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OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Health Physics Appraisal Program

Report No. 80-03

Docket No. 50-272

License No. DPR-70 Priority - Category C

Licensee: Public Service Electric and Gas Company (PSE&G)

80 Park Place

Newark, New Jersey 07101

Facility Name: Salem Nuclear Generating Station, Unit 1 (SNGS)

Appraisal at: SNGS Hancocks Bridge, New Jersey; PSE&G Corporate Offices in Newark, New Jersey

Appraisal conducted: January 28 thru February 8, 1980

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SUMMARY

The Health Physics Program at Salem Nuclear Generating Station (SNGS) is currently in a state of transition. The existing program is deficient in several areas, particularly in regards to an inordinate reliance on contracted health physics services, lack of a comprehensive training program to assure proficiency in health physics technicians, lack of a viable alternate to the Radiation Protection Manager, as well as failure to fully implement NRC directives as specified in NUREG-0578, "TMI Lessons Learned ... Short Term Recommendations." The deficiencies noted have a bearing on the licensee's ability to effectively manage the increased responsibility accompanying the operation of a second unit.

The licensee has initiated several actions designed to upgrade the performance of the Radiation Protection Program and to resolve the discrepancies noted by this appraisal. Some long-term corrections that effect his performance will be factored into Labor-Management negotiations that are currently underway.

The portion of the health physics audit covering emergency planning involved five general areas:

Emergency Facilities and Equipment

Emergency Plan Implementing Procedures

Organizational Control of Emergencies

Management Controls for Maintaining Response Readiness

The results of the audit indicate that the station staff and contractors have identified many shortcomings in the existing program and have developed conceptual solutions to resolve these shortcomings. Little has been done, however, to carry these changes to implementation. Of particular concern is that even the most critical shortcomings were not being vigorously attacked. This "wait and see" posture has understandably and predictably evolved due to the far reaching actions of the NRC Task Force on Emergency Planning. Despite this, there are areas in the emergency planning program which must constantly be attended to and a wait-and-see attitude is inappropriate, particularly at an operating facility. In light of these considerations, there are three general areas of the current emergency planning program which necessitate immediate attention to ensure that a response of reasonable effectiveness would result in the event of a serious emergency at the Salem Nuclear Generating Station. These areas are: the emergency organization; training; and procedures.

Major organizational changes in the program are being considered and plans are expected to be developed to better prepare the program to deal with the radiological hazards that are prevalent in normal operation as well as off-normal and emergency conditions.

1.0 RADIATION PROTECTION (HEALTH PHYSICS) ORGANIZATION

1.1 Description

The present organization in place at the Salem Nuclear Generating Station is depicted in Figure 1. This is an amendment to the organizational structure shown in the current Technical Specifications (Figure 2). A request for amendment of the Technical Specification was filed on January 28, 1980 to split the duties previously assigned to the Senior Performance Supervisor - Chemistry/Health Physics (HP), between two individuals, i.e., Senior Performance Supervisor - Radiation Protection and Senior Performance Supervisor-Chemistry. The former is the designated Radiation Protection Manager (RPM) for the facility. This action was completed in response to a previous inspection finding (IE Report 272/79-07) which noted that the Senior Performance Supervisor - Chemistry/HP could not adequately devote his attention to radiation protection matters due to his involvement in other production related activities; and as a result the licensee's evaluation of the Radiation Protection Program in the wake of the Three Mile Island experience.

In the organizational structure depicted in Figure 1, the Health Physics (HP) activity is under the managerial control of the Station Performance Engineer who is also the prime responsible manager of the Instrument and Control (I&C), and Chemistry (Chem) organizations. It was noted that there is a distinct similarity between the Station Performance structure and responsibilities at the Salem plant, and eight fossil fuel plants also operated by PSE&G. The Salem Station Performance Engineer is responsible for the following activities:

1) Unit Performance Testing;
2) Routine Station Reports;
3) Plant Water Chemistry;
4) Demineralized Water Plant Operation;
5) Control of Environmental Releases;
6) Calibration and Maintenance of All Instruments and Controls; and
7) Radiation Protection

The Radiation Protection aspect of the Performance Department responsibility is essentially an appendix to what would normally be under the management of the Performance Engineer at any of PSE&G's conventional stations, and, in the case of Salem, appears to be regarded as adjunctive to the operation of the station; i.e., an activity that is appended to, but not an essential part of the station's operation.

Figure 1 Amended organization as depicted in Technical Specification change submitted January 28, 1980

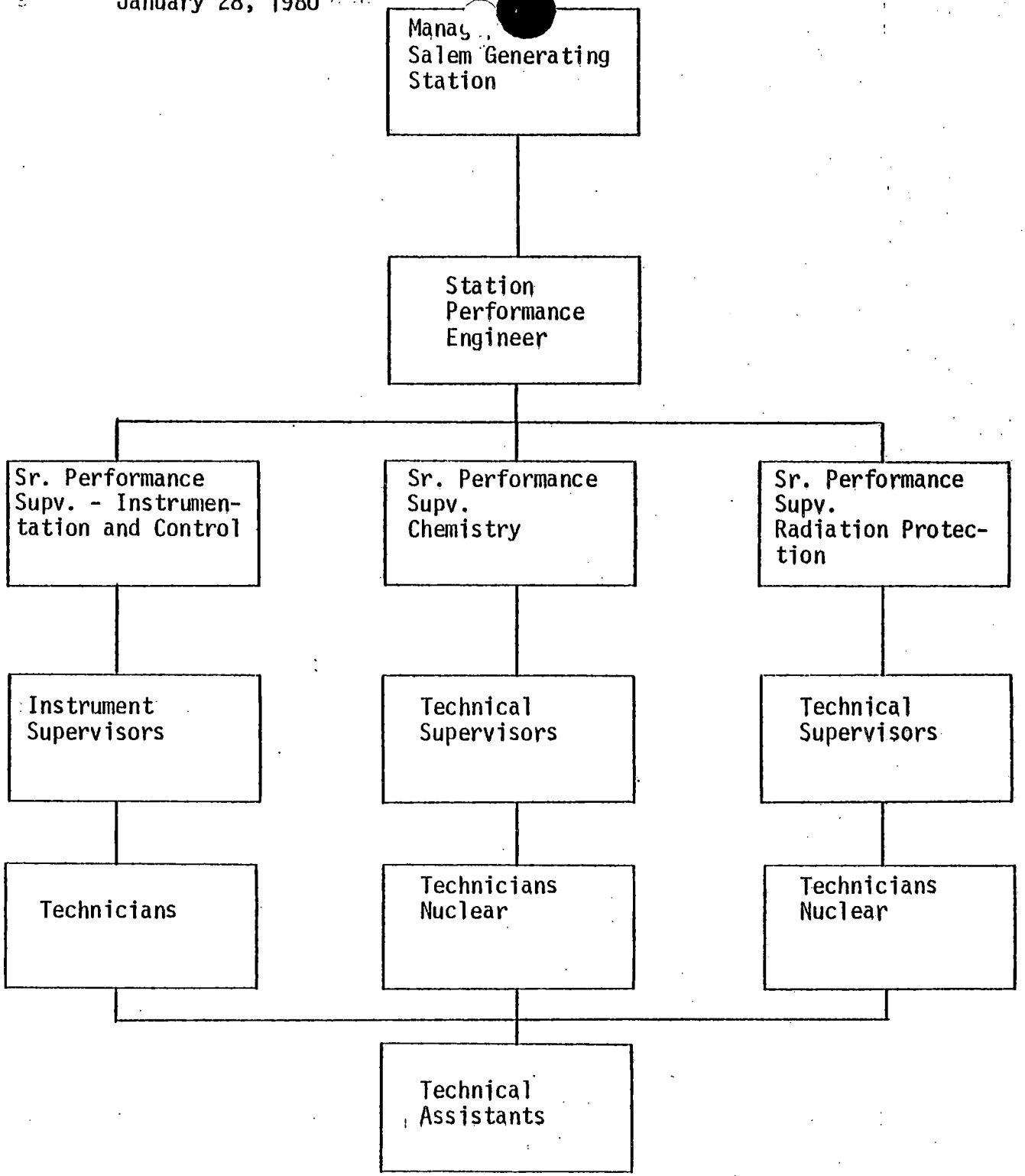
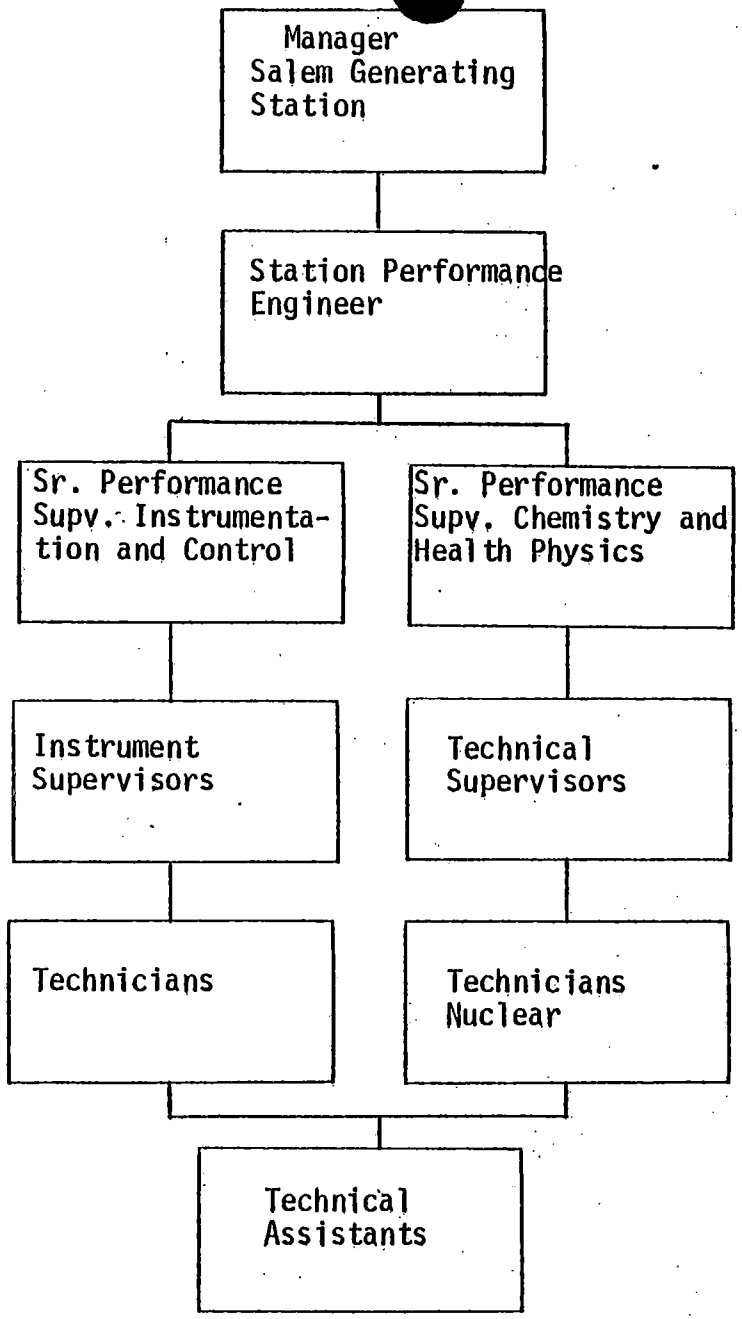


Figure 2 Organization as depicted in Current Technical Specification



1.2 Scope of Responsibilities and Authorities

Observations during this period of review indicated that the Senior Performance Supervisor-Radiation Protection provided adequate direct contact and oversight of the Radiation Protection function. The individual was aware of the general status of the program and the status of in-plant activities affecting the program.

Information feedback, although not a formalized system, appeared adequate enough for the program to function.

The Radiation Protection Program's authority, management reporting chain, and scope of responsibilities are documented in the Station Administrative Procedure, AP-24, "Radiological Safety Program", Revision 2. This document does not, however, describe the current program being implemented. The Radiation Protection Program within the last six months has been in a transitory stage primarily due to the correction of deficiencies identified in internal audits by the Station Quality Assurance group, and appraisal by management of the Performance Department. Major problem areas identified included:

(1) inability of the current organizational structure to efficiently provide job experience and training (sufficient to meet the requirements of ANSI-N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel") to personnel intended to fill technician level positions in the radiation protection group as well as chemistry and I&C;

(2) lack of a formal comprehensive training program to assure adequate technical proficiency in technician specialty areas, i.e., radiation protection; chemistry and I&C;

(3) administrative difficulties in the Performance Department in providing effective management oversight for the specialty areas of Chemisty, I&C, and Radiation Protection due to the diverse nature and specialization required in each program;

(4) inherent program inflexibility, particularly in the Radiation Protection area, due to technician job specifications and functional descriptions contained in the current union/management agreement that fail to recognize specialization attributes for technicians.

The recognition of these weaknesses by the Performance Department has resulted in the initiation of changes in many program areas, particularly, procedure development and revisions to emergency planning, personnel training, organizational structure, and manpower allocation.

Due to these changes already underway, AP-24 is being revised to reflect station policy, organization and responsibilities regarding Radiation Safety. Other implementing documents which are also undergoing revision are the Performance Department Manual (a delineation of administrative functions, policies, responsibilities and instructions) and the Radiation Protection Manual (detailed description of the Radiation Safety program). Procedures for direct radiation protection implementation are contained in the Radiation Protection Instructions, and are also being subjected to further development and revision.

The adequacy of these efforts is contingent upon support and approval of PSE&G corporate management which, up to this time, has not been expressed.

From the foregoing observations it was concluded that, at the station level, there has been a recognition of the program deficiencies affecting the area of radiation protection, and the development and implementation of plans for resolving these deficiencies. The ability of the organization as it stands at the present time is questionable in regard to its technical competence and capability.

Twenty-four hour shift coverage is maintained by both contractor and station personnel. A Technician - Nuclear (TN) is supposedly given the responsibility for health physics coverage on the backshifts.

Conceptually this appears adequate, however, in actuality TNs have no direct involvement in normal in-plant health physics activities. On the backshift the TN usually works in the Chemistry function or in the counting room, and is generally not current with the radiological status of the plant or jobs in-progress. These activities are left to the contractors. Contrary to the licensee's intentions, it is generally the contractors, not the TN that provides backshift health physics coverage.

In terms of functional responsibility, contractors provide the entire range of technical and administrative support for the Radiation Protection program, including the management of solid radioactive waste, HP technician training, procedure development, emergency planning, and administrative and clerical support. In addition the entire in-plant operational health physics activity (responsible for radiological surveys, direct coverage of personnel performing work in the radiologically controlled area, and the determination and identification of the radiological status of the controlled area) is supervised and performed by contractors.

The same is true for Radiation Exposure Permit (REP) planning. Contractor personnel are responsible for planning and evaluating the radiation protection techniques used to perform work in radiologically controlled areas, including ALARA considerations.

