorded. Training for offsite support groups had been developed. Specialized training in fire fighting, rescue and first-aid had been developed and implemented, and appeared to be adequate.

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

Complete the development of the emergency preparedness training program to include the following:

- Establish qualification criteria for instructors (50-352/84-18-05)

- Establish a single point of responsibility for across-the-board Emergency Plan Training (50-352/84-18-06)

- Establish qualification criteria for each emergency response function in such a manner that a clear line of progression, from untrained to qualified, including hands-on demonstrations, can be achieved (50-352/84-18-07)

- Organize and consolidate training records so that it is possible to track the progress of qualification for each individual assigned to specific emergency response duties. (50-352/84-18-08).

- Develop a means to evaluate and record individual proficiency for out of classroom training activities, walkthroughs, mini-drills, and other (50-352/84-18-09)

- Specify General Employee Training (GET) and retraining requirements in the Energency Plan (EP). (50-352/84-18-10)

3.2 Program Implementation

The auditors held discussions with licensee personnel concerning their routine duties and emergency response responsibilities, and reviewed training records. The auditors could not correlate the various emergency

organizational elements with specific training requirements due to the lack of a coherent description of the emergency organization (see section 2.1).

The auditors noted that certain individuals had not received training specified for their emergency response role, and that the "basic skill" portions of training were missing. Some selected examples are: (1) The Emergency Site Coordinator and his alternate received training in only one of nine lesson plans, (2) some dose assessment technicians were not trained in the use of the radiation detection instruments, (3) chemistry technicians were not trained in gamma spectrometry, (4) respiratory protection training including the use of self-contained breathing equipment was not performed, (5) H.P. technicians did not know if decontamination equipment or supplies were available at assembly areas, (6) post-accident sampling systems had not been tested, (7) all operations staff had not received emergency response training while the ones who had received training failed to perform their emergency functions during walkthroughs (e.g., classifications, notifications, and protective action recommendations). (See Section 7.2.1)

Thus, critical personnel who would act as Interim Emergency Directors during emergencies were not able to efficiently perform their duties. In addition, the auditors found that other personnel responsible for taking charge of emergency direction and coordination lacked adequate knowledge concerning the emergency organization and its associated mechanisms (i.e., information flow, specific responsibilities for forming repair/corrective actions, etc) for performing the various tasks. The auditors concluded that the Emergency Plan Training Program had not been effectively implemented. The auditors verified that many individuals identified to receive Emergency Plan classroom training had received it. However, as a consequence of the lack of qualification criteria, the ambiguities of the emergency organization description, and the fractionated nature of training and recordkeeping, the auditors were not able to establish from records alone the overall training completeness. On the other hand, as noted, training interviews and walkthroughs with a considerable number of emergency personnel revealed deficiencies in the knowledge and proficiency of emergency personnel (see Section 7.2).

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

- Complete training and qualify all emergency organizational elements, so that instructors can verify with a reasonable degree of assurance that they will effectively perform their emergency duties during actual emergencies. (50-352/50-18-11)

- Implement a centralized Emergency Plan training records system consistent with the findings of Section 3.1 (50-352/84-18-08), and the revised emergency organization which will allow determination of the progress of emergency response personnel toward full qualification. (50-352/84-18-12)

4.0 Emergency Facilities and Equipment

4.1 Emergency Facilities

4.1.1 Assessment Facilities

4.1.1.1 Control Room

The control room is a combined facility serving LGS Units 1 and 2. Specific emergency equipment was installed in each unit (on opposite sides) while common equipment is located in the center of the control room using virtual image laydown. The auditors inspected the space, the installed equipment, decision-making aids, and supporting documentation. Discussions were held with operations and technical personnel.

The ventilation component of the habitability system was incomplete in that several penetrations remain open pending inspection by the nuclear insurer. With the exception of the fire brigade equipment, prepositioned emergency equipments and supplies (e.g. portable radiation monitoring equipment, protective clothing, breathing apparatus, damage control kits, etc.) were either missing or present at various unmarked locations in unspecified quantities. (See Section 4.2.4)

The auditors found that supporting documentation was incomplete. For example, technical specifications were early in the cycle of transposition from standard technical specifications to plant specific specifications and as a result, operators lacked significant information upon which decisions such as Limiting Conditions for Operations (LCOs) will be made.

Extensive work was in progress on the common area and Unit 2 side with lesser but significant levels of incompleteness or design change package (DCP) work being performed on the Unit 1 side: cable pulling not completed; cable trays not closed out; chassis wiring in progress; seismic monitor drawer missing; literally hundreds of meters, switches, actuator/indicators, and instruments not yet turned over for operation; accident related process monitors inoperative. (See Section 4.2.1.2)

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

- Complete control room Unit 1 and common area installations and ensure that all emergency equipment, supplies and supporting documentation are in place. (50-352/84-18-13)

4.1.1.2 Technical Support Center (TSC)

The TSC is located in the TSC building on the Unit 2 side of the plant north of the administration building. It is coupled into the Unit 1 protected area by a lengthy expanded metal corridor which penetrates the Unit 2 construction area. With approximately 2500 net

square feet of space, the facility meets the occupant guidance provided for by NUREG-0696. Growth could be accomodated within the habitability envelope by consolidation and utilization of the hallways and the large mechanical space.

The auditors examined the facility, observed the TSC in operation during an LGS sponsored training drill, reviewed applicable portions of the draft technical specifications, the EP, procedure EP-201, "Activation of the TSC", and held discussions with emergency workers and managers involved in the drill.

The auditors noted the following:

- Although the TSC was generally acceptable with respect to habitability requirements, some problems existed (e.g., ventilation damper position indication was incomplete; when completed, it will indicate actuator position, not damper position).

- The applicant was unable to demonstrate that the facility provided personnel with adequate protection from direct radiation exposure from inplant sources and that TSC direct radiation protection factors comply with the habitability guidance of NUREG-0696.

- Some installed equipment was not operable: Particulate Iodine and Noble Gas System (PINGS); and Emergency Response Facility Data System (ERFDS).

- The TSC equipment and supplies were not always consistent with the language contained in the EP and applicable EPIPs (e.g. status board content differed from what was identified in the appendices of EP 201-3).

- Radiological support equipment was missing, e.g., KI, personnel dosimetry, and portable radiation detection instrumentation.

- Portions of the communications installation were missing or inoperative, e.g., ENS and HPN communication lines were not installed, some radio units were inoperative.

- The facility was powered from alternate power supplies provided by offsite sources. In a stationwide AC power blackout, only emergency lighting and power to the computer systems Emergency Response Facility Data System and the dose assessment system in the TSC will be provided by battery. However, in view of the flexible electrical power system available to LGS (e.g. two separate onsite substations, each double end fed from offsite power sources with an onsite intertie between substations) the auditors concluded that power supplies are adequate.

- The auditors were unable to verify the availability of Type A, B, C, D and E variables of Reg. Guide 1.97 since the ERFDS system remained in the software development stage.

- The TSC failed to meet NUREG-0696 guidance for a 2 minute walk from the TSC to the Control Room. It would take about 5 minutes to traverse the protected area corridor.

- The temporary wooden bridge over the isolation zone adjacent to the TSC violated the protected area perimeter.

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

- Complete installation, testing, and turnover of the TSC communications, ventilation, radiation monitoring, ERFDS, personal dosimetry, and thyroid blocking systems and equipment. (50-352/84-18-14).

- Ensure that TSC direct radiation protection factors comply with habitability guidance of paragraph 2.6 of NUREG 0696. (50-352/84-18-15).

- Remove the wooden bridge which is installed to couple the Unit 1 protected area with the TSC, since it violates the integrity of the protected area isolation zone. (50-352/84-18-16)

4.1.1.3 Operations Support Center

The auditors toured the Operations Support Center (OSC), located in an enclosed space at the 269 foot level of the turbine building immediately outside the primary access doors of the Control Room, reviewed OSC related sections of the Emergency Plan and Emergency Plan Implementing Procedures 202, 254, 260, 261, 303, and 305).

The auditors found the space to be conveniently located with respect to liaison with the control room during an emergency. Day to day use of the space as a local I&C shop did not appear to compromise the space. Several dedicated phones, a Gaitronics plant paging unit, portable radiation monitoring equipment, rapid deployment kits for inplant monitoring teams, and air pacs were present. Although the kits had inventory checklists taken from the procedures, the only other reference to the OSC equipment inventory was the last sentence of paragraph 7.1.4 of the EP, which provides for unspecified amounts of respiratory protection, protective clothing, flashlights, and portable survey meters. Equipment storage practices were inadequate. Equipment was located in unlocked cages in open or unsealed kits. OSC radiation monitoring equipment was marked with tape "For Drills Only"; none of it indicated current calibration.

The OSC was found to be too small to simultaneously fulfill space requirements for both the emergency operations and assembly area roles. At evacuation, HP technicians and non control room plant operators assemble at the OSC. Discussions with the licensee staff estimated that 40 to 80 persons would report to the OSC at the same time.