Contractors also provide all personnel required for whole body counting and portable instrumentation calibration and maintenance.

The direct involvement of PSE&G's personnel in the radiation protection program (accepting direct management from the Senior Performance Supervisor) is limited to dosimetry, records maintenance, operation of counting equipment, and the respiratory protection program. Even in these areas, contractors provide up to 50% of the manpower requirements.

From the interviews with several licensee personnel, the Radiation Protection Group conceptionally does have adequate authority to control activities on-site. However, the Radiation Protection Group is not currently recognized in the site emergency plan and does not have clearly defined responsibilities for such an event. If an emergency had occurred during this assessment, the group would make an effort to align itself in the recognized emergency organization on a "ad hoc" basis. Certainly its effectiveness would be compromised as confusion regarding responsibilities and reporting chain would likely occur. This particular item is further discussed in Section 6.0, Organizational Control Of Emergencies.

The Senior Performance Supervisor - Radiation Protection reports to the Station Performance Engineer, Performance Department (Figure 1). While Instrument and Control, and Chemistry are well-suited to alignment with the Performance Department responsibilities because of the production-oriented aspect of those activities, the same is not true of Radiation Protection. By its nature, it is safety-related and responsible to both management and employees, and is a very specialized area with a scope and responsibility much diverse from the other activities in the Performance Department. As such, it should be independent from production divisions.

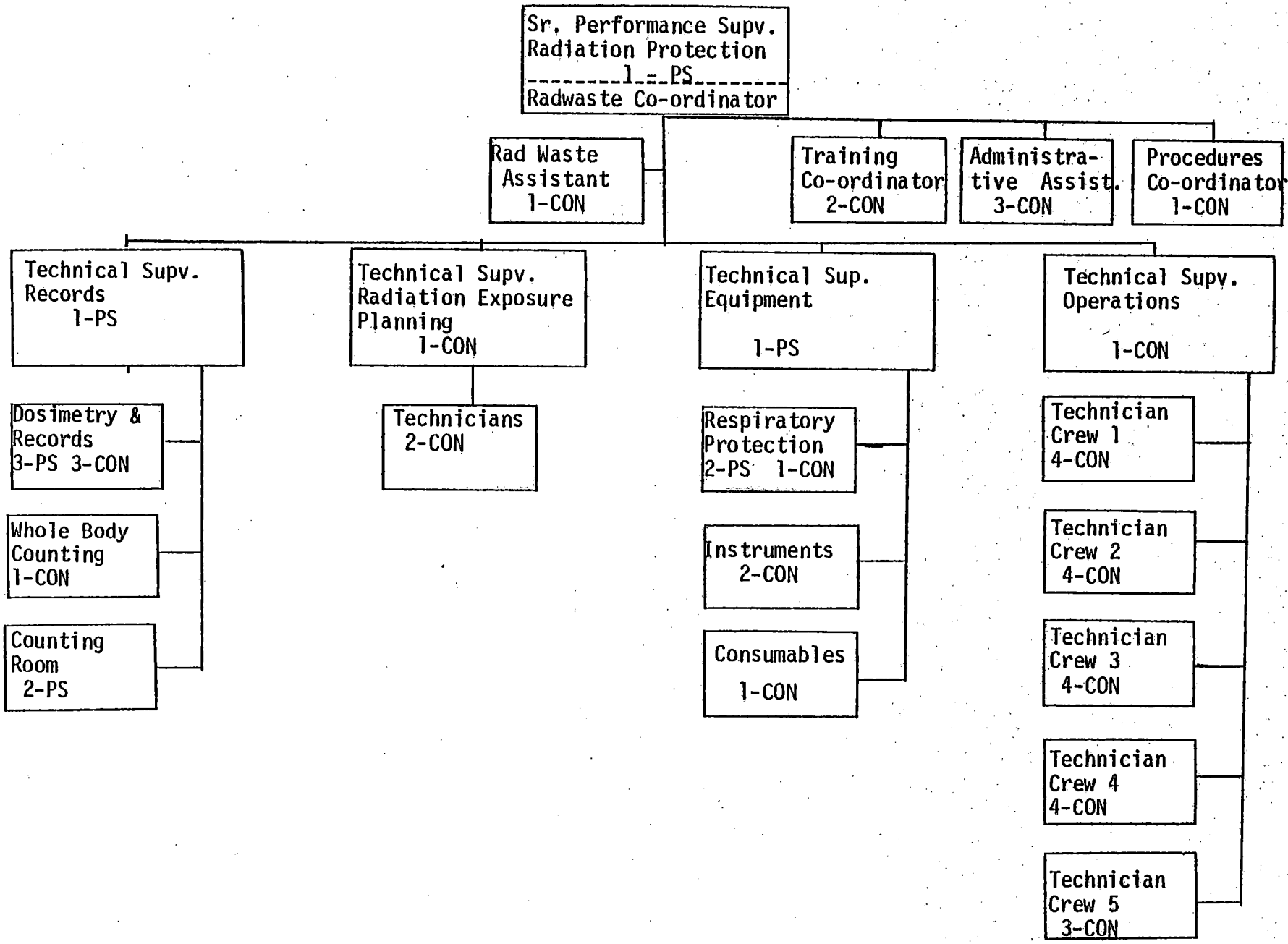
The proposed reorganization of the Performance Department recognizes this management problem but does not provide adequate resolution. It is recommended that this area be evaluated and revised as necessary to assure that the Radiation Protection group is independent of organizations that have direct production responsibilities.

1.3 Staffing

Figure 3 represents a staff commitment of approximately 55 people. Though a major improvement over the previous structure, particularly in the recognition of the need for specialized management of crucial aspects of the program; the need for technical and administration support, and for manpower resources sufficient for a two unit operation; it is not a true reflection of the PSE&G management team's commitment to the Radiation Protection aspects of the stations operation.

PS Public Service Employee
CON Contractor Employee

Figure 3 Combined Radiation Protection Organization



The actual PSE&G commitment of personnel resources to the radiation protection organization includes one Senior Performance Supervisor - Radiation Protection; two Technical Supervisors, four qualified Technicians - Nuclear (TN), and about five Technical Assistants (TAs) who are not dedicated to any particular activity in the Performance Department. TNs rotate assignment between Chemistry and Radiation Protection; and the TAs rotate assignment between I&C, Chemistry and Radiation Protection. The result is about twelve people to support an anticipated two unit operation. The rest of the personnel are contractor supplied radiation protection personnel.

Of a staff of approximately 55 people, 80% are contractors. This inordinately heavy reliance on contractor personnel for normal operations would obviously carry over to off-normal or emergency conditions where contractors would provide the primary manpower resource.

Contractor personnel are used normally to supplement or augment the existing radiation protection staff in off-normal situations, e.g., outages. In the case of Salem, contract personnel essentially are the radiation protection staff.

While contractor personnel may be as technically qualified and capable as PSE&G's own personnel, inordinate reliance on personnel who may not be familiar with the stations design, characteristics and procedures, and who are subject to continual turn-over (the majority of contract technicians are at Salem for only six months) is undesirable. Additionally, though contractor personnel are responsible for the most substantive elements of the program, they are not subjected to any specialized training or retraining to maintain proficiency in the health physics specialty (See Section 2.0, Personnel, Selection, Qualification and Training).

There appears to be adequate numbers of personnel (predominately contractors) in the Radiation Protection organization to maintain normal operations for a single unit facility. Operation of additional units may require additional staffing.

At this time, essentially all of the technical and managerial expertise in the area of radiation protection is vested in one individual available on-site, the Senior Performance Supervisor - Radiation Protection. There is no planned back-up capability for this individual. In the case of prolonged absence, his responsibilities would fall to significantly less qualified individuals who would be unable to effectively administer this area.

Alternate personnel, outside of the Radiation Protection organization, that the licensee might consider, are not being developed in any manner to assure that they are current with the program's status, the radiological plant status, or the administrative functioning of the organization.

In response to this concern, the licensee has committed to developing an individual to act as alternate for the RPM in his absence. To this end, the Corporate Health Physicist will be the interim back-up to the RPM, with an established plan to maintain a sufficient knowledge of the program and the plant's status to enable him to function effectively if required.

2.0 Personnel Selection, Qualification and Training

2.1 Selection Criteria

The only selection criteria formally applied are specified in ANSI-N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel." In the case of technicians, it is this selection criterion (2 years of related experience) that is applied to both PSE&G and RSI to select personnel for responsible positions. However, currently this selection criterion, i.e., a person having 2 years previous experience in the Health Physics specialty is also generally presumed to be qualified as a Health Physics technician.

This is particularly true in the case of contractor personnel who are not subjected to any training or retraining in their specialty as in plant specific areas such as plant systems.

2.2 Qualification Criteria

The only formal standard applied to the qualification of personnel is ANSI-N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel." Due to the licensee's method of developing personnel, particularly technicians, the required application of this standard has led to the current situation of inordinate reliance on contractor personnel.

The current program attempts to qualify and train technicians so that they are capable of performing activities in Instrument and Control, Chemistry and Health Physics. The development of proficiency in Health Physics technicians is further confounded by continuously rotating the personnel among all three specialties as in the case of Technical Assistants, and among the Chemistry and Health Physics specialties as in the case of Technicians-Nuclear. The result of this attempt to cross-train technicians is that personnel are not afforded sufficient time and experience to appreciate and develop the technical skills necessary to perform in a responsible position. This has led to the inability to promote within the organization (because of a lack of personnel meeting the minimum selection criteria), and has therefore forced the licensee to seek the required technician support for its Radiation Protection Program from contract organizations. As previously mentioned, contractor personnel provide as much as 80% of the program requirements.

The licensee's failure to develop and implement a technician retraining program to assure that the technicians' skill and level of knowledge is maintained satisfactorily also contributes to overall lack of technical proficiency of personnel. Though some type of retraining has

been performed, it was done without reviewable lesson plans, formalized procedures, or training documentation. Currently, another retraining session is being performed, but again lesson plans, training procedures and training documentation have yet to be developed.

2.3 Training

2.3.1 General Radiation Protection

The licensee's general radiation protection training for all employees and radiation workers was reviewed. All employees receive a lecture training session on radiation protection, along with lectures on the station's emergency plan and security system, as part of the General Employee Indoctrination. This indoctrination lasts one day for those completely unfamiliar with station procedures and radiation protection principles. For experienced personnel, some portions may be deleted with permission of the Senior Performance Supervisor-Radiation Protection; however passing of qualifying tests may still be required. For those to be designated as radiation workers with unescorted access to the controlled area, a two-day course entitled Radiation Protection-I is required with a passing grade on the final test.

After review of the current lesson plan and course handout for the radiation protection portion of the General Employee Indoctrination and after receiving an abbreviated version on entering the plant, this training was found to be adequate for individuals not working in, or just occasionally frequenting, the controlled areas.

The Radiation Protection-I training was reviewed by attendance at the second of the two-day lecture series, review of the course handout, and an interview with station employees chosen from the security force, who had recently (November 1979) taken the course and had no previous radiation worker experience. This course appeared adequate as initial training for an inexperienced radiation worker. Several weaknesses were noted, however:

1) The origins of the radioactive materials in the plant operations are not well explained (i.e., fission products from fuel; activation products from primary systems).

2) Some outdated or inaccurate information on plant procedures was presented (i.e., old REP/EREP procedures and exposure card procedures were presented).

3) The distinction between dose rate and accumulated dose was weakly presented. It was made specific for reading dosimeters, but not as a general principle.

4) The requirement of 10 CFR 19.12 that workers "shall be instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licensees or unnecessary exposure to radiation or radioactive material" was not addressed.

2.3.2 Contractor Training - Health Physics Personnel

From interviews with representatives from the Health Physics contractor organization (RSI) and the licensee's representatives it was learned that contracted Health Physics technicians are not subjected to any type of formalized training in their specialty or in plant systems. Additionally, a review of the contract organization records indicated that the average length of time that contract personnel are at Salem is about six months. This affords the individual little time to become familiar with the facility and results in a near constant turnover of personnel.

The result is that the majority of the elements in the SALEM HP program is being implemented by personnel who are not formally trained (or retrained) in HP and who have limited experience and familiarization with the facility. The licensee exercises very little control over the quality of contractor personnel except for those who are placed in responsible positions (for which only 2 years of previous experience is required).

3.0 Exposure Control and ALARA Implementation

3.1 External Exposure Control

3.1.1 Dosimetry Program

The licensee uses an in-house Harshaw thermoluminescent dosimeter (TLD) system in conjunction with direct-reading pocket dosimeters to evaluate external exposure. The TLD system includes a two chip LiF-700 TLD badge; a Harshaw model 2271 automated personnel monitoring TLD system, consisting of a dosimeter identifier, card loader, card reader, Sr-90 calibrator; a model 2000B Automatic Integrating Picoammeter; a teletype; and Univac 1110 computer.

The TLD badge contains two LiF-700 chips. One chip has a cadmium shield and is used to evaluate exposure from gamma rays, and the second chip is essentially unshielded and is used to evaluate exposure from gamma rays and beta particles. Beta dose equivalent is determined by subtracting the response of the shielded chip from the response of the unshielded chip (the licensee equates roentgen and rem).

Extremity exposure is evaluated through the use of special TLDs, as outlined in Health Procedure PD-15.3.021, "Special Personnel Monitoring." Neutron exposure is determined with a Landauer "neutrak" system. Portable neutron instrumentation including the PNR-4 "rem ball" and AN/PDR-70 "snoopy" are also available to assist in neutron exposure evaluation.

The routine dosimetry program is inadequate in the area of control of pocket dosimeters. Dosimetry procedures do not exist to ensure control of these dosimeters. Such procedures are a necessity since approximately 400 pocket dosimeters were lost or damaged during the licensee's last outage.

Additionally, procedures delineating the dosimetry program during emergency conditions do not exist. Considerations with respect to backup systems, alternate offsite facilities, and logistics should be made and the results incorporated into the procedures prepared for these areas.

3.1.2 Quality Assurance

The Quality Assurance (QA) program that the licensee conducts on the Harshaw TLD badge is adequate. It is noted that external exposure is being slightly overestimated due to no correction for fading of the TLD chips being made by the licensee. (The auditors noted that the pre-heat cycle which the licensee possesses and intends to use will minimize this overestimate.)

QA procedures do not exist for the recently adopted "neutrak" neutron TLD system. Such procedures should include a review frequency as well as appropriate acceptance criteria. Suitable acceptance criteria exist in ANSI N13.11, "Criteria for Testing Personnel Dosimetry Performance", not only for neutron irradiation but also for beta and gamma irradiation (independently and in mixed fields). The licensee does not appear to be considering the guidance which is available in Regulatory Guide 8.14, "Personnel Neutron Dosimeters."

It is recognized that the licensee participated in the University of Michigan intercalibration study; participation in intercalibration studies should continue. However, records indicating the results of the licensee's participation were not available for review at the site, but were instead located at the corporate offices. From interviews with management who were responsible for the station's program, it was apparent that the results of these tests, and the licensee's own performance were not made available to them, and therefore they were unaware of the capabilities of their dosimetry program.

3.1.3 Exposure Review

External exposure is measured in two ways simultaneously: 1) daily, by self-reading pocket dosimeter, and 2) biweekly, by TLD. Exposure information from both systems is placed on the Univac 1110 computer in the program file entitled, "Personnel Radiation Exposure Monitoring System" (PREMS). Several programs have been written to store exposure information in a variety of ways, which allows for cross-reference capability.

External exposure information is disseminated on a daily basis in the form of computer printouts. The printouts are distributed to appropriate department heads, and a listing of all personnel is maintained by the health physics group. Exposure review is thus performed not only by the respective department heads but also by health physics.

Exposure information is being compiled on each RWP issued, which allows an evaluation of exposure expended versus job function. This information can be used to supplement and strengthen the licensee's ALARA program.

Health Physics procedures PD-15.1.012, "Post Operation Debriefing," and PD-15.3.014, "Alert System for Personnel Exposure Control," describe additional exposure review programs and their implementation.

3.1.4 Barriers

3.1.4.1 Administrative

Station administrative control limits on external exposure are contained in AP-24, "Radiological Safety Program." The control limit is 100 mrem per week under normal operating conditions. A blanket extension of all plant personnel to 300 mrem per week was made by plant management in order to accommodate the last outage. As of the time of the appraisal, some four weeks after the end of the outage, the extension had not been withdrawn. However, personnel exposures in this period usually were less than 100 mrem/per week. The licensee's representative indicated that this administrative limit was under review to determine if the limit could be reset.

The weakness of the administrative control program is also manifested in the lack of any health physics representation on the station's outage planning group. Such representation is necessary so that radiation work can be planned ahead to assure conformance with administrative controls and the reduction of exposures to levels as low as reasonably achievable. Steps should be taken immediately to secure and maintain health physics representation on this important group.

3.1.4.2 Physical

The auditor reviewed the licensee's posting and control of radiation areas, high radiation areas, radioactive material areas, and the labelling of radioactive material during tours of the plant. 10 CFR 20.203(f) requires that each container of licensed material bear a durable, clearly visible label identifying the radioactive contents and providing sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof to take precautions to avoid or minimize exposures. During a tour of the plant; numerous yellow bags of radioactive material were found stored in various areas of the unit one auxiliary building. The highest radiation level on the bags that were surveyed by the auditor was 4 mR/hr on contact with the bag. The material was not labelled as radioactive material and did not meet any of the exemptions presented in 10 CFR 20.203(f)(3). Although licensee representatives stated that yellow bags were used only for radioactive material, during a tour of the plant one licensee representative pointed out some clean material that was in a yellow bag. Station Procedure AP-24 states that yellow bags shall only be used for radioactive material. The explanation provided was there were no other bags available so yellow bags were used for clean and radioactive material. The auditor stated that

failure to label containers of radioactive material with a clearly visible label identifying the radioactive contents and providing the additional information required was in noncompliance with 10 CFR 20.203(f). (272/80-03-01)

10 CFR 20.203(a)(2) states that the licensee may provide on or near radiological warning signs additional information which may be appropriate in aiding individuals to minimize exposure to radiation or to radioactive material. During tours of the plant, the auditor noted that the licensee does not have radiation/contamination levels posted on or near radiological warning signs. A licensee representative stated that the station relies on the briefing of the worker prior to beginning work each day to make him aware of the radiological hazards in the work area. However, discussions with station workers indicate that briefings are not given for entries made on Extended Radiation Exposure Permits (EREP). Access to radiation, high radiation and contamination areas are permitted for entries covered by an EREP. During one day, 80% of the entries into the Auxiliary Building were made using an EREP. Although licensee representatives stated that workers should receive a briefing prior to the first entry of the day, no system is established at the REP desk to ensure that a worker has received the required briefing.

3.2 Internal Exposure Controls

3.2.1 Dosimetry Program

The dosimetry program for assessing internal exposures consists of whole body counting and urinalysis. The licensee is currently using a shadow shield whole-body counter supplied and administered by a contractor. The licensee intends to purchase a chair-type counter equipped with three sodium iodide (NaI) detectors and assume control of the whole-body counting program from the contractor when the new system becomes functional. Appropriate procedures for using the new system and evaluating the results obtained are still being developed.

Plant procedures governing whole-body counting are deficient in that they fail to require whole-body counts for new hires and persons terminating work at the station. In the event an individual sustains an intake of radioactive material at this facility, data (i.e. incoming baseline and termination whole-body counts) would be necessary to evaluate the intake and determine if in fact the exposure had occurred at this facility. Therefore, entrance and exit whole-body counts are necessary to evaluate any internal deposition of radioactive material and the resultant dose, particularly for those individuals frequenting the controlled areas of the facility.

The licensee's urinalysis program exhibited similar shortcomings. Plant procedures do not specify criteria for collection methods, analysis of results, or action levels. This, as well as other site-specific information, are vital to the establishment of an adequate urinalysis program.

Provisions for operation of the exposure control system in off-normal or emergency conditions are deficient in that procedures detailing the off-normal operation of the system have not been established. These procedures should be developed in sufficient detail to ensure that adequate exposure control services and staff are available during emergencies. Such factors as alternate sites, movement of exposure control equipment, augmentation by off-site agencies, special controls, personnel accountability, and other changes necessitated by changed and unusual conditions should be considered. Further discussion of this area is containined in Section 6.0, "Organizational Control of Emergencies," and Section 9.0, "Emergency Plan Implementing Procedures."

In discussing the evaluation of the dosimetry program with licensee personnel the auditor stressed the need to consider the requirements and recommendations of ANSI N343, "American National Standard for Internal Dosimetry for Mixed Fission and Activation Products," in establishing an adequate internal dosimetry program.

3.2.2 Quality Assurance

A calibration of the whole-body counting system performed by contractor personnel was observed. The contractor procedures were found to be adequate to ensure that an acceptable calibration is performed and included the use of NBS-traceable sources and phantoms. The requirements and recommendations of ANSI N343 with respect to calibration are being met.

In addition to calibrations as noted above, daily checks of system performance are made and are adequate to ensure the maintenance of the whole-body counting system.

3.2.3 Exposure Review

Procedures for review of internal exposure do not exist. As currently practiced, exposure review is performed initially by the contractor technicians in charge of the whole-body counting system. Bioassay results are forwarded to the records section for inclusion in the individual's file. Health Physics procedure PD-15.11.009, "Bioassay Program", should be amended to include a formal exposure review system. (272/80-03-02)

3.2.4 Barriers

The auditors reviewed the licensee measures to control and/or reduce internal exposures. In this regard administrative and physical barriers were considered.

3.2.4.1 Administrative

The licensee's posting and control of airborne radioactivity and contamination areas and general housekeeping during plant tours was reviewed. During these tours, it was noted that the licensee did not have contamination levels posted on or near warning signs to aid individuals in minimizing exposure as required by 10 CFR 20.203(a). A licensee representative stated that reliance is placed on the briefing of a worker prior to the beginning of work each day to make him aware of the radiological hazards in the work area. Discussions with station workers, however, indicated that such briefings are not given to workers who make entries on Extended Radiation Exposure Permits (EREPs), even though access to contaminated areas are permitted by an EREP. It was determined that there was no system established at the REP desk to ensure that workers receive the required briefing.

During the tours of the Unit 1 auxiliary building, it was also noted that general housekeeping was poor. As an example, anti-contamination clothing, tools and equipment, polyethelene bags and paper were scattered about. It appeared that the space behind the Boric Acid Evaporator Pond was being used as a trash receptable. It was noted that poor housekeeping will compound the problem of contamination/control and may even be a potential fire hazard.

3.2.4.2 Physical

By review of records, observations, and discussions with licensee representatives, the auditor evaluated the licensee's respiratory protection program including air sampling, engineering controls, MPC-hour controls, medical qualification, training, maintenance and issue controls for respirators.

The licensee currently uses respiratory protective equipment to limit the inhalation of airborne radioactive material, however, they do not take credit for the use of such equipment when estimating exposures of individuals. Credit is not taken for respiratory protection devices because the respiratory protection program does not meet the requirements for an acceptable program specified in 10 CFR 20.103(c) and Regulatory Guide 8.15.

Although the licensee committed to having an acceptable respiratory protection program that met the requirements of Regulatory Guide 8.15 prior to the last Unit 1 refueling outage, action on this commitment still has not been completed. The records used to identify workers qualified to wear respirators contain errors and are incomplete.

In reviewing the licensee's respiratory protection procedures, it was noted that 10 out of 25 written procedures are in various stages of preparation or review and the training received by workers requires considerable upgrading to be effective. Licensee management attention was directed to this area, with a recommendation to complete program implementation.

Specific deficiencies in the licensee's respiratory protection program were identified during the appraisal. Most of the deficiencies identified were attributable to a lack of a review of day-to-day operations of the program by the individual assigned responsibility for respiratory protection and included failure of the individual assigned responsibility for the program to assume responsibility for the total respiratory protection program.

The following deficiencies were noted:

-- On February 4, 1980, two contract health physics technicians were issued self-contained breathing apparatus (SCBA) for entry into Unit 1 containment. Upon review of the respiratory protection status sheet, which indicates the qualifications of individuals to wear respirators, the inspector noted that one of the individuals was not medically qualified to wear a respirator. The daily computer listout of radiation exposure information also indicated the individual was not fully qualified to wear a respirator. Although a copy of the technicians medical qualification was not in the licensee's files, a copy was obtained from the on-site coordinator for the contractor. The auditor stated that the technician issuing the respirators must be able to rely on the status sheet or computer listout. Individuals who are not fully qualified should not be issued respirators. To ensure that the issue records (status sheet/computer listout) are accurate, the licensee should conduct a record-by-record verification of data and should institute appropriate quality control checks and supervisory reviews of changes to the list.

-- An auditor survey of several respirators that had been cleaned and inspected and temporarily stored in the respirator maintenance room was made. The radioactive contamination levels on all respirators surveyed were less than the limits specified in station procedure PD-15.6.003, "Respiratory Protective Equipment Cleaning and Disinfection". During this review, it was noted that the respirator inspection tags for the surveyed respirators had not been signed indicating the respirators had been inspected and found ready-for-issue. A licensee representative stated that to "get around" the requirement in station procedure PD-15.1.009, Respiratory Protective Equipment Quality Assurance, to reinspect on a monthly basis all respirators awaiting reissue, respirators are cleaned, disinfected, surveyed and inspected, however, the inspection tag is not signed. As respirators are needed, they are reinspected and the inspection tag signed. It was noted during the review of this area that no more than four respirators

were observed to be in the issue room in a ready-for-issue status. In the event of an emergency requiring respiratory protection, an adequate number of ready-for-issue respirators would not be immediately available. Respirators in the storage bins should be inspected and made ready-for-issue. It was also noted that respirators temporarily stored in the bins in the respiratory maintenance area were stacked four or five high. The auditor stated that NUREG 0041, Section 9.3 recommends that respirators be stored so that they are not damaged by adjacent equipment or twisted out of their normal configuration. A licensee representative stated that the storage of respirators would be changed to follow the recommendations of NUREG 0041.

-- The auditor observed a technician prepare the sodium chloride quantitative fit test booth for use and underwent a fit test. The auditor ascertained that technicians were temporarily assigned to perform fit tests as a collateral duty and that the records were being filed without an independent review of the test results by the individual responsible for the respiratory protection program or another technically qualified individual. The auditor stated that the test results should be reviewed by a technically competent individual for accuracy and adherence to procedures, and signed by the reviewer before filing.

-- The auditor attended the respiratory protection phase of the radiation protection training (RP-1) received by new employees and visitors on January 30, 1980. The training received did not cover the basic material recommended in NUREG 0041, nor did it cover the material required by Station Procedure PD-15.2.003, "Respiratory Protection Training and Fit Testing." During the presentation on January 30, approximately twenty minutes were devoted to respiratory protection training. The following areas were not discussed during the training:

a. construction, operating principles and limitations of the respirator and selection of the respirator which is the proper type for a particular purpose,

b. reasons for using respirators and explanations of why more positive controls are not used,

c. procedures for insuring that the respirator is in proper working condition,

d. checking respirator for adequacy of fit,

e. practical (field) training in donning a respirator, and wearing it to develop confidence in ability to use the device properly.

-- In discussions with the auditor, licensee representatives stated that a detailed outline for respiratory protection had been provided to the station training group when they assumed responsibility for that phase of the radiation protection training. However, due to time restrictions, the amount of material covered was reduced. The auditor stated that the respiratory protection training should be revised to include all the training recommended in chapter 8 of NUREG 0041. The auditor also noted that the instructor presenting the training was unable to answer specific technical questions from the audience concerning the program. The instructor should have a thorough knowledge of the respiratory protection program at the station. This could be obtained by having the instructors attend the training courses for health physics technicians in such areas as; selection and use of respirators, maintenance, quantitative fit test, etc.

-- The licensee does not presently have onsite combination charcoal/high efficiency filter cartridges for use with the Norton respirator to minimize the exposure of individuals to radioactive Iodine in the event of an accident. A licensee representative stated that the combination cartridges will be procured. (272/80-03-03)

3.3 Surveillance Program

The auditor reviewed selected records of radiation, contamination, and airborne radioactivity surveys performed between July 1979 and February 1980, discussed the survey results with licensee representatives, observed technicians performing various surveys and performed independent surveys of areas. The detail and frequency of surveys performed by the licensee appeared to be adequate. However, the following deficiencies were noted:

-- No continuous air monitors with an alarm function were located on the 55' elevation or the 64' elevations of the Unit 1 auxiliary building. A licensee representative stated that the station does not have enough continuous air samplers to locate samplers on the 55' elevation and the 64' elevation. High airborne radioactivity detected in samples taken January 21, 1980, on the 64' elevation in the hallways outside the gas stripper pump room, would indicate a need to have continuous samplers on this level as well as the 55' elevation. A review of the latest instrument and equipment inventory revealed that 9 air monitors were on hand and only five were in service, indicating a lack of available equipment.

-- The auditor accompanied and observed a technician as he performed a routine loose surface contamination survey in the hallways of the auxiliary building, counted the smears and documented the survey. The auditor noted that the technician used 20% as the efficiency of the RM-14 count rate meter with HP-210 probe. When questioned concerning the use of this efficiency, the technician stated that the efficiency of the instrument was 10-20%, however, he was instructed to use 20% to be conservative. The inspector checked the efficiency of four different RM-14/HP-210 instruments utilizing the 2 inch Cobalt-60 check source (S-104) that is used for calibration of the BC-4 counter. The efficiency of the instruments were 15-16% when the source was held one quarter to one half inch away from the detector. This is the distance that several technicians stated was the smear-to-detector distance they used for evaluating smears. The use of an efficiency of 20% would result in a 33% error in the non-conservative direction for smears evaluated using the RM-14/HP-210 instrument. The auditor stated that the actual efficiency of each RM-14/HP-210 instrument should be determined and that value used or an arbitrary efficiency that is conservative should be selected (e.g., 10%). It was also noted that the RM-14/HP-210 instruments in the counting room are not response checked periodically to verify that they are functioning properly. These instruments should be response checked prior to use and at least daily while in continual use in accordance with the guidelines established in ANSI N323-1978.