The auditors found that the OSC location in the turbine building was conveniently adjacent to the Control Room, but noted that there was a high probability of the space becoming uninhabitable during emergencies. If local evacuation of the OSC was required, procedures would direct plant operators and an equivalent number of HP technicians to relocate to the Control Room. Overflow HP personnel report to the Administration Building. It was not clear that the OSC function survived within the Control Room boundary. A specific location that could serve as alternate OSC (e.g., the lunch room) was not indicated.

The auditors identified a weakness in the coordination of plant operations with maintenance under emergency conditions. The Emergency Plan stated that emergency inplant damage control and maintenance was a function assigned to the maintenance organization under the supervision of the assistant maintenance foreman. Direction was provided directly from the TSC and bypassed the OSC except where blocking tags or HP/OPs personnel were required. Although procedures required the OSC to perform a coordination role with respect to deployed teams, the emergency organization as identified by the EP would make this difficult to accomplish. After evaluating actual practices as described by OSC coordinators during walkthroughs, the auditors concluded that revision of the EP or EPIP was needed to reflect the correct responsibility, staffing, and organization of the OSC.

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

- Establish an equipment and supply inventory for the OSC. Outfit the space, stow emergency materials, and install locks or seals as appropriate. (50-352/84-18-17)

- Review the concept of operations of the OSC with respect to the number of personnel assigned under all conditions. (50-352/84-18-18)

- Designate a specific location for an alternate OSC; define the staffing therein; revise supporting documentation as required to ensure continuity of operations in the alternate OSC. (50-352/84-18-19).

- Clarify actual practices concerning the staffing, organization, and responsibilities pertaining to the OSC. (See Section 2.0)

4.1.1.4 Emergency Operations Facility (EOF)

The EOF is located in the PECO Plymouth Service Building, at Ridge Pike and Chemical Road, Plymouth Meeting, Pennsylvania, approximately 17 miles from LGS. Its dimensions are 110 ft. by 36 ft. with a total floor space of 3960 square feet. The facility would provide work space for 36 licensee, State, County, and NRC personnel. Therefore, the floor space allows over 75 square feet of work space per person. Facility arrangement was adequate to allow interpersonnel communications within the EOF. All status boards and maps were in-place as outlined in EP-302 "EOF Activation" and readable from a distance of about 15 feet. Dedicated and commercial telephones providing communication links to onsite emergency centers were available. A radio for field team communication was also available. Neither a working ENS nor an HPN phone for NRC personnel had been installed. An SPDS console with both video readout and hard copy capability was available in addition to a dose assessment computer terminal interfaced with the same computer as the terminal in the TSC. Dose assessment data including pertinent meteorological parameters located at either the TSC or the EOF were available. A separate computer terminal linking PECO corporate staff with the EOF is used to access data generated onsite. The Site Emergency Coordinator's (SEC) desk was located in the center of the EOF. On the SEC's desk were copies of the EP, emergency plan implementing procedures and other relevant emergency response documents. Pertinent FSARs, plant status drawings, corporate information and Technical Specifications were available from the dedicated Corporate computer terminal. Not all check lists being used in the EOF were found in EP-203. Also, a review of EP-203, showed that there were no provisions for access control to the EOF.

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

- Establish means for access control for the EOF. (50-352/84-18-20)

- Include check lists used in the EOF in EP-203 "EOF Activation" (50-352/84-18-21)

4.1.1.5 Post Accident Primary Coolant Sampling and Analysis

The auditors examined facilities and equipment for post accident primary coolant sampling and analysis including the Post Accident Sampling System (PASS) and the sample analysis equipment located in the chemistry laboratory radiation counting room. The auditors noted that although the PASS was in place as described in EP-231, acceptance testing was incomplete and the system was inoperable. The counting laboratory equipment for sample analysis had been installed and was operational (See Sections 5.4.2.4 and 5.4.2.5).

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

- Complete the acceptance testing, verify the operability of the PASS station, and ensure that the facility meets the criteria of NUREG-0737 to allow post-accident primary coolant sampling and analysis. (50-352/84-18-22)

4.1.1.6 Post Accident Containment Air Sampling and Analysis

The auditors examined the facilities and equipment for the post accident containment air sampling and analysis. The containment air sample would be taken at the PASS station and analyzed in the counting laboratory. Again, the auditors noted that the PASS was in place, but acceptance testing was not complete and the system was inoperable. The counting laboratory equipment for sample analysis had been installed and was operational. However, see Sections 5.4.2.6 and 5.4.2.7.

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

- Complete the acceptance testing, verify the operability of the PASS station, and ensure that it meets the criteria of NUREG-0737 to allow post accident containment air sampling and analysis. (50-352/84-18-23)

4.1.1.7 Post-Accident Gas and Particulate Effluent Sampling and Analysis

The auditors examined facilities and equipment for sampling and analysis of post-accident gaseous and particulate effluents as described in EP-237, Rev. 2, and noted that the equipment for obtaining the sample was in place and operational, but the lead cask for transporting the sample had not been fabricated. The counting laboratory equipment for sample analysis had been installed and was operational. The auditors noted that obtaining this sample would require considerable physical exertion under unsafe conditions due to the location of the Wide Range Gas Monitor (WRGM) and concluded that under severe accident conditions the sample probably could not be obtained. (See Sections 5.4.2.8 and 5.4.2.9).

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

- Demonstrate that a gas and particulate sample can be obtained from the WRGM under severe accident conditions, (i.e., in full respiratory protection gear and carrying the transport cask) utilizing the access routes given in EP-231. (50-352/84-18-24)

4.1.1.8 Transfer, Storage, Sampling and Analysis of Post-Accident Liquid Wastes

The auditors noted that the liquid sampling equipment and analysis equipment were in place, however, sample handling tools (e.g. shielded containers) were not available. The auditors noted that there was a potential problem associated with the storage of post-accident liquid wastes. The primary system capacity is about 200,000 gallons and the suppression pool has a capacity of 2,000,000 gallons. It is anticipated that the suppression pool will be maintained at 1/2 capacity during normal reactor operation. Since reactor coolant lost in the dry well will drain to the suppression pool, it must have sufficient reserve capacity to accept all post-accident liquid waste that could result from a LOCA inside the primary containment.

The radwaste tanks that receive liquid waste from the equipment drains have a capacity of 150,000 gallons. The radwaste tanks that receive liquid waste from the floor drains have a capacity of 138,000 gallons. If both the equipment drain tanks and the floor drain tanks are full and the licensee is not able to discharge the contents of either due to the potential for environmental consequences, it appears that the reserve capacity of these tanks during an emergency may not be adequate.

In the event of the loss of drywell pressure the equipment and floor drains would automatically isolate. The effluent that would normally go to these tanks could then be routed to the suppression tank.

The floor drains in secondary containment drain to a 1000 gallon tank that normally is pumped to the floor drain tanks in the radwaste building. If these tanks are isolated, the secondary containment drain tank would be pumped to the drywell. During normal operations the drywell pressure is too high for this to happen. After shutdown, a pressure decay of 6 to 8 hours would have to occur before the secondary floor drain tank can be pumped to drywell. The pump down time for 200,000 gallons of water would be between 30 to 50 hours of continuous pumping. Startup testing of these pumps showed that they could not pump for more than 10 minutes without the pumps heating up and tripping the breakers. (See Sections 5.4.2.4 and 5.4.2.5)

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

- Develop plans/schemes and procedures for handling, storing, transferring and discharging post-accident liquid wastes. (50-352/84-18-25)

4.1.1.9 Alternate Laboratory Facilities

The auditors noted that the licensee intends to use the services of Babcock-Wilcox in Lynchburg, VA as the primary alternate laboratory facility during emergency conditions. The licensee would also use

the laboratory facilities of Peach Bottom as backup laboratory facilities. From discussions with the licensee staff, the auditors concluded that the turn-around sample time to Lynchburg or Peach Botton would exceed the three hours sample measurement and analysis time suggested in NUREG-0737.

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

- Identify permanent back-up capability for performing chemical and radiochemical analysis during emergencies, so that the time for sample measurement and analysis will not exceed the limits of NUREG-0737. (50-352/84-18-26).

4.1.2.1 Assembly/Reassembly Areas

The auditors inspected primary and alternate inplant assembly and re-assembly areas. Re-assembly areas were located at the Limerick airport and the Cromby Generating station (both owned by PECO). The auditors reviewed the EP and EPIP-110 and found that no alternate assembly areas were assigned for the TSC, Security Guards, I&C Technicians or maintenance personnel in the event that their spaces became uninhabitable (although the Control Room was identified as an alternate TSC in a different procedure). With the exception of the OSC (Section 4.1.1.3), each of the spaces identified provides sufficient room for the intended use. Where appropriate, ample parking was identified. The auditors noted that noise levels on the turbine deck at the Cromby Station would inhibit mustering of personnel; however, this difficulty was outweighed by the positive factors that the site offered. Generally, assembly areas were not marked.

The Emergency Plan indicated that personnel monitoring and decontamination will be performed in assembly areas. The EP also noted, however, that designation of an area as an assembly area did not imply the presence of special facilities or equipment, (e.g. for monitoring and decontamination of personnel).

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

- Specify alternate assembly areas in the event that primary areas should become uninhabitable; mark primary and alternate assembly areas; revise the Emergency Plan and EPIP-110 to identify all assembly and re-assembly areas; identify monitoring and decontamination capability for each; and where no capability exists at the assembly area, identify the source from which support equipment and supplies would be obtained. (50-352/84-18-27)

4.1.2.2 Medical Treatment Facilities

The auditors noted that there was no medical treatment facility at Limerick Generating Station. The onsite medical facility was considered by the licensee to be the Pottstown Medical Center located offsite two miles from the station.

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

- Establish an onsite medical facility as required by 10 CFR 50, Appendix E and NUREG-0654, capable of supporting the various scenarios that may occur during accidents, including the simultaneous or sequential handling of several injured and contaminated persons. (50-352/84-18-28).

4.1.2.3 Decontamination Facilities

The auditors noted that there was a decontamination facility located at Level 217 in the Radwaste Building. This facility lacked procedures, instrumentation and supplies required for decontamination of personnel. Further, it had no telephone, was poorly arranged for contamination control specifically when handling more than one person, and was not located in close proximity to a medical facility (see Section 4.1.2.2). Health physics management was aware of this and was preparing a request for modification of this facility. The auditors noted that there was no decontamination equipment and supplies at assembly areas. The applicant does not intend to use any chemical for personnel decontamination but would rely on soap and water alone. This decision was made in concurrence with corporate medical personnel. Although there were provisions for replacement clothing, there were no means at assembly areas for the disposal of radioactive wastes.

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

- Provide equipment, supplies and procedures for the decontamination facility and modify the internal structure of this facility to ensure adequate contamination control. (50-352/84-18-29)

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

- Develop means for the disposal of radioactive wastes at assembly areas. (50-352/84-18-30)

4.1.3 Expanded Support Facilities

The auditors reviewed Section 7 and Figure 7-1 of the Emergency Plan and EP-284, "Company Consultants and Contractors" and determined that an adjacent area to the station was designated to accomodate trailers in the event expanded support is required. The auditors noted that the personnel processing center and training center would be used as backup. During emergencies, telephone links would be installed after trailers arrive from outside sources. General service agreements existed at the corporate level to add contractor and support groups when needed.

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:

- Designate fixed facilities with existing communications capability, (e.g., personnel processing center and training center) for administrative and logistical support in the event of a prolonged emergency response and modify the EP as necessary to reflect these changes. (50-352/84-18-31).

4.1.4 News Center

The auditors reviewed Section 7.17 of the Emergency Plan, a draft copy of the News Center Training Manual and Procedures and toured the News Center located at PECO Corporate Headquarters in Philadelphia, PA. The auditors noted that 40 telephone lines were provided for use by the press and corporate personnel. Occupancy of the briefing area located on the basement level is limited to 145 persons and appears adequate to accomodate the expected number of media representatives. Public address and audio visual equipment (i.e. screen and projector) were in place and operational. The corporate duplication center was located adjacent to the News Center and would be available for media use during emergencies. The Emergency Plan indicated that the News Center would be activated at the Site or General Emergency classifications. However, discussions with corporate public information personnel indicated that News Center activation could also occur at the discretion of the Emergency Director. The auditors noted that during emergencies security guards would be placed at entrances on the main level on a 24-hour basis.

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

- Upgrade the Emergency Plan to include provisions for the Emergency Director to have the option to activate the Emergency News Center prior to a site area or general emergency. (50-352/84-18-32).

4.2.1.1 Emergency Kits and Emergency Survey Instruments

The auditors reviewed Sections 7.1.4, 8.3, Appendix E of the Emergency Plan and ST-O-EPP-351-0, Rev. 1, "Quarterly Emergency Equipment Inventory", which specified the locations of emergency kits, emergency radiological survey instruments, and emergency supplies, and noted that some of the emergency kits specified in the procedure were not in place (e.g. Control Room, Admin. Guard Station-Ambulance, and Cromby Generating Station assembly area kit). In addition, inventories pertaining to the OSC, EOF, and the Limerick Airport assembly area kit were incomplete (e.g. personnel dosimeters, protective clothing, and radiation survey instrumentation were missing). The auditors noted that the majority of radiological survey instruments had not been calibrated.

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

- Ensure that the contents of all emergency kits are as described in the Emergency Plan and Implementing Procedures, that inventories are consistent with the description of contents in ST-O-EPP-351-0, Rev. 2, and verify that portable radiological survey instrumentation in emergency kits are calibrated. (50-352/84-18-33)

4.2.1.2 Area and Process Radiation Monitors

The auditors found that the Process Radiation Monitors (PRMs) were in place but had not been acceptance tested. Instrument electronics calibration of the Area Radiation Monitors (ARMs) had been completed and the units were operational, but radiological calibration procedures were not established for these monitors. Operation procedures were not complete for process monitors. The four primary containment monitors were positioned at different elevations within the drywell. Each had a range of 1E+8 Rad/hr. Main steam line monitors were placed in the proximity of each main steam line. These monitors had ranges up to 1E+6 mR/hr. There were 7 turbine enclosure ARMs each with a 1E+4 mR/hr range. In addition to the four high range primary containment monitors, there were two ARMs with ranges of 1E+4 mR/hr in the drywell. There were five ventilation exhaust duct radiation monitors with a maximum range of 100 mR/hr, 9 ARMs with 1E+4 mR/hr or 1E+6 mR/hr ranges in radwaste and sump tank areas, 6 ARMs in the area of the spent fuel pool, the drywell head laydown area, and the plug laydown area. Additionally, ARMs with 1E+4 mR/hr or 1E+6 mR/hr ranges were found in pump rooms, valve compartments, sumps, RHR areas, the reactor building, reactor water cleanup areas, drywell laydown area, steam separator area, new fuel storage vault, H2/02 analyzer area, OSC, decontamination and laundry areas, and hot maintenance shop. The number, position and range of the existing ARMS should provide a adequate indication of direct radiation conditions during emergency conditions.

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

- Verify the operability and adequacy of all Process Radiation Monitors, establish procedures for calibration and calibrate all ARMs and PRMs. (50-352/84-18-34)

4.2.1.3 Non-Radiation Process Monitors

The auditors examined non-radiation process monitoring equipment intended to measure vital parameters of a non-radiological nature (e.g. plant pressures, temperatures, flows, etc.) which would be relied upon for accident detection, classification, assessment, and mitigation.

Although most of the equipment had been installed, several significant units were not operational, in particular the Emergency Response Facility Display System (ERFDS) which makes these parameters available within the TSC. Other illustrations of Reg. Guide 1.97 type A-D variables which were found to be inoperative were:

Source range neutron monitoring
Containment hydrogen recombiner
Containment hydrogen and oxygen analyzer
Steam leak detection
4 KV safeguards power

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

- Complete the installation, and verify the operability of Reg. Guide 1.97 type A-D non-radiation process monitors. (50-352/84-18-35)

4.2.1.4 Meteorological Instrumentation

The auditors reviewed the licensee's meteorological measurements program against the guidance and criteria of Regulatory Guides 1.23 and 1.97, NUREG-0654, NUREG-0696 and NUREG-0737, and Supplement 1 to NUREG-0737.

The licensee outlined the characteristics of their meteorological measurements system in Emergency Plan Section 6.2.1. The integration of meteorological data into the applicant's dose projection scheme was found to be summarized in Section 7.3.1 of the plan and implemented using Emergency Procedure EP-316. The auditors reviewed the applicant's meteorological instrumentation, including data acquisition, recording systems, its associated preventive maintenance and calibration programs.

The auditors found that the current meteorological instrumentation provided the basic parameters (i.e., wind direction and speed and an estimate of atmospheric stability) necessary to perform the dose

assessment function. In the Control Room, data from the meteorological measurements system were recorded on strip charts and were displayed, on interrogation, in the form of 15-minute averages of the measured variables. The measurements system consisted of meteorological sensing and recording from primary, secondary and supplementary towers. The sensors on the primary and secondary towers recorded wind speed and direction, vertical temperature differential, and temperature, while the supplementary tower sensors recorded only wind speed and direction. Information on meteorological conditions for the region in which the site is located was not available via communication with the National Weather Service. A notification system for the National Weather Service to notify the Control Room had not been established for severe weather conditions affecting or likely to affect the site.

The auditors noted that procedures for quarterly calibration of meteorological sensors, electronics and recorders were contained in Research and Testing Division Implementing Procedures RE-11-00805 through RT-11-00828 and were being implemented. The instrumentation at each measurement location was checked five to six days each week and serviced once each month, but no procedures had been written to perform this task. Since new instrumentation had been installed recently, there was no basis to conclude that the system provided reliable indication of meteorological variables.