The auditor reviewed the licensee methods for controlling work in radiologically controlled areas. The station implemented a new radiation exposure permit (REP) procedure (Station Procedure PD-15.1.013) during this appraisal effort. Although the procedure is new, most workers and radiation protection personnel are at least familiar with how the system works. The following specific discrepancies were noted in the control of work using the REP system:

-- The procedure requires that a copy of surveys (radiation and contamination) must be in the REP/EREP folder for review by the worker. It further requires that the survey be less than 24 hours old. Several entries were made on REP's on February 5, 1980, for which the survey in file was more than 24 hours old. More current surveys were later found after the discrepancy was brought to the attention of the licensee.

-- Station Procedure PD-15.1.013 requires that workers obtain an authorization to work on a particular REP from their supervisor and to present this authorization to the REP desk prior to entering the restricted area. A review of REP's on February 5, 1980, revealed that workers had signed in on a REP, however, the authorization slip was not in the REP file.

-- The station procedure requires a prework and a post-work ALARA review of each REP issued. Observations by the inspector and a review of completed REP's indicates that only a perfunctory review is performed. Numerous REP's in file had the prework, post work or both sections blank.

The auditor stated that the individual assigned the responsibility in the radiation protection group for the review and issue of EREP's and REP's is devoting an excessive amount of his time performing administrative tasks, such as filing routine surveys; task which could be performed by a clerk, rather than a health physic technician. A licensee representative stated that very rarely does the group which will perform the work meet with the REP reviewer and discuss the work to be performed and the necessary radiological controls which will be required. The auditor stated that pre-REP discussions should be held as well as prework and post work briefings to be attended by the individual who will perform the work and the HP technicians who will provide radiation protection coverage for the work.

During a discussion of station procedures with a licensee representative the representative stated that maintenance and operations procedures do not routinely receive health physics review prior to issuance. The auditor commented that all procedures involving work on radioactively contaminated systems, handling of radioactive material or work in radiation areas should be reviewed by the radiation protection staff as far in advance of the work as possible. This review is necessary

to insure that adequate consideration is given to health physics aspects of the work, including staffing, availability of health physics equipment and supplies, temporary shielding, engineering controls to minimize airborne radioactivity and to keep exposures ALARA.

Radiological survey records, from 1978 and 1979 which are permanent records that Technical Specifications require to be retained for the life of the plant, are being stored in cardboard boxes in the REP room. A licensee representative said the station was in the process of microfilming the records. The auditor stated that survey records should be promptly delivered to document control for retention and/or microfilming or they should be stored in fire-resistant cabinets.

The auditor observed personnel frisking themselves and using the portal monitors. There appears to be no consistency in how much of the individual's body is frisked, nor how much time is necessary to ensure that the contamination levels are below the limits established by the station. Some individuals frisked the entire body in 10-20 seconds, others frisked their hands and feet and still others frisked only their hands. The auditor noted that RP-1 Training Course handout states the individual should frisk his entire body. The licensee should post signs at the exit to the controlled area, stating what parts of the body should be frisked and how long a satisfactory frisk should take. The licensee should also station a member of the health physics staff at the exit point periodically to observe personnel frisking practices as a method of ensuring that proper frisking practices are being used. The auditor also noted that at shift change the control point for entry into the auxiliary building is so crowded that contaminated tools and equipment could be removed from the auxiliary building without detection. The auditor stated that the flow of traffic into and out of the auxiliary building should be separated and exiting personnel kept under surveillance.

At the request of the auditor, a licensee representative checked the alarm set point of RM-14/HP-210 personnel friskers at the control point. The alarm for one instrument was set at 300 cpm over background and the other instrument was set at 400 cpm over background. Licensee representatives stated that the alarm set point should be 200 cpm over background. The auditor stated that the equivalent count rate over background for 1000 dpm should be determined and this value used for the set point. Signs should also be placed on the instrument stating that the alarm set points are not to be changed except by qualified radiation protection personnel. The response of the friskers should be checked with a check source in accordance with the procedure specified in ANSI N323-1978 and the alarm set point verified prior to the first use and at least daily when in continuous use.

3.4 Radioactive Waste Management

3.4.1 Liquid

The licensee's installed liquid processing system consists of tanks and equipment for collecting, transferring, treating, monitoring, and

releasing radioactive liquids. Boric acid and radwaste evaporators are installed for processing the liquid waste before discharge to the Delaware River or reuse in the plant. Inleakage of brackish river water rendered the radwaste evaporator inoperable in 1978. Since that time, mixed bed portable demineralizers (contractor provided) have been used to process the liquid radwaste. The licensee was cited for failure to conduct a review, as required by 10 CFR 50.59, for use of the portable demineralizers in lieu of the installed radwaste evaporator during a previous inspection. A replacement radwaste evaporator is expected to be inplace and operational by the end of 1980.

According to licensee personnel, the primary water storage tank continues to experience oxygen absorption problems which render the water undesirable for use in the primary system. Consequently, the demineralized water tank is used as a source of makeup water instead of the primary water storage tank. Demineralized water storage tank water typically contains 0.05 ppm oxygen as compared with 0.5 ppm oxygen in primary water storage tank water. As a result of the oxygen problem, radwaste water is routinely discharged to the river after being processed through either the portable demineralizer or the boric acid evaporator.

Radioactive liquid releases are made on a batch basis, normally from the CVCS monitor tanks or the waste holdup monitor tank. The installed waste monitor tanks are not normally used because of their small volume. Liquid releases are quantified on the basis of pre-release and post-release (composite) analyses. A liquid release permit is used to provide management control over radioactive releases. In addition to providing authorization and documentation for the release, the release permit is used to determine the allowable release rate and the liquid effluent monitor setpoint. The auditors reviewed selected release permits for calendar year 1979. No significant discrepancies were identified. Neither the technical specification limits nor the design objectives have been exceeded for liquid releases. This conclusion is based on a review of semiannual effluent report data, discussions with licensee personnel, and a selective review of 1979 discharge permits. No significant discrepancies from the technical specification surveillance requirements were identified. The composite surveillance analyses are performed by a contract laboratory, which was audited by the licensee.

Steam generator blowdown liquid is also monitored and sampled for radioactivity. No significant activity has been found in the blowdown releases. At present, steam generator blowdown is released to the river after neutralization treatment. According to licensee personnel, a modification to route steam generator blowdown back to the condenser for reuse has been initiated.

The annual curie quantities of radioactive liquids releases for 1977, 1978 and 1979 were approximately 60%, 80% and 90%, respectively, of

the five curie design objective. Liquid releases will increase with plant age unless further processing or reuse of radioactive liquids occurs. This matter was discussed at the exit interview. Although the volume and activity of liquid radioactive releases are not atypical for operating PWRs, a significant number of PWRs find it possible to operate with annual liquid releases totaling approximately 10% of the licensee's annual releases.

Liquid radwaste system and CVCS tankage consists of about 300,000 gallons storage capacity in shielded tanks. Available storage capacity at a particular time is dependent upon plant operations, but typically totals about 200,000 gallons, with the remaining 100,000 gallons occupied by liquids being collected/processed. The completion of Salem Unit 2 will essentially double the available storage and processing capacities. Planned cross connects between the two units will allow flexibility in operation of the systems.

3.4.2 Gaseous

The licensee's installed gaseous processing system consists of tanks and equipment for collecting, transferring, storing, monitoring, and release airborne radioactive wastes. Available treatment consists of storage in one of four waste gas decay tanks (WGDT) at up to 110 psig before release through the plant vent. The major potential sources of gaseous wastes are containment purges, WGDT releases, auxiliary [illegible]fuel handling building ventilation releases, and air ejector re[illegible]s. All of these potential release pathways exit the plant through one vent which is continuously monitored for noble gases and continuously sampled for particulates and iodines. A second monitor consisting of noble gas, iodine, and particulate channels, is normally aligned to the sample containment atmosphere but is realigned to sample the plant vent during WGDT releases and containment purges and in emergency situations requiring offsite dose predictions. Waste gas decay tank releases have been the major contributor to gaseous effluents to date. No detectable activity has been found to date in air ejector releases.

No significant problems affecting operation of the gaseous waste equipment were noted. Airborne relases have been low, less than 10% of the annual design objectives, since startup.

Containment purge and waste gas decay tank releases are quantified based on pre-release analyses. A gaseous release permit is used to provide management control over the releases. The trip setpoints for the WGDT effluent monitor is determined on the release permit. The approximately 30 WDGT release permits covering the last 10 months of 1979 and 11 containment purge release permits covering the first 6 months of 1979 were selectively reviewed. No significant discrepancies were noted. It was noted, however, that 20 of the 32 WGDT's

released were heldup for less than 24 hours between isolation and release. Only 2 of the 32 WGDT's released were heldup for more than 7 days between isolation and release. According to the Salem FSAR, the gaseous waste system is designed to provide a 45 day holdup in the WGDT's before release.

Normal gaseous release quantification is based on containment purge and WGDT pre-release grab samples, weekly grab samples of plant vent releases, and continuous plant vent iodine and particulate samples. As noted previously, in certain elevated release situations, the containment monitor (gas, iodine, and particulate channels) is realigned to sample the plant vent. Procedures exist for quantifying noble gas and iodine releases from the plant vent using this monitor. However, discussions with two control room operators and two shift supervisors revealed that the criteria for shifting the containment monitor to the plant vent were not well understood nor readily available in plant procedures. This item was discussed at the exit interview. The operating characteristics of these monitors are discussed in more detail in section 4.2.2 of this report.

Other problems noted were: (1) The licensee does not systematically review the plant vent noble gas monitor recorder for quantification of anomalous releases during the periods between weekly grab samples. (2) The vent for the steam generator blowdown atmosphere flash tank is located in close proximity to the outside ladder leading to the plant vent iodine and particulate sampler. On occasion, the sampler is not safely accessible due to ice formation (from flash tank vent moisture) on the ladder. (3) Licensee procedure PDV3.8.016 - Gaseous Radwaste Release Calculations (Rev. 2), contains an erroneous formula which had been routinely used for calculating total activity in WGDT releases on the gaseous release permits. The erroneous formual underestimates gaseous, iodine, and particulate release quantities by about 20%. The error did not affect release rate (or concentration) calculations and has not significantly affected the licensee's compliance with T/S release limits. The licensee's semiannual effluent reports were also not affected by the error since separate calculations are performed for these reports. (4) The gas analyzer has been plagued with repetitive moisture problems resulting in only 50% to 75% operability during 1979. (5) Procedures had not been developed for collecting and handling gaseous samples under accident conditions.

Plant vent grab samples are collected at the particulate and iodine sampler (194 foot elevation on outside of containment) and also at the containment monitor when it is aligned to the plant vent. Comparative data for the two sample locations was not available.

Containment samples for purge calculations are collected by making a containment entry. The containment monitor samples the same general area in containment (130') but is not used by chemistry personnel who take the grab samples. Licensee personnel stated that the grab samples were preferred because of a belief that they are more representative of the containment atmosphere than the installed monitor and because of difficulties in physically obtaining samples using the containment monitor. The chemistry procedure for collection of containment air samples (PD 3.5.061) refers to the use of the containment monitor and does not include procedures for collecting grab samples within containment. The licensee did not have comparative date of sample results by the two methods. According to health physics personnel, containment atmosphere samples are collected on a daily basis using the containment monitor sample lineup.

3.4.3 Solid

This area was previously reviewed in Inspection Report No. 50-272/79-31, dated January 21, 1980, and was therefore not subject to review during this appraisal effort.

4.0 Health Physics Facilities and Equipment

4.1 Facilities

4.1.1 Radiation Protection

Management's failure to adequately integrate the radiation protection function into the initial planning process is demonstrated in that the station received an operating license on August 13, 1976, it was not until mid-1979 that in-plant space and facilities were made available to the Radiation Protection group. Up to that time, the entire group (including supporting equipment, instruments, the dosimetry system, management personnel, etc.) occupied a trailer located outside of the Unit 1 Turbine Building, and remote from the areas (i.e., Auxiliary Buildings and Reactor Buildings) which required their attention. This item was initially identified in IE Report 311/78-13 and in IE Report 311/78-52. Since that time, space and facilities had been made available in the vicinity of the control point for most of the group's personnel and equipment. The Senior Performance Supervisor - Radiation Protection and the supporting administrative and technical staff, however, are still located in a trailer facility. According to a licensee representative, the remainder of the Radiation Protection group will be assigned space in another building currently under construction.

4.1.1.1 Analytical Laboratories

The licensee's analytical laboratories for Units 1 and 2 are located in the Auxiliary Building and consist of a counting room, chemistry laboratory, and sampling room.

The counting room is located on the Unit 2 side of the Auxiliary Building. The Senior Performance Engineer for Chemistry indicated that the room has increased shielding and its own air supply.

Alpha and beta counting capability is provided by a low-background, thin-window, gas-flow, proportional counter with automatic planchet handling (Beckman Model: Wide Beta II). Beta calibration is performed with an appropriate commerical Sr-90 source, and the frequency of calibration and background determination are adequate.

Tritium counting capability is provided by a Packard TRI-CARB Liquid Scintillation Spectrometer. Operation of the spectrometer was not observed during the site visit.

Gamma spectrum analysis capability consists of three shielded Ge(Li) detectors. Two detectors are connected to a Canberra Scorpio MCA/Computer System. The third detector is connected to a Canberra 8100 Series MCA. Both systems are capable of automatically counting, analyzing, and printing isotopic identification and concentrations

of liquid or gas samples in μCi/ml or μCi/cc in several specific geometries. Daily calibration checks are made with a mixed gamma standard (NBS traceable), and recalibration is performed if the calculated sample standard deviation is in excess of 0.35.

The counting room had adequate storage space, bench space, sinks, and desk or writing areas. The fume hood is inoperative and will remain so until the Unit 2 ventilation system is functioning. Liquid, gas, and dried liquid samples are carefully wrapped in plastic to prevent the area from becoming contaminated. All equipment seemed well maintained and in working order, and the lab was well organized.

The chemistry laboratory is located at the 100-foot level of the Unit 1 side of the Auxiliary Building. Nonradiological chemistry is performed in most of the room, with one end (with two fume hoods) used for radioactive sample operations.

Airflow through the two fume hoods seemed minimal; however, it was not checked with a velometer. No labels indicating the last airflow check or the proper sash level (opening) for 100 cfm were seen. A dumb waiter to bring samples from the sampling room above is located conveniently next to the fume hoods; the dumb waiter was inoperative during this inspection.

4.1.1.2 Change Rooms

Change rooms with lockers and benches were located conveniently near the control point and decon area. A restroom adjoined the locker area; however, convenient, separate women's lockers and restrooms were not available.

4.1.1.3 Decontamination Area

The room designated for personnel decontamination was conveniently located near the control point. It contained four large sinks and two shower stalls. Respirator equipment decon and small tool decon were routinely performed at the same sinks. The posted procedures and the use of multiple sinks seems adequate for cleaning the respirators; however, during times of peak use by personnel or decon of larger quantities of contamination, some cross-contamination could occur. The use of this area for purposes other than personnel decontamination should be discouraged.

One shower head was missing and one sink was cracked. There was no dedicated frisker in the room. Personnel decon could be performed, but the design capability of the room was not available.

4.1.2 Chemistry

4.1.2.1 Sampling Areas - Coolant

The sample room is located on the 110-ft level directly above the chemistry lab on the Unit 1 side of the Auxiliary Building. Liquid samples from several sources in the containments and the Auxiliary Building are drawn into this room. The sample lines terminate inside the fume hood over the sinks, with the final valves located inside the fume hood. One fume hood contains the sample lines from Unit 1 while across the room is a second fume hood for lines from Unit 2. Valve position lights and activating switches are located next to each sampling hood. Area radiation monitor R6A is located on the wall next to the Unit 1 sampling hood. The sampling hoods are conveniently next to the dumb waiter down to the chemistry lab. No labels indicating hood airflow checks or sash levels were observed.

The equipment in the liquid sample room is adequate for routine low-level samples; however, the functioning of equipment (e.g., the fume hoods) is not adequately assured by routine checks, and shielding for nonroutine samples is not present.

Capabilities for sampling the reactor coolant do not now meet the criteria of NUREG-0578. The sampling lines are not shielded to protect the technician from high exposures during sampling of high-activity coolant. Valve manipulation for the final sampling must be done by hand at the valve in the sample sink. Gaseous release from the coolant water can be adequately captured by the hood over the sink. With the existing recirculating procedures before sampling, the sample is representative of the reactor primary coolant system.

The licensee's response to the lessons learned inquiries was given in a letter of January 1, 1980, to the Commission. The letter indicated that a design and operational review of the containment atmosphere and reactor coolant sampling system had been performed and that this review indicated that modifications to the atmosphere and reactor coolant sampling systems were needed. When the auditor asked for comments on these modifications from the Senior Performance Engineer for Chemistry, he indicated that he had not seen this letter of response which, he said, came from the corporate office in Newark, N.J. His initial reaction on reading the proposed modifications was that they would not work for the coolant samples because:

1) the exposure in the sampling room from the coolant in the lines would be too high after sampling,

2) the high exposure rate would preclude the use of the Unit 2 sampling sink, which is across the room, and

3) the sampling sink drains run into the sampling room floor (i.e., the chemistry lab ceiling) and would (could?) raise the exposure level in the chemistry lab.

The Senior Performance Engineer for Chemistry did not have the source terms or documentation of the design review, which he said were from corporate in Newark. He had no further documentation of the review. He did produce a handwritten, draft procedure for using multiple sample takers to obtain a post-accident coolant sample with the current equipment. He also indicated that the procedures for sampling and analyzing very highly radioactive samples in a post-accident situation had been discussed among his staff but were not documented. In discussing these procedures, he indicated that his current method of obtaining a containment atmosphere sample would be to use the existing containment air sampling lines to get a grab sample; however, the response letter of January 1, 1980, indicates that the electrical penetration room where containment air sampling lines are located "becomes inaccessible during an accident due to radiation streaming through the surrounding penetrations."

In an attempt to determine the current procedures for sampling reactor coolant, the auditor followed a plant Technican Helper assigned to the chemistry section during a routine sample run. Salem Procedure PD-3.5.001, "Sampling of the Reactor Coolant" was successfully followed with one significant exception. Under "Precautions," one item noted that Salem Procedure PD-15.7.008, "Handling and Tagging of Samples," should be observed. This procedure primarily concerns measurement of the exposure field on contact and at 1 foot from the freshly drawn sample. The use of a high-range survey meter is prescribed, along with instructions to be followed if the sample reading is too high. In addition, proper tagging procedures are given. The Technician Helper did not carry a survey meter, check the exposure rate, or tag the sample container with the proper radiation symbol and exposure rate levels. (When the sample was measured by the auditor, the contact level was less than 1 mrem/hr, as would be expected in a normal sample). When asked about the apparent lack of safeguards against an unknown hot sample, the Technician Helper responded that he was following the procedures he had been taught and that if the Operations Department indicated trouble he would call his supervisor or if the area alarm sounded he would leave and find help. When asked whether he had received instructions or had had discussions with his supervisors on the immediate steps to take for a post-accident sample, he said he had not.

The apparent lack of communication between the corporate generators of the lessons learned response and the plant senior performance engineer for chemistry indicates that the effort to precluding another TMI-2 response to an accident has not been successful up to this time. The

concern of the NRC for this situation, and immediate, simple steps to reduce unnecessary exposures to post-accident samples have apparently not been well communicated. Time did not permit an examination of the corporate review documentation for the proposed engineering modifications.

4.1.3 Radioactive Waste

4.1.3.1 Ventilation Systems

Technical Specification 4.7.7.1 requires, in part, that the Unit 1 auxiliary building exhaust air filtration system should be demonstrated OPERABLE, at least once per 18 months by satisfactorily completing in-place filter testing with the system operating at a system flow rate of 21,400 cfm $\pm$ 10%. During a review of the most recent in-place test of the auxiliary building exhaust ventilation performed in July 1979, the auditor noted that the test results indicated that ventilation system Number 13 had a flow rate of 31,293 cfm during the in-place test. A licensee representative stated that the test results had just been received and a thorough review had not been performed. He further stated that he thought the flow rate value recorded on the data sheet was in error, since the flow rate had been within specifications on previous tests, however, he would contact the vendor and confirm the flow rate. The auditor stated that failure to perform the in-place test with the system operating within the specified flow rate would be in noncompliance with Technical Specification 4.7.7.1. The auditor stated this item would remain unresolved (272/80-03-04) pending further review during future inspections.

The auditor discussed with licensee representatives the extensive painting which has taken place in the auxiliary building within the past few weeks and the impact of painting on the ventilation system filters. The licensee representative states that the auxiliary building ventilation would be retested as soon as the schedule could be worked out with the vendor who performs the test.

During a tour of the auxiliary building, the auditor observed that one of the roughing pre-filters in exhaust ventilation system #11 had been destroyed. Differential pressure across the roughing filter bank was zero. Discussions with licensee representative revealed that new filters had been ordered, but not yet received.

4.2 Equipment

4.2.1 Protective

This area is discussed in section 3.2.4.2.

4.2.2 Instrumentation

4.2.2.1 Portable

The auditor observed a variety of health physics instruments and equipment (portable survey instruments, portal monitors, personnel friskers, pocket dosimeters, air samplers) in use, observed the calibration of instruments, checked calibration stickers, performed battery checks for selected portable instruments, and selectively examined calibration records for survey instruments in use. The auditor discussed the radiation survey instrument calibration program with contract instrument technicians who perform the calibrations, with the technical supervisor responsible for instrument calibration and with technicians who use the instruments as well as licensee management.

The number and nature of the findings discussed below indicates a need for more direct management involvement in the instrument calibration program. The instrument calibration program has been turned over to a contractor, with little, if any, technical review of their work by the licensee. The licensee does not assure that a technically sound calibration program is in place and does not require an aggressive monitoring of this program by the responsible individual. The calibration program should meet or exceed the recommendations of ANSI N323-1978, Radiation Protection Instrumentation Test and Calibration. Without radiation detection instruments that are calibrated by qualified technicians, using approved procedures, and sources that are directly traceable to National Standards, the credibility of this portion of the station's health physics program is questionable.

Technical Specification 6.8.1 states, in part, that written procedures shall be established, implemented and maintained covering the activities recommended in Appendix "A" of Regulatory Guide 1.33, Rev. 2, February 1978. Regulatory Guide 1.33, Appendix A, Section 8.b(1)(aa) states that specific procedures for surveillance test, inspections and calibrations should be written for area, portable and airborne radiation monitor instrumentation.

Station Procedure PD-15.9.004, "Calibration of the Radiation Monitor, Model, RM-14", Rev. 0, Paragraph A.I.7 states, "Place a beta-gamma standardization source against or directly under the probe. The indicated count rate should be 10-20% of the indicated standard dpm for pancake detectors." When questioned concerning what type of source was used for checking the RM-14's, a technician who calibrates the instruments stated that this section of the procedure was not performed and that the calibration of the RM-14 was only an electronic calibration using a pulse generator.

Station Procedure PD-15.9.009, "Calibration of Eberline Portable Neutron Rem Counter," PNR-4, Rev. 0, Paragraph A.I.2-5 states, "Place instrument in a 4 mrem/hr, 40 mrem/hr, 400 mrem/hr and 4 rem/hr neutron field and check reading. If correct reading within 10% are not obtained in all fields, proceed to section II." Licensee representatives stated that this part of the procedure is not being followed, because the output from the neutron source is not known. The auditor stated that the output of the neutron source could be determined by measuring the output with an instrument that has been calibrated offsite. After this had been accomplished, the source could be used to check the response of the neutron survey instruments in accordance with the procedure. The auditor stated that failure to follow the procedures for the calibration of instruments was in noncompliance (272/80-03-05) with Technical Specification 6.8.1.

The auditor observed the calibration of a staplex high volume air sampler. When the auditor asked to see the procedure that was being used, the technician stated that the procedure was still being written. It should also be noted that the licensee could not produce a calibration certificate for the Alnore thermo-anemometer used to determine the flow rate for the staplex. A licensee representative stated that the anemometer had been compared to a "calibrated" instrument by the instrument calibration contractor, however, no results were available for review. The calibration certificate for the "calibrated" anemometer used as the reference was also not available.

The auditor stated that failure to have a written procedure for determining the flow of the staplex air sampler is another example of noncompliance (272/80-03-06) with Technical Specification 6.8.1.

Technical Specification 6.8.2 states in part that each procedure and administrative policy of 6.8.1, and changes thereto shall be reviewed by the SORC and approved by the Station Manager prior to implementation.

Station Procedure PD-15.9.002, "Background and Efficiency Determination on BC-4 and SCA-4 Counting Instruments," has been rewritten and the new procedure used to determine the efficiency of the counters on February 1, 1980, without first having the procedure reviewed by SORC and approved by the Station Manager. The temporary change provisions of Technical Specification 6.8.3 are not applicable. The auditor observed a technician attempting to perform a daily source count and background count on the BC-4 counter using the data sheets in the procedure without having a copy of the procedure available for reference. The technician stated that he had not received any training on the procedure. The source count was outside the 3 sigma control band (high side) that had been established. The corrective action was to change the source-to-detector distance until the count rate fell within the required band; no records were available to indicate the source-to-detector distance used for initial calibration. The BC-4 counter is used to evaluate particulate air samples.

During the calibration of a Teletector high range survey instrument, the auditor noted that the Station Procedure PD-15.9.011, "Calibration of Teletector 6112" being used by the technician had pencil changes made to paragraph A.I.7 and 9. The technician stated that these changes had been made to correct errors in the procedure. A review of the master copy of the station procedure revealed that the procedure had not been officially changed. The auditor stated that failure to have the changes to Station Procedures PD-15.9.002 and PD-15.9.011 reviewed by the SORC and approved by the station manager prior to implementation was in noncompliance (272/80-03-07) with Technical Specification 6.8.2.

The station uses a Cobalt-60 source (No. S-140) for calibrating the BC-4 beta counter. The station could not locate any documentation to indicate that this source is traceable to a National Standard. The auditor stated that failure to have a certification for the source documenting relatability to a National Standard would make any analysis performed on the BC-4 suspect. The auditor stated that relatability of the source to a National Standard should be promptly established.

The auditor observed that portable health physics instruments were being checked prior to use by holding the instrument near a radiation source and observing that the instrument responded to radiation (instrument read greater that some value). The RM-14 friskers were considered satisfactory if the alarm sounded when the alarm setpoint was full scale and the HP-210 probe was brought near a source. The auditor stated that neither instance insures that the instrument is functioning properly. The response is checked on only one scale and just because the reading is above a present point does not necessarily mean the instrument is functioning properly. The auditor stated that the procedure described in ANSI N323-1978, should be used for response

checking instruments. This procedure requires that the instrument be exposed to a check source immediately following calibration in a constant and reproducible manner. Reference readings should be obtained on each scale normally used. If the instrument response to the check source on subsequent response checks differs from the reference reading by more than 20%, the instrument should be removed from service and recalibrated.

The station's health physics instruments and equipment are being calibrated and maintained by an outside contractor. By observations and discussions with the contract technicians and station personnel, the auditor determined that the records generated by the contractor are not reviewed by station personnel for accuracy and adherence to procedures. The auditor stated that calibration records should be reviewed by a technically competent individual, preferably the technical supervisor responsible for this area, and signed by the individual before the records are filed.

4.2.2.2 Fixed Area Radiation Monitors

The Salem Station has a conventional area radiation monitoring system consisting of fixed G-M detectors with local and remote (control room) displays and alarms. There are approximately 18 area monitors and all but 3 of which have remote readout and alarm functions. The control room alarm has a reflash function. Ranges are limited to 10 R/hr except for one of the five containment monitors and one auxiliary building monitor (mechanical penetration area) which have an upper range of 1000 R/hr. The containment monitors are not designed to operate in a major LOCA environment. In response to an October 30, 1979, letter from the NRC (NRR), the licensee agreed to install two area monitors in containment by January 1, 1981. These monitors are to be capable of withstanding required accident environmental conditions and to have an increased range.

The licensee performs functional testing and calibrations of the area monitors. The calibrations are performed in accordance with approved, written procedures which specify two point solid source calibration checks of the detectors, and an electronic calibration of the monitor. The functional checks are primarily electronic, but do include a detector response check with installed check sources. Although some maintenance problems have been encountered with the area monitors, sufficient spares are available from Salem, Unit 2 to minimize downtime. An equipment change on Unit 2 resulted in the additional spare monitors.

In addition to the area monitors, approximately nine G-M monitors are installed in proximity to filters in various radioactive systems.

No evidence of a licensee evaluation of area monitor adequacy under accident conditions was found. The variability of accident scenarios appears to make a good case for a system of portable area monitors with readout in a central location (control room). Although, according to licensee personnel, Salem, Unit 2 will have such a system, there are no present plans to backfit Unit 1 with a similar system.

4.2.2.3 Effluent and Process Radiation Monitors

A system of approximately 24 monitoring channels consisting of gas (G-M), iodine (scintillation), particulate (scintillation), and gross liquid (scintillation) detectors monitors radiation levels in various plant operating systems. Monitor readouts and alarms are provided in the control room. The control room alarm has a reflash function. The monitor ranges are 1E1 cpm to 1E6 cpm (a range of 1E1 to 1E4 can be selected at the monitoring system cabinets, but not on the control room indicators).