The auditors found that most of the meteorological instrumentation met the criteria in Regulatory Guide 1.23. However, the exposure of some of the sensors on the primary tower did not meet the criteria due to the presence of dirt piles close to the tower. As a consequence, the auditors could not conclude that meteorological data from the primary tower reasonably represented conditions in the plant vicinity (up to 10 miles).

The auditors could not verify that the applicant had the capability to appropriately integrate meteorological data into the radiological assessment projection proecedures because procedures were in the process of being changed to incorporate revised atmospheric stability estimation parameters.

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

- Provide a communications link and procedures with the National Weather Service from which meteorological conditions representative of the region surrounding the site can be obtained. (50-352/84-18-36)

- Provide equipment and/or procedures for the National Weather Service to notify the Control Room shift personnel of severe weather conditions affecting or likely to affect the site. (50-352/84-18-37)

- Improve the exposure of sensors on the primary tower. (50-352/84-18-38)

- Establish by means of sufficient data that the current meteorological measurements system provides reliable indication of meteorological variables. (50-352/84-18-39)

- Provide updated radiological assessment/projection procedures which are consistent with acceptable atmospheric stability estimators and establish means to document results. (50-353/84-18-40)

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

- Implement procedures for inspecting the instrumentation at the meteorological towers and establish means to document results. (50-352/84-18-41)

4.2.2.1 Respiratory Protection

The auditors noted that equipment and supplies needed to implement a respiratory protection program were in place (e.g. full face masks, compressed air bottles onsite, an acceptance tested operational air compressor for refilling air bottles and self contained breathing apparatuses). In addition, a Bechtel contracted radiation area study showed that the air compressor would be accessible during accident conditions. Dedicated self contained breathing apparatuses (SCBAs) were in place in the TSC and OSC emergency kits. A respirator training manual was also available. The auditors noted, however, that personnel had not been respirator qualified, mask fitted, or medically examined and certified for respirator use.

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

- Implement a program to certify that personnel are respirator qualified to support emergency activities. (50-352/84-18-42).

4.2.2.2 Protective Clothing

The auditors examined the licensee's supplies of protective clothing stored onsite and noted that dedicated sets of clothing were in place in the emergency kits in the TSC and OSC. Emergency kits were also available for onsite and offsite radiation survey teams. Adequate quantities of protective clothing consistent with types and levels of radioactive contamination expected during severe accidents (e.g. cloth and vinyl suits, latex and cotton gloves, hoods, plastic booties and rubber boots) were also available from warehouse stores. However, protective clothing specified in ST-O-EPP-351-0, Rev. 1, was not provided for the Control Room or Administration Building Guard Station.

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

- Provide protective clothing supplies for all locations for emergency response functions consistent with the types and levels of radioactive contamination expected during emergencies. (50-352/84-18-43)

4.2.3 Emergency Communications Equipment

The auditors reviewed sections 3.4.2 and 7 of the Emergency Plan, the Emergency Plan Implementing Procedures, and inspected installed and portable communications equipment for use during emergencies. The auditors noted that onsite communication equipment was referenced in the Plan and in place in emergency response facilities (ERF), but neither key communication links nor specific alarms were identified in the Plan or procedures. Installation and testing of the prompt public notification (siren) system throughout the plume exposure EPZ had not been completed. Emergency communications equipment consisted of prelude/microwave telephone system, Gaitronics public address system, portable two-way radios, telefax capability, computer hardware/software for corporate communications, beepers, and various specified alarms. Radiation emergency alarms and fire alarms were tested and observed to be operable. However, the auditors found that the site evacuation alarm malfunctioned when tested. The auditors discussed design features of an internal antenna system with corporate staff and found that it will apparently increase radio transmission in high noise and remote in-plant locations.

Telephone communication links and portable radios were checked for operability during each drill. Testing of radiation and fire alarms was conducted routinely.

The auditors determined that the licensee was capable of notifying the NRC, Pennsylvania Bureau of Radiation Protection (PA BRP), Pennsylvania Emergency Management Agency (PEMA), and County authorities at any time. Beepers were used if key personnel could not be reached by telephone. The auditors inspected and tested the following primary and backup communication links: TSC/EOF, TSC/Montgomery County EOC, TSC/PA BRP, TSC/field survey teams, TSC/Control Room, Control Room/NRC Operation Center (via commercial line). All links tested were found operable, but HPN and ENS lines were not installed. Redundant power was supplied by two offsite AC sources and four (4) diesel generators and appeared adequate to satisfy the requirements of 10 CFR 50, Appendix E., IV. E.9.

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

- Incorporate into the EP and EPIPs details of the communications links between each organizational element and identify associated equipment used for emergency communications. (50-352/84-18-44).

- Complete installation, and testing, and ensure operation of the prompt alert and notification (siren) system in the plume exposure EPZ. (50-352/84-18-45).

- Provide a means to ensure reliability and operation of the siren warning system. (50-352/84-18-46).

4.2.4 Damage Control/Corrective Action and Maintenance Equipment and Supplies

The auditors reviewed the EP, EPIPs and toured emergency response facilities, assembly areas, and the maintenance and the I&C shops.

Paragraph 7.6 of the Emergency Plan noted that damage control equipment was located in tool storage cribs, shops, and other locations. No EP provision for prepositioned damage control equipment existed nor were prepositioned kits observed. There was an adequate selection of damage control equipment located in the control room. However, it was not identified in EPIP's, was located in several different unmarked lockers, and lacked capability for inventory control. The auditors concluded that a damage control program which was completely decentralized and dependent upon equipment drawn from tool cribs and normal maintenance shops was inadequate.

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

- Determine the needs for prepositioned inplant damage control kits, outfit and position kits in marked storage lockers, and revise EPIP accordingly. (50-352/84-18-47).

4.2.5 Reserve Emergency Supplies and Equipment

The auditors reviewed Surveillance Test Procedure ST-O-EPP-351, interviewed emergency response and health physics personnel and determined that the licensee relied upon existing onsite inventories of supplies (e.g., survey instruments, protective equipment etc.) to support emergency operations. A coding system was established for ordering routine supplies and restocking emergency kits after use to ensure adequate reserve supplies for emergencies. Quarterly inventories of emergency reserve supplies were being performed to verify stock on hand. When requests were made for equipment from outside sources, a comparison of part specifications is performed at the corporate headquarters to ensure compatibility for use with onsite equipment.

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

4.2.6 Transportation

The auditors interviewed utility personnel and verified availability of vehicles designated for use during emergency response and determined that four (4) vehicles (two equipped with 4-wheel drive) were available for use by offsite monitoring teams. These vehicles were being used for normal operations by the licensee's instrument and control (I&C) department. I&C staff maintained keys, vehicle maintenance, and user logs. The means for assuring transportation of personnel during a site evacuation had not been addressed in procedures (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 matters should be considered for improvement:

- Identify in EPIPs transportation arrangements to be provided for site personnel in the event of a site evacuation. (50-352/84-18-48).

5.0 Procedures

5.1 General Content and Format

The auditors found that the format of licensee's emergency procedures included individual sections such as purpose, responsibility, references, appendices, prerequisites, special equipment, and precautions, many of which had no application to the procedure or were of no value to the users during emergencies. This approach resulted in obscuring the intent of the procedures, loading them with unnecessary references, repetitions, and statements concerning generalized responsibiltics for overall implementation. For example EP-105 "General Emergency Response" indicated various responsible organizational elements in an individual section, namely, "responsibilities" instead of specifying responsibilities within the context of action steps.

The auditors noted that clarification of actions, duties, and responsibilities would result from a different approach to established procedures. Concentrating on practical and useful information directed to each element of the emergency response organization is needed to accomplish specific tasks. Additionally, procedures should be kept consistent with the hierarchy of command and the structure of the emergency response organization (see Section 2.0).

Among discrepancies found in the content and format of procedures were omissions (e.g., values for temperature and radiation levels in EP-101, dose assessment considerations in EP-316), unnecessary references (EP-202, 203, 261), no means of verifying adequacy of tasks performed (EP-23 and 237), uncertainties of designating responsible individuals while progressing through emergencies (See Section 2.0), incomplete feedback of information loop and other deficiencies.

The auditors also found that many procedures essential to an adequate emergency response had not been written and others were not completed (onsite radiation surveys, radiochemical analysis, sampling of highly radioactive liquid waste, EP-235, 237, 238, 241). In some cases procedures could not be completed because construction of facilities had not been finalized (e.g., sampling and analysis of post-accident liquid wastes, primary coolant, containment air, stack effluents during accidents). Further, other procedures of an operational nature (e.g., dose assessment) needed for emergency detection and classification during accidents had not been completed.

The auditors held discussions with PECO staff, described the various deficiencies in procedures, and recommended that procedures be revised and walked-through to ensure that they accomplished their specific objectives within the organizational structure, and that information flow and closure were adequate.