Two monitors are used for monitoring airborne radioactive effluents. The plant vent monitor (R-16), which consists of four inline G-M tubes, routinely monitors the plant's gaseous releases. During WGDT releases, containment purges, and in certain emergency situations, a combination gas, iodine, and particulate monitor (R11A, 12A, 12B) is aligned to the plant vent. According to licensee personnel, an additional monitor consisting of gas, iodine, and particulate channel will be installed and dedicated to monitoring the plant vent continuously. Neither the installed noble gas monitors, R12A and R16, nor the planned additional gas monitor possess the monitoring range specified in the October 30, 1979 letter from NRR to the licensee (Lessons Learned Task Force, Short Term Recommendations). In response to the October 30, 1979 letter, the licensee agreed to modify the plant vent gas monitor to provide the specified detection range (1E-7 μCi/cc to 1E5 μCi/cc) by January 1, 1981. The licensee had not, however, completed the actions specified for completion by January 1, 1980, regarding noble gas monitoring. The licensee did not address the January 1, 1980, requirements for noble gas or radioiodine and particulate effluent monitoring in their response, although requested to do so in the October 30, 1979 letter. At the time of this inspection, the licensee's noble gas monitor was capable of monitoring releases up to about 0.5 μCi/cc, which is several orders of magnitude less than the NRR request.

The two installed gas monitors (R16 and R12A) were calibrated with Xe-133 and Kr-85 gases during preoperational testing. The R16 setpoints were verified by the auditors to correspond (conservatively) to the quarterly average technical specification release rate (warning) and the instantaneous technical specification release rate (alarm) based on

the preoperational Xe-133 calibration. Use of the Xe-133 calibration data results in a conservative quantification for Kr-85 and typical release mixtures. The quarterly calibrations of R16 and R12A performed subsequent to the preoperational fluid calibrations have utilized two solid calibration sources that were cross calibrated during the fluid calibrations. Monthly functional tests include an electronic check in addition to the use of a check source for detector response. Although the licensee has no current provisions to do so, it would be prudent to repeat fluid calibrations of these monitors at certain intervals. It would likewise be prudent to use more than two solid sources per calibration and to define an acceptable response to the functional test check source. These items were discussed at the exit interview.

It was determined that licensee procedures existed for the calibrations and functional testing of the process and area monitors. However, these procedures were not examined in detail during this inspection. The surveillance testing was noted to have been conducted within the technical specification intervals. No significant discrepancies were identified regarding administration of the calibration and functional testing surveillance program.

5.0 Administration of Emergency Planning

The Assistant to the Manager is assigned overall responsibility for the station emergency plan and implementing procedures and reports directly to the Station Manager and acts with his authority in all matters involving emergency planning and maintaining a state of constant readiness. He has an assistant who devotes approximately 50% of his time to emergency planning functions. Acting as the Emergency Planning Coordinator, the Assistant to the Manager delegates the actual performance of certain readiness functions to senior supervisors in the line organization while retaining full authority to deal directly with the responsible supervisors in the organization irrespective of the formal chain of command. The Emergency Preparedness Coordinator maintains overall control of various emergency planning readiness function records, e.g. drills, training, equipment inventories, etc. thereby enabling him to keep day-to-day track of the readiness posture and the performance of required readiness functions. Discussions indicated that the Assistant to the Manager and his assistant receive adequate support from both Corporate and site personnel in the performance of their emergency planning functions.

In addition to the licensee employed individuals involved in emergency planning activities, two contractors have been retained to provide planning and procedure development support. One contractor is part-time in the sense that his activities are only partially devoted to the Salem site. The other is full-time, working in the radiation protection group. Communication between the various individuals involved in emergency planning appears good and a number of areas for upgrading have been identified. For those problem areas identified, conceptural approaches for resolution have been developed. Despite this, there has been little actual effort toward implementation of these conceptural changes. This reluctance to implement appears to have resulted from the development of a "wait-and-see" attitude precipated by the ongoing review and upgrading of the emergency plan by the NRC Emergency Planning Task Force. This attitude has had an adverse impact on the emergency organization configuration, training, and the emergency plan implementing procedures. Based upon the results of this audit and upon discussions with the Assistant to the Manager, this attitude seems to have lessened and action will be taken to implement and correct immediate short term difficulties that would hamper an effective response to a serious emergency at the Salem Generating Station.

Generally, the management control of emergency planning at the Salem site is adequate. It provides a unified approach where the ultimate authority and responsibility for the readiness posture of the facility is vested in a single individual who exerts centralized control over all readiness functions. This situation appears to have a positive impact upon the state-of-the-art nature of the licensee's procedures, facilities, equipment and overall response posture.

6.0 Organizational Control of Emergencies

6.1 Onsite Organization

The licensee's emergency organization is somewhat general in the assignment of functional responsibilities. Organizational elements described are: Senior Shift Supervisor; the Emergency Duty Officer; the Manager of Salem Generating Station; the Emergency Radiation Survey Teams; Fire Brigade and First Aid Team; and Personnel Accountability Team. To evaluate the adequacy of the licensee's emergency organization from a radiation protection standpoint, it was necessary to take an overview of the entire emergency organization as currently structured to determine what radiation protection functions were covered, by whom they were covered and which functions were not covered. As described in the emergency plan and reflected in the implementation procedures, the licensee's onsite emergency organization is as represented in figure 1.

From discussions with various individuals at the management level and in the radiation protection group, it was noted there has not been a specific delineation of authority and responsibility for several key individuals and groups of the emergency organization. The role and authority of the Station Manager during an emergency is one such example.

In accordance with the Salem Generating Station Emergency Plan the Emergency Duty Officer (EDO) directs, coordinates, and controls implementation of the emergency plan. Presently there are five EDOs all of whom are SRO licensed. The Station Manager no longer has an SRO license and is therefore not included in the five man EDO pool. There are provisions for emergency coordinator called the EDO at the Salem site onsite at all times. During any emergency the Senior Shift Supervisor initially assumes this duty until relieved by the assigned EDO of the day. All senior shift supervisors are EDO qualified and have (as do all EDOs) the authority and responsibility to initiate any emergency actions within the provisions of the emergency plan including the exchange of information with offsite authorities responsible for coordinating offsite emergency measures. It was not clear in the Salem plan and procedures or through discussions with EDOs of the exact scope of the authority and responsibility vested in the emergency coordinator particularly in the area of plant operation. Procedurally, the EDO's functions, authorities and responsibilities exclude his involvement in operations aspects related to an emergency. The Shift Supervisor appears to be permitted to act independently from other elements of the emergency organization and independently from the EDO. Under accident conditions the operating crew appears to have final authority over any operational-related matters. This is reflected in the nature of the training and the procedures of the emergency plan.

With the EDO having no clear-cut authority over the actions which the operations crew may wish to take, an apparent lack of a unified command and control of the emergency organization exists. There is a potential for conflict with the actions, decisions, capabilities, and resources of that portion of the emergency organization under the control of the EDO as well as competion for the manpower resources. Since the operational aspects of an emergency can heavily impact upon the radiological, e.g. operational decisions and activities can directly affect the radiological consequences of the event for which the emergency organization has been created to combat. This competition and vying for emergency resources occurs when the operation's group has need of the skills of and support from other elements of the emergency organization, particularly in the areas of radiation protection, chemistry and radwaste.

The existing emergency organization does not include or delineate an organizational structure to support continuity of radiation protection functions during emergencies. Within the radiation protection area, the organization is limited to a general statement, "radiation teams." Procedures do reflect some limited support in this area, primarily in the area of team coverage. Such aspects as personnel dosimetry, site access controls, dose assessment, ALARA considerations, chemistry, etc. are not included and are not addessed in the existing organization.

Discussions with licensee management and radiation protection personnel indicated that considerations for continuity of radiation protection functions during emergencies has been considered. A conceptural organization has been developed and is currently under review for possible implementation. The auditor reviewed this conceptural organization and noted that it provided adequate coverage of the aforementioned areas.

Generally the licensee's existing emergency organization is constituted in such a manner that during a serious emergency it would be necessary for ad hoc organizations to be created to combat radiation protection problems and interface the operational and radiation protection aspects and resources.

Further review of the licensee's emergency organization indicated that the interface between corporate and private contractor support groups are not clearly delineated. The chains of command and communication and authority were not clearly specified. For example, the licensee's emergency environmental monitoring program would be administered by an individual from the Corporate headquarters. This is not reflected in the current organization nor have detailed provisions for interfacing this organization been included in the site organization description. The licensee had also identified this problem area and had developed a conceptural approach to resolving this organizational discrepancy.

6.2 Augmentation of Onsite Emergency Organization

As discussed previously, certain of the Corporate management, administrative and technical support personnel who would augment the plant staff are not clearly specified in the emergency organization, particularly in the areas of environs monitoring, logistical support for emergency personnel, technical support for planning reentry and recovery operations, for the release of information to news media, and coordination with governmental authorities. The scope of the accident against which the present plan is designed has not resulted in the development of provisions for supplementing the health physics staff under accident conditions. Consequently, such provisions for additional health physics support would have to be made on an ad hoc basis.

Certain of the contractor and private organizations who may be requested to provide technical assistance to and augmentation of the emergency organization are discussed in the implementing procedures themselves. In some instances, however, the authorities, responsibilities and limits on the action of the Corporate and contractor support groups are not clearly specified in the procedures governing their activities.

Generally the licensee's emergency organization is weak in four general areas:

(1) in the delineation of authorities and responsibilities for key individuals within the licensee's emergency organization, in particular, the Station Manager and the Emergency Duty Officer.

(2) in the area of intercoordination of the operational aspects with other elements of the emergency organization.

(3) inadequate description of the radiation protection organization during emergencies to ensure that radiation protection functions continue with some degree of continuity commensurate with the emergency situation.

(4) the interface, authorities and responsibilities of Corporate and contractor groups who may support the licensee's emergency response are also not clearly defined and interfaced with the licensee's emergency organization. The licensee had identified these shortcomings and had already initiated conceptural plans to correct these organizational gaps and weaknesses in the emergency organization. These concepts are presently under review with final resolution expected in the near future.

7.0 Training

Emergency plan training at the Salem site is deficient in several areas. While the categories of emergency personnel and the frequency at which they are trained are specified, the scope and nature of the training to be provided are not specified. The exact scope and nature of the actual training is left to the discretion of the assigned instructor, and there are no provisions to evaluate the ability of each individual to perform their emergency duties once the training has been completed. In this regard, there are no training objectives clearly stating the conditions, tasks and standards of performance that would apply in making an evaluation and a determination that a particular individual is qualified to perform his assigned emergency function.

In pursuing the scope and content of the various training sessions conducted for emergency personnel, the auditor noted that there are no approved formal lesson plans for each category of emergency training for use by the instructor. It was also noted that for each category of training required, the individual who will be responsible for conducting the training was not specified. Training of individuals for the site emergency organization occurs at a routine frequency about once every 12 months. In discussions with licensee management and persons involved in administering the emergency planning program, the auditor determined that there were no formal provisions for retraining or training members of the emergency organization in changes to procedures and equipment which might occur in the period of time between the scheduled training sessions one year apart.

Through interviews of emergency team personnel and licensee management, the auditor determined that training programs consist almost entirely of lecture-type classroom instruction. Occasionally there have been an opportunity for attendees to gain practical experience in the use of equipment and procedures which they may be expected to use, but, in general, this is not included in the training program.

8.0 The Emergency Facilities and Equipment

8.1 Emergency Kits and Emergency Survey Instrumentation

The licensee maintains prepositioned emergency supplies and survey instrumentation at various specified locations throughout the facility. The kits and equipment were located as specified in the plan and procedures and inventories were correct. A review of available portable survey instrumentation indicated that their ranges, types and numbers were adequate to meet anticipated emergency needs. Instrumentation available for individuals or teams re-entering the facility provide the capability to detect and measure radiation fields up to 1000 R/hr. The station has no radiation survey instruments with ranges greater than 1000 R/hr. The inspector stated that the station should consider acquiring instruments with ranges up to 10,000 R/hr to be used in the event of an accident. Instruments with ranges greater than 1,000 R/hr were needed immediately following the accident at Three Mile Island, but were not available. A licensee representative stated that the station would review the need for such instruments.

Emergency environmental sampling and sample counting equipment provide a capability to detect and measure radioiodine concentrations in air with a sensitivity of at least 5 E-08 uCi/cc under field conditions. The counting instrument used is the Stabilized Assay Meter (SAM) II in conjunction with the RD22 sodium iodide detector. The air sampler used is the Radeco H809V with variable flow capability. Charcoal cartridges are presently used as the collection medium, but to counteract the adverse effects of noble gases, the licensee has ordered silver zeolite to replace the charcoal.

Operability checks and inventories are routinely performed at a quarterly frequency on all emergency instrumentation, supplies and equipment described in the emergency plan and implementing procedures. The conduct of emergency equipment inventories and checks is governed by Procedure No. EPII-10, Conducting an Inventory of Emergency Equipment. The inventories and checks being performed appeared adequate to maintain emergency supplies and equipment in a constant state of readiness.

While there is no formal policy for maintaining state-of-the-art survey instrumentation, constant review and attention are given to the configuration of emergency instrumentation. The responsibility for this review is assigned to a single individual in the licensee's radiation protection organization. A portion of this individual's normal duties involve maintaining inventories, reorder levels and stockage of all supplies and equipment used in the radiation protection program at the site.

The licensee maintains an onsite capability to fill self-contained breathing devices. A mobile, diesel powered, skid-mounted air compressor is available for this purpose, and could be moved if the areas which it is located should exhibit high airborne or direct levels of radiation. The licensee has also made backup provisions with a local fire department in this respect for filling breathing devices.

8.2 Fixed Facilities and Instrumentation for Radiological Accident Assessment

8.2.1 Area and Process Radiation Monitors

During the audit, the area and process radiation monitoring systems of both Unit 1 and Unit 2 were reviewed for operability. It was noted that Monitors for assessing the release of radioactive materials to the environment under accident conditions do not have sufficient operating ranges to adequately assess the releases which may occur under a serious accident condition. The licensee recognized this several years ago and developed a contingency procedure to be used under accident conditions where assessment instrumentation should happen to be offscale or out of service.

The numbers and locations of area radiation monitors appear adequate to assess accident conditions affecting internal areas of the plant. These monitors could, however, be affected by elevated background radiation or be inaccessible during a serious emergency.

Procedures related to the use of area and process radiation monitor readings under accident conditions are limited. Area monitors are primarily used for accident detection and classification. Specific review of area monitoring data prior to the conduct of emergency operations requiring entry/reentry into the facility is not clearly specified in the procedures governing the conduct of these types of operations.

Process radiation monitors are used to assess releases and project accident consequences. Procedures relating to the use of certain process radiation monitors for projecting such radiological consequences appear clear and easy to follow. Under the present organizational configuration, readings from the area and process radiation monitoring systems are readily available to the individuals of the emergency organization who would be required to use the information to assess the accident. All radiation monitors, area and process, are maintained on a routine schedule, with daily operational checks performed on all monitors. A review of these checks indicate they are adequate.