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

- Review Emergency Plan Implenting Procedures (EPIPs) and make revisions to:

  (a) Specify duties and responsibilities of emergency personnel performing emergency response tasks;

  (b) Correct ambiguities, inconsistencies, omissions, errors, wordy discussions, unnecessary references, lists of contents, and other extraneous materials to help users perform their duties during emergencies more efficiently;

  (c) Provide specific cross-references to other procedures in the action steps when needed to further detail and clarify actions;

  (d) Identify lines of command, communications, and information flow necessary to perform emergency tasks and response actions; and

  (e) Ensure that emergency response tasks are coordinated between the appropriate elements of the emergency organization and are consistent with the organizational structures.

- Provide adequate procedures to implement the Emergency Plan, in these areas:

  (a) On-site (out-of-plant) radiological surveys during emergencies

  (b) Sampling and analysis of high radioactive liquid waste

  (c) Personnel accountability

  (d) Security during emergencies

(e) Operation of radiochemistry analysis equipment. (50-352/84-18-49)

5.2 Emergency, Alarm, and Abnormal Occurrance Procedures

The auditors reviewed alarm and abnormal event procedures (e.g., "Alarm Response Cards", "Special Events", "Operational Transients", "Preparation of Operating Procedures") and held discussions with the LGS operations staff and other emergency response personnel to determine whether they were written to incorporate the guidance of Regulatory Guide 1.33 (i.e., contained immediate and followup actions requiring evaluation of initiating conditions relative to emergency action levels). Additionally,the auditors wanted to determine if such procedures referenced EPIPs, in particular EP-101, "Classification of Emergencies," in a manner that could easily and unambiguously translate initiating conditions/emergency action levels into specific emergency classes.

The auditors determined that most LGS procedures were organized along the general guidelines of Regulatory Guide 1.33.

Immediate and long-range action sections were included in the licensee's alarm and abnormal procedures, but they failed to make reference to EP-101. For example, ON-110, "Loss of primary containment", references the Technical Specifications but made no reference to EP-101, although this condition is indicated in Appendix 1 of NUREG 0654 as an unusual event.

In many instances, EP-101 specifies that several factors act in combination by gate logic (e.g. and,or) before the composite result requires emergency classification. One such instance is the Reactor "lo lo lo level alarm" which is not a reason in itself for an emergency classification, unless combined with a scram and containment pressure greater than 1.68 psig and increasing. The corresponding TRIP alarm card did not consider correlating it with a scram or a containment pressure, and made no reference to EP-101. Other examples are found in Special Event Procedure, SE-1 (shutdown from outside the control room) and SE-4 (flood). Both events fail to reference EP-101 for classification.

In summary, the only abnormal event procedure found by the auditors which referred to EP-101 was SE-5 (earthquake).

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

- Review all emergency, alarm, and abnormal procedures to ensure proper reference to EP-101, "Classification of Emergencies". (See Section 5.1)

5.3 Implememting Instructions and Emergency Action Levels

Emergency Plan Implementing Instructions (EPIIs) are intended for use by the organizational element directing the emergency response. The procedures should assist in the implementation of non-delegatable responsibilities and help to orchestrate the implementation of other, more specific, procedures (e.g., onsite surveys, personnel accountability, etc). Each EPII should refer to one specific emergency class.

Emergency Action Levels (EALs) are easily accessible, quantifiable, observable parameters with specific values which can be correlated with distinct emergency categories of varying severity. EALs are indicative of certain emergency conditions.

The auditors reviewed the licensee's EPIIs (e.g. EP-102, "Unusual Event Response", EP-103, "Alert Response", EP-104, "Site Emergency Response" and EP-105 "General Emergency Response") and noted that they were written from the perspective of the emergency director, and made reference to other procedures in a manner that would allow the user to orchestrate the emergency response. Although EPIIs appeared to be acceptable, they should be subject to human engineering aspects (see Section 2.1), and format considerations. (See Section 5.1)

The auditors noted that several implementing instructions (e.g., EP-103, EP104) instructed the Emergency Director to obtain protective action recommendations from the Shift Technical Advisor (STA) and the Dose Assessment Leader. Although these organizational elements could provide the Emergency Director with data interpretations in the operational and dose assessment areas, and may suggest a certain course of action based on the data, it is the Emergency Director who evaluates their input and recommends protective actions to the State.

Regarding EALs, the auditors noted the following:

Unusual event EALs on main turbine vibration trip, or failure of a diesel generator to start were not included. No alert EAL was established for the failure of a diesel generator to start on the loss of off-site A.C. power, or for turbine failure causing penetration.

EALs were not established for Hazards to Station Operation where fire, earthquake, or other natural disaster could cause damage to plant systems.

EP-101-5 stated that fires involving permanent plant structures within the protected area lasting 10 minutes or more after initial attempts to extinguish it would constitute an unusual event. According to NUREG 0654, time should start with the discovery of the fire and not with the initial effort to extinguish it.

Site Emergency and Alert EALs in Appendix EP-101-5 considered only fires that affect an ECCS, instead of fires that could potentially affect any safety systems.

EALs for Alert or Site Emergency due to scram instrumentation and specific readiness were lacking.

Specific values for temperatures, positions, and high radiation levels were not provided; instead relative terms such as "high", "low", and "position" were used.

Other boundary degradation measurable indicators such as an increase in the cycle frequency of the drywell equipment drain tank sump, an increase in the drywell air cooler condensate leak off, an increase in high drywell temperature, a HPCI or RCIC steam leak, and a leak in the reactor head flange were lacking.

EP-101 failed to consider the loss of steam dump by the closure of an MSIV or all steam bypass valves, or the loss of condenser vacuum as site emergency indicators. Under General Emergency, the same information should be considered along with increasing reactor pressures, increasing pool temperatures, and the unavailability of other heat sinks. These indicators should be included in the EALs as specific meter readings.

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

- Review and revise EALs as needed to clearly and unambiguously define the various emergency classes. Ensure that EALs address all pertinent initiating conditions found in NUREG-0654 and ensure that EALs are in terms of specific values of quantifiable parameters. As a minimum, the following EAL revisions should be considered:

  a) Change the Unusual Event "fires involving permanent plant structures" to conform with NUREG-0654 Unusual Event #10.

  b) Provide Unusual Event EALs on main turbine vibration trip and failure of a diesel generator to start.

  c) Provide an Alert EAL for the failure of a diesel generator to start on the loss of offsite A.C. power.

  d) Provide General Emergency EALs for hazards to station operation where fire, earthquake, or other natural disaster could cause massive damage to plant systems.

  e) Add to Appendix EP-101-10 the instruments and their specific readings that would indicate failure to scram.

  f) In Appendix EP-101-11 provide specific values for temperatures, positions, and high radiation levels.

  g) In Appendix EP-101-11 include other boundary degradation measurable indicators such as an increase in the cycle frequency of the drywell air cooler condensate leak off, an increase in high

drywell temperature, a HPCI or RCIC steam leak, and a leak in the reactor head flange. Also include the instruments or other measureables and specific numerical EAL values.

h) In Appendix EP-101-12 include under site emergency the loss of steam dump by the closure of an MSIV or all steam bypass valves, and the loss of condenser vacuum. Under General Emergency include the same information along with increasing reactor pressures, increasing pool temperatures, and the unavailability of other heat sinks. Where applicable, include specific instrument readings indicating EALs. (See Section 5.1).

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

- Clarify that Protective Action Recommendations are the responsibiity of the Emergency Director in EPIPs, and should be based upon plant conditions using EP-317 "Determination of Protective Action Recommendations" (See Section 5.1).

- Review and revise EALs as needed to clearly and unambiguously define the various emergency classes. Ensure that EALs address all pertinent initiating conditions found in NUREG 0654 and ensure that EALs are in terms of specific values of quantifiable parameters. (See Section 5.1)

5.4.1 Notifications

The auditors reviewed Section 7 of the Emergency Plan, procedures EP-103, 104, 105, 291 and determined that for each emergency classification, procedures specified the sequence of notification to alert, mobilize and augment the onsite emergency organization including immediate notifications to be made by the shift superintendent (interim Emergency Director) or the Site Emergency Coordinator. The prelude telephone system provided the primary means for initial notifications while beepers were used for backup purposes. The Emergency Plan action levels specified that the onsite emergency organization and corporate support will be notified at the Alert, Site Area, or General Emergency classifications. Contractor support and local services (fire and ambulance) notifications were not specified by action level but are requested at the discretion of the emergency director. The NRC, State, and county governments would be notified at all emergency classifications (Unusual Event or above) and when a change in emergency classification occurs. The general public and transient population within the EPZ would be notified by the county actuated siren system following information and recommendations provided by the LGS emergency staff. The auditors noted that EP 103-105 contained provisions to provide one hour notification to the NRC Operation Center and to maintain a continuous line to satisfy the requirements of 10 CFR 50.72. Planned messages, public address announcements and alarms used for initial notifications as well as content of messages were included in procedures. However, the onsite siren warning system was not used exclusively for emergency purposes (also see

Sections 4.1.1.1 and 5.2 regarding content of messages). EP 102-105 contained two listings of offsite agencies, telephone numbers, and personnel contacts who are notified by means of commercial telephone. One list was designated for initial notifications while the second was for use during any change in plant status. Specified telephone numbers were monitored on a 24-hour per day basis to ensure all contacts were reached when the initial notifications list is implemented.

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

- Reserve activation of the onsite siren warning system exclusively for use during actual or simulated emergencies and site evacuations. (See Section 5.1)

5.4.2 Assessment Actions

The auditors reviewed Procedure EP-316 "Cumulative Population Dose Calculation for Airborne Releases-Manual Method". The auditors noted that the applicant was changing the method of determining stability class from the Brookhaven method to the delta-T method (See Section 4.2.1.4), but these changes had not been introduced into EP-316. Additionally, procedures for the operation of the RM-21A computer for dose assessment determination were in draft form. Wind direction, temperature, and differential temperature data from the meteorological towers were available in the control room in both a strip chart readout and the RM-11 computer. North and South Vent effluent monitor concentration readouts were available on the control room panel and on the RM-11 computer directly in physical units (i.e. uCi/sec). The dose assessment computer, RM-21A could receive the meteorological and effluent release data directly from the RM-11 computer in the automatic mode. The information could also be inputed. The radioisotopic concentration of the effluent could be entered into the computer manually, or the computer could calculate radioisotopic concentrations using the times of reactor shut down, and accidential release, and the projected core damage fraction obtained from effluent vent readouts. This method could be used to project offsite doses, establish dose isopleths, plume direction, plume spread, and plume doses.

The licensee's computerized means for performing dose assessment provided trend analysis and continuously updated the trends. The computer evaluated data from containment monitors in order to establish source terms. The auditors noted that the licensee did not have a written method for determining the source term if the high range containment monitors and the wide range effluent monitor were inoperable.

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

- Develop and implement procedures for computerized dose assessment. Review EP-316 and revise it to reflect updated dose assessment methods. (See Section 5.1)

- Ensure that EP-316 includes instructions for coordinating field data results with offsite agencies (e.g., identified sampling locations are in agreement). (See Section 5.1)

- Develop a method to obtain source term information when PRMs and ARMs are inoperative. (See Section 5.1).

5.4.2.1 Offsite Radiological Surveys

The auditors reviewed procedure EP-222 "Field Survey Group" and noted that survey methods and survey equipment were specified. Instruments included Eberline RO-2A's capable of discriminating beta emitters from gamma radiation, and GM detectors with ranges up to 200 mR/hr. Silver zeolite cartridges and particulate filters were used as filter media, HP-210T pancake probes were used to count particulate filters, and SAM-2's were available to detect radioiodine in air cartridges. The auditors noted that procedure EP-222 was written for the persons conducting the radiation surveys and analyses. Maps were used that identified points and/or locations where sampling would normally be taken. Standard data sheets for sample acquisition and analysis were provided. Data sheets required team member names and dose history, survey dates, times, and locations, instrument used and use mode, air monitor flow ranges, and count times. The procedure instructed field teams to acquire radios and suggested that in the event of radio failure they should find a telephone and report results. The procedure addressed a central repository for samples, sample containment and identification and radiation protection guidance for team members. Field team coordination with County, State and the Federal Emergency Management Administration (FEMA) teams was coordinated by phone through the agencies' representatives in the EOF.

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

5.4.2.2 Onsite (Out-of-Plant) Radiological Surveys

Onsite (out-of-plant) surveys are performed in LGS under the direction of the plant survey group. The auditors reviewed EP-251 "Plant Survey Group" and noted that it provided insufficient information for conducting onsite out-of-plant radiological surveys, e.g., use of specific survey instruments and survey techniques were lacking, failure to list specific data survey sheets on which to log the data, sample handling, communications identification.

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

- Develop a procedure to perform on-site radiological surveys during emergencies. (See Section 5.1)

5.4.2.3 In-plant Radiological Surveys

The auditors reviewed EP-251, "Plant Survey Group", and noted that it established chains of authority, incorporated necessary radiological control information, and contained references to established techniques.

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

5.4.2.4 and 5.4.2.5 Post-Accident Primary Coolant Sampling and Analysis

The auditors reviewed EP-231, "Operation of Post-Accident Sampling Systems" (PASS) and noted that the procedure could not be verified due to the inoperability of the system. The auditors noted that procedures for the operation of the radio-chemistry analysis equipment had not been developed and implemented.

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

- Verify that PASS procedure EP-231 can be used to obtain a primary coolant sample from the sample locations specified in the procedure. (See Section 5.1)

5.4.2.6 and 5.4.2.7 Post-Accident Containment Air Sampling and Analysis

The auditors reviewed procedures EP-231-2 and EP 231-3 for obtaining a drywell atmosphere, suppression pool atmosphere, and secondary containment atmosphere samples. These samples would be obtained at the PASS station. The auditors noted that the procedures could not be verified due to the inoperability of the system. Procedures for operation of radioisotopic analysis equipment had not been developed and implemented.

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

- Verify that PASS procedures EP-231-2 and 231-3 can be used to obtain the post-accident air samples from the sample locations specified in the procedures. (See Section 5.1)

5.4.2.8 and 5.4.2.9 Post-Accident Stack Effluent Sampling and Analysis

The auditors reviewed procedure EP-237, for obtaining the iodine/particulate and/or gas samples from the north vent Wide Range Gas Monitor (WRGM), and EP-242 and EP-243, to be used in the preparation

and handling of highly radioactive particulate filters, Iodine cartridges, and gas samples. Although procedures EP-242 and EP-243 appeared to be adequate, procedures specific to operation of analysis equipment had not been developed and implemented.

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

- Verify that procedure EP-237 can be used to obtain an iodine/particulate or gas sample from the sample location specified in the procedure. (See Section 5.1)

5.4.2.10 Sampling and Analysis of Post-Accident Liquid Wastes

The auditors noted that liquid sampling equipment and analysis equipment were in place but procedures for performing radiological analysis were not completed.

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

- Complete and implement procedures needed for sampling and analysis of highly radioactive liquid wastes. (See Section 5.1)

5.4.2.11 Radiological and Environmental Monitoring Program (REMP)

The auditors found that corporate emergency procedure EP-C-315 "Recovery of Emergency Radiological Environmental Monitoring samples from Peach Bottom Units 2 and 3 and Limerick Unit 1" specified the REMP for Limerick, and established implementation of the sampling program. EP-C-315 identified individuals by emergency position who had specific responsibility for coordination and implementation of the program sample locations, and conditions for taking and analyzing samples, TLD placement/retrieval, etc.

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

5.4.3.1 Radiation Protection During Emergencies

The auditors noted that the special and unique features of radiation protection during an emergency were listed in EP-401. Although dose record keeping was described in a supporting procedure, there was no specific means for maintaining records of cumulative radiation doses during an emergency. There was no clear method for ensuring that emergency workers entry into hazardous areas would not take place.

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

- Develop means to keep a cumulative updated record of doses received by radiation workers during emergency conditions. (See Section 5.1)

- Provide means to assure that personnel during an emergency, will not enter hazardous plant areas without the knowledge of qualified radiation protection personnel. (See Section 5.1)

5.4.3.2 Evacuation of Owner Controlled Area

The auditors reviewed the Emergency Plan and Emergency Plan Procedures EP-303, 304 and 305 for local, partial plant, and site evacuations. Instructions for local evacuation consisted of departing the area of concern when the problem was recognized, notification of shift supervision (either of the two senior onshift personnel in the Control Room) to define the problem, and followup actions under the direction of shift supervision utilizing HP staff for radiation threats and chemistry staff for toxic threats. Partial plant evacuation consisted of the same processes applied on a larger scale while the site evacuation resulted from more generalized events. Once shift supervision was informed of the threat and its magnitude, a selection was made from options presented in EPIP 302, 304, or 305 and the appropriate level of evacuation was directed. Emergency workers would remain in-plant and nonessential personnel would evacuate.

There were two primary routes for exiting of onsite vehicles. Neither was marked as an evacuation route nor were these routes specifically identified within the procedures. Although selection of assembly areas was based upon plume direction, evacuation route selection was not. There was little difference between the contractors shift change signal and the site evacuation alarm. Although several PECO persons were aware of this problem, the contractor has not been required to shift to a distinct signal. (See Section 5.4.1)

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

- Designate evacuation route alternatives based upon threat, weather, wind direction and other appropriate factors. (See Section 5.1)

5.4.3.3 Personnel Accountability

The auditors reviewed applicable procedures, witnessed accountability during an emergency preparedness drill, inspected the Central Alarm Station (CAS), selected automated card reader stations, and discussed the accountability process with various emergency response personnel.

The auditors found that the applicant was unable to achieve accountability since the automated card reader installation was incomplete and the manual badging system did not log persons into or out of the protected area.