8.2.2 Meteorological Instrumentation

Readouts of station meteorology are available in each control room. During the audit, the operability of this equipment was reviewed and the system appeared to be operating properly. The system is not provided with vital or redundant power, but there are backup provisions for obtaining representative, real-time meteorological information during an emergency if the onsite instrumentation should become inoperable. The Greater Wilmington Airport Weather Station is used for this purpose.

8.3 Emergency Communication Equipment

The communications equipment specified in the licensee's Emergency Plan and Procedures were available. There are specified alarms throughout the facility which have specific meanings. These alarms are: the fire alarm, the radiation alert alarm, the containment evacuation alarm, the fuel handling building evacuation alarm, and the cardox evacuation alarm covering the emergency diesel generator rooms and switchgear rooms. Each of these alarms are tested on a weekly basis in accordance with approved operator surveillance procedures.

During the audit, an apparent problem was noted with the containment and fuel handling building evacuation alarms. Workers interviewed reported that electrical arc welding operations cause spurious activation of the containment and fuel handling building evacuation alarms. Apparently, during outages these false alarms become such a frequent occurrence, that the alarms are ignored altogether. Further discussions with workers who have experienced this situation indicated that during periods when welding operations are being performed there are no backup alarm provisions made available in the containment or fuel handling building to indicate that an evacuation of the area(s) is needed.

Voice communications devices and equipment consist of portable radios, fixed base station radios, a NAWAS telephone line, a direct line to the New Jersey State Police and a direct line to the Lower Alloways Creek Township Municipal Building. Each of these three direct-line systems are routinely checked for operability and immediately repaired if such checks indicate that they are inoperable.

The licensee does not have provisions for tape recording telephone and radio communications originating from or going to the emergency coordination center and control room. The recording method relies on manual transcription of messages on data forms and paper.

In addition to the licensee installed communication systems and devices, two NRC telephone nets are in strategic locations throughout the facility.

One net is the off premises extension (OPX), used for rapid notification of the NRC in the event of an emergency and for the subsequent passage of operational data. A second line, the SS4 or health physics net, is used for the passage of health physics and environmental monitoring data to the NRC.

Generally, the onsite and offsite communications systems appear adequate to support the performance of vital functions in transmitting and receiving information throughout the course of an emergency. A particularly good communications aspect is the interface of radio communications between the State of New Jersey teams that may be responding to the incident and the licensee's emergency coordination center and environmental monitoring teams. Through the direct line to Lower Alloways Creek Township and telephone and radio communications to the State, the licensee has an onsite communications capability to assure contact with offsite authorities responsible for implementing protective measures in the environs.

8.4 Emergency Operation Centers

The licensee has provisions for a principal and an alternate emergency coordination center from which the direction, evaluation and coordination of all licensee activities relating to the emergency will be performed. The primary emergency coordination center is located in the Shift Supervisor's office and the alternate at the Lower Alloways Creek Township Municipal Building. The location of the primary emergency coordination center is such that access to the facility may be precluded during a serious emergency in which internal areas of the plant are affected by higher than normal radiation levels. The room itself is somewhat small, having only one door to the main corridor between the Unit 1 and Unit 2 control rooms and one door into the Unit 1 control room. The alternate emergency coordination center at the Lower Alloways Creek Township Municipal Building is also similarly small.

Review of these centers indicated that they were equipped as stated in the plan and procedures and that generally the scope, range and nature of equipment available would be adequate for the licensee to respond to an emergency.

8.5 Medical Treatment Facilities

The licensee maintains onsite provisions and facilities for the treatment of individuals who may be injured and contaminated. Originally the licensee had two such facilities: one located near the controlled area and one located in the Administration Building. Several months ago, the licensee converted the controlled area first aid room into a health physics counting room. Consequently, all persons who may be injured or contaminated must be transported to the Administration Building first aid area.

The first aid room in the administrative area is maintained under lock and key. There are, however, provisions for rapid dispatch of a key to the facility to permit immediate access. The facility is easily accessible to a stretcher being carried by two individuals and was equipped with first aid equipment and supplies adequate to perform personnel decontamination with the exception that there was not an operable calibrated personnel contamination survey instrument maintained in the facility for immediate use. Communications were available from the first aid facility and procedures for treatment and decontamination of individuals were available.

Discussions with licensee personnel indicate that the controlled area first aid room was eliminated without total evaluation from the standpoint of a 10 CFR 50.59 review. The availability of a single first aid and decontamination treatment area in the Administration Building appears inadequate since it necessitates the transport of a potentially contaminated victim through clean areas of the plant.

8.6 Decontamination Facilities

There were minimal provisions for decontamination in close proximity to the onsite medical facility discussed above. These provisions consist of a body tray for wash down of an individual, large carboys for the collection of potentially contaminated water, cotton swabs and various other decontamination supplies. A source of water was available from a deep sink located in the facility. There were provisions for the disposal of solid and liquid waste at the first aid/decontamination facility. Other provisions for decontamination at the Salem site are the showers normally used by individuals who work in the controlled area. There were no provisions for offsite decontamination of personnel or vehicles/equipment from the station that may have to be evacuated in the event of an emergency.

8.7 Protective Facilities and Equipment

Assembly areas are designated and located within the facility. These areas, however, have not been selected based upon a review of the features to ensure adequacy with respect to their capacity to accomodate the number of persons expected for shielding, ventilation, supplies of equipment, (e.g. decontamination supplies, respiratory protection, protective clothing, portable lighting and communications equipment).

Personnel are not routinely assembled or evacuated from the site in the event of a serious emergency at the facility. Rather, personnel instructed to "stand fast" upon hearing a radiation alarm until directed to report to their assigned assembly area such as the cafeteria. Individuals remain at their accountability stations until a decision is made that evacuation is necessary or prudent. Each of the assembly areas is to be staffed by radiation protection personnel to monitor

area radiation levels and report to the emergency coordination center. Under conditions of a plant, site or general emergency it is possible that these assembly areas could become untenable and that personnel should be evacuated from the site upon declaration of such emergencies. Consequently, the auditors have determined that assembly areas located within the facility are inadequate due to their diverse locations, the need for coverage by numerous health physics personnel and the potential for increased radiation levels both direct and airborne and resulting exposure/contamination of individuals in these locations.

8.8 Damage Control, Corrective Action and Maintenance Equipment and Supplies for Use During Emergencies

The licensee does not maintain reserves of equipment for damage control, corrective actions, and/or emergency maintenance of equipment. Rather, the emergency plan relies upon the availability of the routine stocks of instrumentation and equipment.

8.9 Reserve Emergency Supplies and Equipment

For a serious emergency, the licensee would rely on the normal inventory of supplies, (e.g., survey instruments, dosimetry for the environmental radiation monitoring program, protective clothing and equipment, and other instruments and equipment) to support emergency operations and supplement the emergency reserves. The licensee is in the process of establishing formal controls to ensure that minimum stock levels of routine operational equipment will always be available. Part of the controls to be implemented will include periodic verification of stock and the establishment of automatic reorder levels when stocks of various items have reached the reorder point.

8.10 Expanded Support Facilities

The licensee's plan and facilities does not designate or consider work facilities or resources available for an expected increase in the number of radiation protection personnel that may be expected under a serious accident condition. Such provisions would have to be arranged on an "ad hoc" basis.

9.0 Emergency Plan Implementing Procedures

9.1 General Content and Format

The licensee has developed 22 procedures that may be used to implement the emergency plan during an actual emergency. These procedures were reviewed to ascertain the adequacy of the general content and format. In this regard the auditors noted that the procedures do not clearly specify the individual or organizational element having the responsibility and authority for performing the tasks covered by the particular

procedures. Within the procedures, emergency action levels and protective action guides were clearly specified as were the emergency actions or protective actions to be implemented.

The procedures were weak in specifying the actions to be performed by Headquarters, contractor, private organization, and local services support. They did not include such aspects as the requirements for coordination with other elements of the licensee's emergency organization, procedures for site access, precautions to be observed and limits to the authorities responsibilities and actions of these groups.

Generally the action steps in the licensee's emergency plan implementing procedures were clearly displayed in a step-by-step sequential fashion. They generally described and highlighted prerequisites and conditions that should exist before the specified actions of the procedure are to be performed and highlighted precautions to be observed during performance of the actions. The procedures did, however, exhibit an obvious deficiency in the area of providing guidance to users regarding when they are permitted to exercise judgement in the implementation of specific actions, in the interpretation of emergency action level, in the application of protective action guides or in making recommendations relating thereto. For example, procedures governing accountability did not address action levels under which assembly areas should be evacuated. This decision is essentially left to the judgement of the emergency coordinator. Such action levels were not specified, nor were guide lines provided for the emergency coordinator to use in making such judgements.

Procedural steps which require other functions or jobs to be performed, or which are supplemented by other procedures already in existence but are not part of the emergency plan implementing procedures, contain references to the specific procedures that are applicable. Generally these references appear in the body of the procedure at the point where implementation of the other function or procedures is to be performed or considered.

There are signoff sheets, check lists and data sheets to document that the actions described in the procedures have been completed. A review of these sheets, however, indicated some inadequacies in their form and content. These inadequacies are discussed further in a subsequent section.

In reviewing the emergency response scheme the auditor discussed and reviewed the plant emergency operating procedures to ascertain whether these procedures contained a step in the immediate action section to require evaluation of the emergency conditions relative to the emergency action levels contained in the emergency plan implementing instructions. The auditors noted that emergency operating procedures do not reference emergency plan implementing instructions or contained

instructions for classifying the situation and implementing appropriate implementing instructions of the emergency plan. Consequently, the interface between the emergency operating procedures and the emergency plan implementation procedures is not clear, making implementation of the plan at the appropriate level difficult and cumbersome in the initial stages.

9.2 Implementing Instructions

There is a separate procedure for each class of emergency specified in the licensee's emergency plan. The classification system presents a graded response, with each implementing instruction clearly specifying the emergency action levels and preplanned response actions required to be considered or implemented in response to each class of emergency.

Many of the emergency action levels are based on readily available information available to operators in the control room. However, the usefulness of these action levels is reduced since, as previously mentioned, the interface between the emergency operating procedures and the emergency plan implementing procedures is weak.

Each of the procedures governing a particular class of emergency generally orchestrates the implementation of other more specific procedures that have been developed to implement or support the emergency plan. Implementing instructions for each emergency class indicate however, they are not written from the viewpoint of and for use by the emergency coordinator such that the emergency coordinator's duties, responsibilities and actions are clearly specified. These procedures imply that all action statements are to be performed by the emergency coordinator himself rather than stating the necessity for directing that such actions be performed by the appropriate emergency organizational element. In this sense the implementing instructions are weak in that the emergency coordinator's specific duties are not clearly specified as action statements but rather are more implied.

9.3 Implementing Procedures

In addition to a review of the implementing instructions for each class of emergency, the auditor also reviewed specific implementing procedures that would be followed and used by specific functional elements and individuals within the emergency organization. Each of the particular areas of interest are discussed individually below.

9.3.1 Notifications

Generally, the sequence of notification to alert or mobilize the onsite emergency organization and supporting agencies was described

for each class of emergency listed in the implementing instructions. Important notifications that are immediate in nature and the responsibility of the emergency coordinator or shift operating crew are incorporated into the steps of the implementing instructions. The specific person (by title or function) responsible for making these immediate notifications, however, is not specified.

Action levels are specified for notification of the site emergency organization, local services support and for participating local, state and federal governmental agencies who support the licensee's response program. Notification procedures and provisions were somewhat weak in that they do not specify action levels for notification of the corporate, contractor, or private agency support relied upon to support the site response.

Preplanned messages, announcements and alarms are used for initial notifications. Initial notifications to the State of New Jersey are made through a dedicated phone to the New Jersey State Police. Notifications to the State of Delaware are made through the NAWAS telephone line. Notifications to Lower Alloways Creek Township governmental officials are made through a direct-line telephone. Notification of onsite personnel at the time of the emergency is accomplished through the use of a series of separate and distinct alarms and announcements over the station page. On backshifts or during other periods of minimal staffing, telephone is used to contact members of the site emergency organization. The licensee's emergency duty officer is accessible 24 hours a day by beeper or hard-wired telephone.

As mentioned previously, there are preplanned messages included for initial notifications. In some cases, the content of the applicable message is included in the relevant procedure. In other instances, the content of the message is not. Notification procedures contain listings of all persons and agencies who are included in the response scheme. Additionally, the means to be used to make such contacts are also specified. Where telephone is to be used, telephone numbers are listed, and there is an authenications scheme for initial notifications to the State of New Jersey.

9.3.2 Offsite Radiological Surveys

The methods, equipment, and the preplanned survey points for emergency offsite radiological surveys are clearly specified in the procedures governing the activities of the offsite radiological survey teams. While the procedure contains a form for team members to record data and information gathered during offsite surveys, the form did not contain certain specific elements of information that may be needed to properly assess environmental conditions. Noted omissions on data sheets were: the date and time the survey is performed, the name(s) of the individuals who perform the survey, the instrument used (to

include type and serial number), the mode in which the instrument was used, (e.g., window open or window closed), the duration of any meter readings, air sampler flow rates, background radiation levels at the time of air sample counting, and sample count time.

The auditors also noted that there were neither provisions for labeling each environmental sample for later identification, nor a description of how collected data (to include the original data sheets) are to be provided to the organizational element responsible for emergency radiological assessment functions. A central collection point has not been established for the return of environmental samples collected by the offsite survey teams.

The primary means of communication for offsite teams is portable radio. Backup means, should radio failure occur, are not specified in the plan, nor have such provisions been considered. The auditor also noted that while the licensee does have one van available, the provisions for transportation of the team was not clearly specified. This would be of particular importance in the event two or more offsite teams would be needed.

9.3.3 Onsite (Out of Plant) Radiological Surveys

The auditors noted that there are no specific procedures for the performance of onsite out-of-plant radiological surveys.

9.3.4 In-plant Radiological Surveys

A review of the entire emergency plan and implementing procedures indicated that the provisions for in-plant radiological surveys during emergencies have not been specified.

9.3.5 Personnel Monitoring and Decontamination

Procedures available for personnel monitoring and decontamination do not clearly specify the provisions for monitoring all individuals leaving restricted areas or areas known or suspected to be contaminated. (e.g., at the in-plant assembly points or offsite should the site be evacuated). There are no provisions for recording the names of individuals who are surveyed, the extent of any contamination found, the instrument to be used for the survey effort and the results of any decontamination efforts. Discussions indicated that the contamination levels that normally require decontamination are 1000 counts above background, however, such levels are not specified in the personnel monitoring and decontamination procedures nor are considerations for high background discussed.