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

- Demonstrate the ability to achieve personnel accountability within the 30 minute period as provided by NUREG 0654. If the primary system is based upon an automated card reader, complete the system installation and demonstrate a viable backup capability. (See Section 5.1)

5.4.3.4 Personnel Monitoring and Decontamination

The auditors reviewed procedures for personnel monitoring and decontamination and noted that they adequately addressed the egress "frisking" of individuals, assembly area monitoring, decontamination, and the forms to be used to record pertinent data.

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

5.4.3.5 Onsite First-Aid/Rescue

The auditors noted that procedure EP-252, "Search and Rescue/First-Aid", adequately addressed the recovering and handling of injured and/or contaminated persons. (However, see sections 4.1.2.2. and Section 5.1)

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

5.4.4 Security During Emergencies

The auditors reviewed EP-208 "Security Team Activation" implemented by the Security Team for security measures during an Alert (or higher) classification, or upon declaration of a site evacuation, and determined that the Plant Security Group and Personnel Accountability Group could provide adequate assistance to emergency personnel for accountability checks, issuance of personnel dosimetry, and maintenance of plant security. With respect to access control, however, it was found that the Access Control Group only performed control of personnel access out to the site boundary and did not dispatch security personnel to the EOF to perform this function. The procedure did not provide instructions to security should orders for a site evacuation occur. Also, EP-208 failed to include checklists as aids to security staff for performing emergency response functions.

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

- Develop a procedure which provides specific instructions should the security force be ordered to evacuate, and checklists which consolidate security emergency duties. (See Section 5.1)

- Provide specific access control measures for identifying personnel authorized to enter the EOF (See Section 5.1)

5.4.5 Repair/Corrective Actions

The auditors reviewed the Emergency Plan, Procedures EP-202 "Operational Support Center", EP-250 "Personal Safety Team", EP-260 "Fire and Damage Team", and EP-401 "Entry for Emergency Repair" and concluded that they adequately described the concept of repair and corrective actions under emergency conditions with the exception of those items identified in Sections 4.1.1.3, 2.0 and 5.1.

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

5.4.6 Recovery

The auditors reviewed Section 9 of the Emergency Plan, EP-401, "Recovery", and EP-410, "Recovery Phase Implementation" and noted that the Emergency Director or Site Emergency Coordinator would decide when the recovery phase could begin. Prior to entering into the recovery phase the NRC, FEMA, and PEMA would be notified and their approval requested. Recovery would be based on plant operating conditions (per EP-410 Appendix 1, 2, and 3), in-plant radiation levels, offsite radiation levels, and other criteria such as cease of fire, floods, correction of malfunctioning equipment and adequate reactor core cooling. Figure 5-6 and Section 5.4 of the Emergency Plan identified key management positions within the recovery organization.

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

5.4.7 Public Information

Specific procedures to identify organizations involved in news dissemination were not found within the Emergency Plan. A local wire service, Mediawire, is used by PECO as a means for public relations staff to coordinate dissemination of information to various locations. A review of the brochure distributed by this service indicated that 35 Philadelphia regional newspapers, radio, and television organizations comprise the local circuit. The News Center Procedure Manual described the method for coordinating internal dissemination of information throughout the public information department. Information provided to the public is also coordinated among NRC, FEMA, State, and utility representatives in designated work areas prior to release. In the event agreement is not reached by all parties concerning the content of messages, the PECO Public Information Officer may exercise discretion and release information deemed necessary.

The utility spokesperson was identified as the Vice-President, Engineering and Research. Although load dispatchers monitor site activities on a 24-hour per day basis, there was no Public Information

Officer onsite. A means to transfer public information between the site and corporate representatives was also lacking. Sources of information used by the spokesperson were provided by the EOF, TSC, and Corporate Emergency Support Center.

Rumor control methods were described in the News Center Procedures and Training Manual. Public inquiries would be handled through a screening procedure and unusual calls would be referred to the Rumor Control Department. Calls received during emergencies pertaining to radiological or operational information would be transferred to the EOF for verification.

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:

- Provide a means to transfer public information between the site and corporate representatives. (See Section 5.1)

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

The auditors reviewed Section 8.3 of the Emergency Plan and surveillance test procedure ST-0-EPP-351-0, Rev. 1, "Quarterly Emergency Equipment Inventory", and noted that it specified adequate frequencies for inventory and maintenance of emergency equipment. The location of emergency equipment was specified and the procedure delineated responsibilities for reporting inventory deficiencies. HP-400, "General Calibration and Labeling Requirements for Health Physics Instrumentation", specified the conditions, equipment, and requirements for calibration of Health Physics Instrumentation. Procedure HP-401, "Control, Accountability, Maintenance, and Repair of Health Physics Instrumentation", established guidelines for the control, accountability, maintenance and repair of instruments. Individual procedures within the HP-400 series provided for operational checks of instrumentation, (e.g. HP-410 contained instructions for operating and checking radiation detection instruments such as, RO-2 and RO-2A, HP-412 the E-520, etc.)

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

5.5.2 Drills and Exercises

The auditors reviewed the licensee's program against Section 8.1.2 of the Emergency Plan. Drills and exercises were administered by the Limerick Emergency Planning Coordinator, and were conducted in accordance with an approved scenario. The EP specified provisions for documented evaluations of drills and assigned responsibilities for and tracking of corrected items. The frequencies of drills were specified and offsite agencies and groups were invited to participate. News coverage was made a part of major drills.

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

5.5.3 Review, Revision, and Distribution

The auditors reviewed the Emergency Plan and EP-500 "Review and Revision of Emergency Plan". A schedule for updating telephone numbers, provisions for incorporating changes resulting from drills or facility changes and responsibility for review were all specified. Distribution lists were established.

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

5.5.4 Audit

The auditors noted that Section 8.6 of the Emergency Plan designated the Operations and Safety Review Committee as the organization responsible for auditing the Emergency Preparedness Program. Although the EP specifies audits to be performed every two years, 10 CFR 50.54(t) requires annual audits. Also, it is common practice to assign audits to persons not involved in plant operations, but such practice is not specified in the EP.

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

- Provide for annual audits of the Emergency Preparedness Program as required by 10 CFR 50.54(t). (See Section 5.1)

- Provide for annual audits to be performed by an independent organization, such as a Quality Assurance Group. (See Section 5.1)

6.0 Coordination with Offsite Groups

6.1 Offsite Agencies

The auditors reviewed Appendix A of the Emergency Plan and letters of agreement with offsite governmental agencies and support personnel, and contacted six agency representatives to verify agency understanding of its responsibilities and procedures in response to Limerick emergencies. In general, agreements reached between offsite authorities and the licensee were consistent with the language specified by each agreement and offsite representatives expressed satisfaction with the efforts made by the licensee to support notifications, training, and routine exchange of information. Discussions with representatives from the Pa. Bureau of Radiation Protection (BRP), Montgomery County Emergency Management Agency, Pottstown Hospital, and Pa. State Police revealed that satisfactory support, effort, and coordination were received from the licensee's emergency response personnel (e.g. notifications, implementation of training program, and routine exchange of emergency planning information). Controlled copies of the Emergency Plan and Procedures (including revisions) were distributed to these offsite agencies. Although the licensee had not conducted a

full-scale emergency exercise at the time of this inspection, offsite authorities have been contacted during communication drills (state and county) and medical drills (Pottstown Hospital and Linfield Fire Company). Review of Table 4-1 of the Emergency Plan and interviews with Pennsylvania BRP staff indicated that protective action recommendations made by the utility were not consistent with those implemented by the State and counties. This is a generic problem for all nuclear power stations within Pennsylvania. Revisions to Emergency Action levels were provided to the BRP for review, evaluation, and concurrence. Agreements were current and were updated periodically.

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

- Develop coordination between the emergency response organization, NRC. and the State Bureau of Radiation Protection to assure appropriate interface for making protective action recommendations during all classes of emergencies. (See Section 5.1)

6.2 General Public

The auditors reviewed the News Center Procedure and Training Manual and the utility's media manual/press kit. Official public information brochures designated for annual distribution and copies of the Limerick Light (a bi-weekly information pamphlet in newspaper form) were not completed and ready for publication. In addition, the auditors noted that no arrangements had been made to provide information to the transient population. A review of a draft brochure revealed that it contained information on how the public was notified, what actions the public should take in the event of an emergency, and general information about radiation (concurred by Pa. Bureau of Radiation Protection). Dissemination of information was accomplished by direct mail, bulk drop, and direct drop at hotels, restaurants, etc. within the EPZ, but there were no means to verify that residents received public information.

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

- Provide for dissemination of emergency planning information to the public within the plume exposure EPZ including the transient population on an annual basis. (See Section 5.1).

6.3 New Media

The auditors noted that the applicant had a training program as outlined in the News Center Training and Procedure Manual to provide the news media with information on the Emergency Plan through annual briefings given by utility and PEMA personnel, but that such briefings have not begun. The Public Information Officer was identified as the point of contact for release of public information. The News Center Manual established that the PIO should hold press briefings at least every 4 hours during an emergency.

The auditors reviewed the media manual and determined that it contained information about how radiation was measured, biological effects of radiation, and a Limerick Plant description. Allocated resources for media personnel at the Corporate Headquarters appeared to be adequate.

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

- Develop means to ensure that annual meetings with the news media are established in order to acquaint them with relevant parts of the Emergency Plan and Procedures. (See Section 5.1)

7.0 Drills, Exercises and Walkthroughs

7.1 Drills and Exercises

The auditors noted that three major drills and four limited "table-top" drills had been performed. The design and conduct of these were consistent with the description in Section 8.1.2 of the Emergency Plan. Drill-identified improvement items were in the process of being resolved, through the use of tracking system and the assignment of responsibilities. The applicant coordinated drills with offsite agencies and the auditors noted that there were means to evaluate, consider, and incorporate comments from these agencies.

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

7.2 Walk-Through Observation

7.2.1 Emergency Classification, Notification, Protective Actions

In preparation for the control room walk-throughs, generic BWR scenarios were prepared prior to the appraisal and made site specific after the auditors arrived at LGS. In an effort to ensure that the scenarios were technically correct with respect to plant specifics, upper level operations management review was obtained prior to each walk-through. Walk-throughs were administered to three shifts in the same day. Each shift consisted of a minimum of one Shift Superintendent (SST), one licensed reactor operator (RO), one Shift Technical Advisor (STA), and one other operator. Participants were encouraged to utilize all of the assets available within the control room but were not permitted to seek help from non-players. No changes to actual plant status were required; no test of communications capability was observed.

The particular scenario which was utilized with all three shifts was a station blackout past battery exhaustion and loss of DC power. By station procedure EP-101, the scenario would have been initially classified as an Unusual Event and escalated one minute later directly to a Site Area Emergency (based on the failure of the diesel generators which resulted in a total AC power outage).

The SST had the option of either declarating an Unusual Event followed one minute later by escalation or direct entry into the Site Area Emergency. Either option was considered acceptable. As the scenario continued, conditions were presented which required escalation to General Emergency. Deescalation, recovery, and dose assessment were not included.

A summary of walkthrough results is as follows: all shifts made a common error in drafting the notification messages and failed to select from preprinted options on the checklist (e.g. airborne, liquid). Generally, the operators were not aware of time limits applicable to notification of offsite agencies. Some persons were confused when they were required to perform NRC notification since the primary method is via the ENS red phone and it has not been installed, but the operators reverted immediately to the dial phone with prepositioned headquarters duty officer phone numbers. Two shifts failed to properly describe the basic problem adequately in that portion of the message format.

Two of the three shifts correctly classified the accident presented in the scenario. After conclusion of the actual scenario, each shift was presented with several independent classification problems, each commencing from the 100% power and normal conditions. The classification error rate then was about 15%. (Again, success or failure was measured with respect to the station procedures, not the NUREG guidance).

When presented with a requirement to make protective action recommendations, all three shifts failed. It was obvious that at least two of the three were not even aware of what a protective action recommendation was; one shift indicated that it might be associated with protective action guidelines but could not explain either guidelines or recommendations. (See Section 3.0 Emergency Plan Training)

Although each shift was aware of the TSC and its purpose in the emergency response organization, the auditors detected a reluctance to impose specific requests on the TSC (e.g., requesting that TSC identify alternative methods of mitigating a particular portion of the casualty). The auditors concluded that training should place emphasis on of the basic role of the TSC, that of relieving the control room of burden and providing evaluations and recommendations.

No person involved in the walk-through was able to identify those responsibilties assigned to the (Interim) Emergency Director which may not be delegated.

When asked whether they had completed emergency plan training, approximately 50% of the operators indicated they had not. With regard to mitigation of casualties, the operator response was generally sound and quick.

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

- Improve the prepositioned notification message format of EP-101 through 104 to increase the certainty that persons drafting these messages will select from the preprinted options thereon. (See Section 5.1)

- Review the adequacy of classification, notification, and protective action training. (See Sections 3.1 and 3.2)

- Include a requirement to demonstrate proficiency in emergency classification, notification, and protective measures in qualification requirements for shift supervision and STAs. Make accomplishment of emergency plan training a prerequisite for control room personnel and STA qualification. (See Sections 3.1 and 3.2)

7.2.2 Post-Accident Sampling and Analysis

Post Accident Coolant Sampling and Analysis and containment air sampling and analysis walk throughs were not attempted due to the inoperability of the PASS equipment. Stack effluent sampling and analysis walkthroughs were not attempted due to the absence of the sample shielded transport container and absence of respirator qualified personnel at Limerick Generating Station.

7.2.3 Dose Assessment

A walkthrough was conducted with the Dose Assessment Team Leader (DATL). The auditors supplied meteorological data, effluent data, and effluent isotopic concentration data. The DATL was able to determine dose projections, plume projections, dose isopleths. and protective action recommendations. Computer plot area maps showing plume path and projected plume path, and projected doses at sample points in the plume paths were demonstrated. Also, the use of field team data to correct projected data establishing criteria for corrected projections was provided. Discussions with the auditors indicated adequate interface with the Emergency Director, dose assessment team, and the Field Team Group Leader. Specific responsibilities for information receipt, analysis, and decision making was also adequate.

The auditors conducted a walk through with the assistant chemist on the multichannel analyzer (MCA) system in order to demonstrate the automated and semi-automated radioanalysis system. Adequate demonstration of the calibration and use of the system, and the production

of hard copy output was made. The MCA's were interfaced with a computer but no program had been developed to calculate the isotopic concentration of a sample. Further, a procedure for the operation of the Multichannel Analyzer system had not been written, therefore, this area could not be verified.

A walkthrough on dose assessment was conducted with two shift technical supervisors (STAs). Part of the walkthrough was conducted individually, and part was a joint effort. The auditors scenario included wind speeds at the 26 ft. level and the 304 ft. level, the temperature differential between the two points, the velocity of the stack effluent, and the concentration in uCi/cc of the stack effluent. Both were able to determine projected doses, dose isopleths, plume direction and spread. Additionally, after the auditors provided information on stack release concentrations, they were able to estimate off-site doses in accordance with Appendix EP-316 "Rapid Assessments", and whole body doses due to noble gas and iodine releases. The auditors concluded that performance in this area was acceptable.

8.0 EXIT INTERVIEW

At the conclusion of the appraisal, the inspectors reviewed the findings identified in this report and the licensee agreed to correct deficiencies. At no time during this appraisal was written material provided to the licensee by the auditors.

9.0 INDIVIDUALS CONTACTED

R. Albruzzese, RO
R. Bernhardt, HP Training
D. Britton, I&C
K. Brennan, PO
G. Bailey, EP Training
S. Baker, HP Technical Assistant
K. Berry, PO
S. Boyle, Corporation Information
J. Basilio, Administrative Engineer Security
A. Bilicki, I&C
K. Crawford, LGS Meteorology
R. Connolly, LGS Meteorology
L. Carson, Startup
H. Carlberg, Site EP
F. Coffey, Electric Engineer
E. Cosgrove, Shift Supervision
R. Dubiel, Senior Health Physist
W. Decker, Chemical Technician
J. Doering, Operations Engineer
R. Deppi, RO
C. Enriss, Regulatory Engineer
J. Eiser, LSG Meteorologist

G. Edwards, Operations
J. Franz, Assistant Station Superintendent
J. Ferrarro, STA
E. Frick, Support Chemist
E. Firth, LGS Training
R. Forsk, RO
E. Griffiths, Computer Systems Engineer
M. Gallagher, Site EPC
R. Harper, Public Information
R. Kankus, PECO EPC
J. Klenk, RO
J. Koelle, PO
B. Leddy, HP
R. Logue, Superintendent, Nuclear Services
G. Leitch, Station Superintendent
M. Montini, Artist
D. McDavitt, EP Training
D. Mierzejewski, Chemistry Training
T. Mscisz, HP
G. Murphy, HP
F. Molotton, HP
A. Marie, Meteorologist
R. McCall, STA
R. Monaco, PO
J. Monaghan, Shift Supervisor
A. Parducci, HP
D. Poliero, STA
R. Patterson, EP Training
T. Payne, PECO Senior Engineer
G. Patton, Shift Supervisor
M. Reller, Chemical Technician
F. Roak, Meteorologist
E. Salomon, EP Training
D. Schuster, Document Administration
J. Sabados, Chemistry Supervisor
B. Smith, HP
S. Supplee, Security
W. Taylor, Public Information
J. Tucker, RO
R. Titolo, HP
S. Taylor, HP
M. Uhland, EP Training
V. Warren, Site EP
L. Wells, HP
T. Williams, Chemical Technician
M. Wyzaleck, Chemical Technician
J. Wiley, Senior Chemist
L. Yates, STA

In addition to the above, team members interviewed personnel from plant operations, radiation protection staff, corporate personnel; and local, county and state officials.