Additionally, personnel survey procedures do not include or reference decontamination procedures for various levels and types of contamination. Discussions with licensee personnel indicate that routine operational decontamination procedures would be used, however, these procedures were not readily available at assembly areas or offsite where such decontamination may have to be performed. Additionally the auditor noted that action levels were not clearly specified which would require further assessment of a contaminated individual's dose, nor was there a designated element of the emergency organization responsible for performing the followup assessment.

As in the case of offsite survey data, the means for providing collected personnel monitoring data and information to the individual or organizational element responsible for the radiation protection program during emergencies was not described. This is primarily due to the fact that the licensee's emergency organization does not include provisions or assignment of responsibility for the continued performance of environmental health physics functions as dosimetry, decontamination, dose assessment, etc. This is discussed further in a subsequent section.

9.3.6 Evacuation of Onsite Area

The licensee's emergency plan implementing procedures do not clearly specify action levels that will require evacuation of particular areas, buildings, or the site. This is a judgement call left to the discretion of the Emergency Coordinator. As mentioned previously, the implementing instructions do not contain guidance for the Emergency Coordinator's use in making such judgements.

During a tour of the licensee's facility, the auditor noted that evacuation routes were not marked either through posted arrows, signs, floor markings or other readily visible means and that evacuation to a predesignated assembly area relies solely upon an individual's familiarity with the plant. Additionally, procedures covering evacuation of onsite or in-plant areas do not specify the particular locations of the assembly areas and the criteria for their use. There are no provisions for concise oral announcements over the facility public address system or other provisions to describe the immediate actions of nonessential personnel. These actions are covered in site specific training. Procedures dictate that upon the sounding of a radiation alarm, all individuals remain at their location until given instructions from the control room. Announcements or instructions are prepared on an ad hoc basis depending upon conditions existing at the time.

9.3.7 Personnel Accountability

The licensee's provisions for personnel accountability during emergencies involve procedures in two areas, the emergency plan and security.

Emergency plan implementing procedure EP I-13, Personnel Accountability, is general in nature. The specifics of how accountability is to be accomplished are covered in security procedure and "post orders." The auditor held a discussion with security personnel at the Salem site to ascertain the exact method by which accountability is accomplished. As a result of these discussions, the auditor determined that the actual accountability procedures for individuals were in the form of "post orders." Post orders are not approved station procedures. A book containing a current listing of individuals who are badged at the Salem site and a post order for accountability is located at each assembly point. These post orders are not approved procedures in the sense of regular security procedures but are generated by the security department and placed at the assembly areas in the aforementioned books. The overall responsibility for accountability is assigned to the security force at the Salem site. However, during discussions with security individuals it became apparent that the security force does not conduct accountability at all accountability station locations. The normal procedure is for a security guard to report to the cafeteria where he conducts the accountability. At other locations where assembly has taken place that is in the control room, in the monitoring room, any individual who happens to be aware that the "post order" book and list of personnel are located there, performs accountability and reports to the Emergency Director.

A review of records of emergency drills conducted in September 20 and September 26, 1979 indicate that accountability times range from approximately 45 minutes to one hour and a half. In the former drill, the first accountability was complete within 45 minutes, with final accountability within 70 minutes. On the subsequent drill, the accountability still had not been completed by the time the drill had terminated. Further discussions with licensee personnel indicate that a key card access system, which has been recently installed, will be used to assist in accountability efforts in future revisions of accountability procedures.

The auditor noted that accountability procedures do not contain provisions for continuous accountability of individuals who may be required to enter the site or be on site after the initial accountability has been completed. Discussions with security and licensee management personnel indictated that continuous accountability provisions will be included in a subsequent revision to the emergency plan implementing procedures.

9.3.8 Assessment Actions

The system for gathering information and data upon which to base decisions to escalate, deescalate, take corrective actions or recommend protective actions to onsite and offsite individuals consists of effluent monitors, area and process monitors, and offsite environmental

surveys performed by emergency team personnel. Applicable procedures identify the sources of information needed or expected to be available from area and process radiation monitor readings, meteorological instruments and offsite radiation surveys. There are provisions for initially assessing offsite radiological consequences in the event plant effluent monitors are offscale or inoperable. The radiological assessment procedures are deficient, however, in describing similar information from in-plant radiation survey teams, plant chemistry and plant operating parameters.

The action levels and protective action guides to be used by assessment personnel as a basis for considering or initiating emergency measures or for terminating or mitigating the actual or projected consequences of an emergency are limited primarily to action levels and protective actions applicable to offsite areas. Procedures are noticeably weak in specifying action levels and protective action guides to be used by assessment personnel for considering or initiating onsite and in-plant emergency measures.

Assessment procedures contained a means for rapidly projecting exposures and exposure rates to the whole body and thyroid of individuals located in the environs of the plant. These projections can be made initially based upon installed control room instrumentation with verification and subsequent additional information and projections made based upon environmental surveys performed by emergency team members. Procedures contain provisions for immediate notification of state and local agencies in the event an initial radiological assessment action indicates an actual or potential exposure to the whole body or thyroid of persons in the environs in excess of limits of the protective action guides established by the State of New Jersey. While there are no clear provisions for trend analysis of all assessment data, there are provisions for continuous update of assessment information to offsite agencies who are responsible for implementing assessment and protective actions in behalf of the general population.

Procedures relating to the assessment of offsite radiological consequences are limited to radiation data from survey teams and do not address the actual or intended use of the environmental monitoring program and the incorporation of environmental TLDs, soil, vegetation, water and animal feed samples. This aspect is discussed further in the following paragraph.

9.3.9 Radiological and Environmental Monitoring Program

The licensee has developed conceptual provisions for a radiation environmental monitoring program to be implemented during emergencies. This program, however, has not been formalized. The assignment of duties for the direction of the program and for the collection and evaluation of data under emergency conditions are incomplete.

As such, the licensee does not have a management coordinated structure for a total emergency environmental monitoring program.

The licensee appears capable of conducting an initial emergency monitoring program, i.e. air samples and direct radiation readings in the environs by emergency teams, but it does not appear that an expanded emergency environmental monitoring program could efficiently be implemented on an emergency basis. Discussion with licensee personnel responsible for emergency planning indicate that corporate personnel are involved and would support the expanded environmental monitoring program. A future revision of the emergency plan and implementing procedures will specify those individuals who will be responsible for the total radiation environmental monitoring program in support of emergency operations.

9.3.10 Onsite First Aid Rescue

Procedures covering onsite first aid and rescue specify the methods for receiving, recovering, transporting and handling injured persons who may also be contaminated. The interface and action levels for using the offsite medical treatment facilities are also clearly specified.

9.3.11 Security During Emergencies

General discussion with security personnel indicate that the security measures to be placed into effect during emergencies have not been fully developed. The licensee has prepared and submitted a Security Contingency Plan in accordance with the requirements of Appendix C to 10 CFR 73. The auditor reviewed the applicable portion of this plan related to operations during emergencies. The licensee indicated that when the plan is implemented considerations for security during emergencies as well as for compensatory security measures should the security checkpoint or other security equipment not be available due to evacuation of the facility or radiological conditions would be included in the procedures.

9.3.12 Radiation Protection During Emergencies

The auditor reviewed the licensee's general provisions for radiation protection during normal operations and held discussions with licensee personnel to ascertain the nature of the radiation protection program under emergency conditions. The inspector noted that the emergency plan and implementing procedures contained little information regarding radiation protection during emergencies. Information was limited to emergency risk doses for equipment and lifesaving activities. In this regard, the auditor held discussions with radiation protection management to determine whether all or part of the procedures and plans for routine operations would continue during emergencies. Based upon these

discussions, the auditor determined that this area had not been clearly thought out and integrated into the emergency response scheme. From reviewing routine radiation protection procedures, the auditor noted that these procedures did not clearly reflect their applicability during emergency situations.

The licensee had given some preliminary thought to approaching the problem of continuity of radiation protection during emergencies and had developed an organizational concept that would be implemented to administer the program under emergency conditions. Within this program and conceptural development, such areas as personnel dosimetry, exposure records, positive access controls, instructions to emergency workers (licensee as well as contractor), dose assessment, and provisions for preventing reexposure of individuals or limiting exposures through ALARA review of emergency operations, had all been considered. Since this aspect of the emergency operation has not been clearly defined either organizationally or procedurally, if a serious accident were to occur at the Salem Nuclear Generating Station, emergency operations could be severely hampered or restricted until ad hoc emergency radiation protection control measures could be established and implemented.

9.3.13 Recovery

Procedure EP I-20, "Recovery Operations," provides very broad guidance to the Emergency Director in considering and implementing a recovery mode of operation. The auditor noted, however, that the organizational authority is not clearly specified for declaring that recovery phase is to be entered. Additionally, there are no action levels or guidance for evaluating plant operating conditions as well as in-plant and out-of-plant radiological conditions in making a decision to de-escalate from an emergency to a recovery operation phase. While the recovery procedure does provide for notifying the control room that recovery to be entered, it does not provide for prior coordination with or notification to the remainder of the licensee's emergency organization or supporting federal, state, local and corporate organizations and groups.

9.3.14 Firefighting

Procedures governing firefighting at the Salem site contain a description of the responsibilities and action levels for offsite firefighting support. Procedures also include instructions for monitoring the exposure to radiation of any offsite personnel, site access procedures, and the command and control aspects under which the offsite agency will function.

9.3.15 Repair and Corrective Actions

The licensee's emergency plan implementing procedures do not contain clear provisions for the conduct of repair or corrective actions that may be needed during an emergency situation. While the procedures discuss reentry in a general sense, specific procedures governing repair teams or other teams who may be directed to perform a maintenance operation to mitigate or terminate consequences of the event are not specified.

This is discussed further in the section on the emergency organization.

9.4 Supplementary Procedures

The licensee has developed several supplementary procedures designed to ensure a state of continued readiness at the Salem facility. These procedures include provisions for: inventory, operational check and calibration of emergency equipment, facilities and supplies; training; the conduct of drills; provisions for review, revision and update of the emergency plan and implementing procedures; and for conducting periodic audits of the emergency plan and its implementation. Each of these generic areas are discussed separately.

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

The procedure governing the aforementioned operations contain an inventory listing and location of all equipment held in reserve for use during emergencies. The inventory and check of emergency equipment is accomplished at a quarterly frequency and the responsibility for performing the emergency equipment readiness checks and for correcting any noted deficiencies is clearly delineated. The auditor reviewed the most recent inventory conducted on this emergency equipment and noted that all equipment had been inventoried and was properly maintained.

9.4.2 Drills

Drills at the Salem site are administered by the emergency planning coordinator in accordance with procedure EP II-1. Prior to each drill a scenerio is developed. As part of the drill, observer comments are documented for subsequent evaluation and discussion during a critique. Comments are then consolidated and responsibility is assigned for corrective action. The licensee has a mechanism for management control which assigns the responsibility for corrective actions and a completion date. In reviewing the documentation and evaluation of observer comments from two past drills conducted in September 1979 the auditor noted that several of the comments made by observers appeared substantive but were not subsequently transposed from comment sheets for action or evaluation. Discussion with

licensee management indicated that during the critique, a number of these observations were resolved (apparently to the satisfaction of the observers), thereby negating the necessity for subsequent review and corrective action. The auditor noted that this was not clear from available documentation and that several of the observer comments appeared to be significant.

The September 20 and 27, 1979 drills noted 12 drill deficiencies. At the time of this audit, nine of the deficiencies remained open, two had been closed with no action, and one was closed by a discussion with personnel involved. The auditor observed that this discussion took place some 10 weeks after the drill, giving the auditor cause for concern over the excessive amount of time which had intervened between the identification of a problem area and its ultimate resolution. Of the 12 identified drill deficiencies, six items had a January 15, 1980 completion date, consequently, many of these items had passed completion date with no indication of action. In this regard, the auditor has identified a need for increased management control in the area of documentation, followup, and timely resolution of drill identified improvement areas.

In discussing the drill concept with licensee management, the auditor learned that there were no provisions in the licensee's procedures for a backshift drill and that no backshift drills have been conducted. The licensee stated, however, that such considerations would be made in the future.

9.4.3 Review, Revision and Update

Procedures governing the review, revision and update of the emergency plan and implementing procedures provide for updating and review of telephone numbers on a six month basis. All procedures which implement the emergency plan are reviewed at least once each calendar year to incorporate changes resulting from drills or changes in the facility itself or the facility environs. The responsibility for the review is specified and assigned to the Assistant to the Manager who also functions as the Emergency Planning Coordinator. A review of the licensee's current plan and procedures indicate that they had been reviewed and updated as required. Additional review indicates that changes have been distributed in accordance with the approved distribution list and that procedure distribution was correct.

9.4.4 Audit

The Salem Nuclear Generating Station has provisions for auditing the emergency plans and implementing procedures on a routine basis. The Nuclear Review Board conducts an annual audit. Observation of an emergency drill is included as part of this audit and comments of the audit team in addition to those of the observers that are normally required by the drill procedure are evaluated for corrective action.

10.0 Management Oversight

There is a formal audit program administered by the Station Quality Assurance Department. The program is described in AP-17, Operational Quality Assurance Program. Implementing procedure OI-5, Audits, provides for an annual audit of the Radiation Protection activity. The last audit performed in this area, 79-3-N1-13, Radiation Control, was on August 31, 1979, and identified many problem areas within the Radiation Protection Program:
These included:

(a) deficiences in the revision and review of Radiation Protection Instructions;

(b) an inadequate portable instrumentation accountability program;

(c) a lack of equipment to support the respirator protection program;

(d) the failure to provide for a Radioactive Waste Management program and assign responsibility for the program;

(e) a failure to implement a system to assure that revisions of procedures are brought to the attention of department personnel;

(f) failure to acceptably document instrument calibrations; and

(g) failure to develop Radiation Protection instructions regarding HP training.

Three other audits were also reviewed:

79-3-J.1-8, Waste Management, dated March 1, 1979

79-3-C.2-10, Appendix "B" Technical Specifications, dated June 30, 1979

79-3-C.2-15, Appendix "B" Technical Specifications, dated September 30, 1979

The audit findings appear to have been one of the primary motivators in the general upgrading of the Radiation Protection Program. Each audit item has been asigned to an appropriate management individual for correction and is subjected to followup.

The major weakness noted in the audit program is that none of the auditors are specialists in matters pertaining to Radiation Protection. While the auditors are qualified, trained and able to verify

adherence to procedures, they are generally not able to ascertain the technical accuracy of the procedure and must rely on the Radiation Protection group. It was noted that there has not been a peer review of the Radiation Protection program since the plant was made operational in 1977.

It is recommended that such an independent peer review be scheduled in the current audit plan to ascertain the technical adequacy of the program.

Contracted Services

The contracted service, RSI, provides the majority of the staffing and is given the predominent responsibility in most normal, off-normal and emergency situations. The only evaluation of contractor personnel is a review of resume's performed by the Senior Supervisor - Radiation Protection.

No selection or qualification criteria are used except for classifying the technicians capable of performing in a responsible position in accordance with ANSI-N18.1. No formal training in the HP specialty is required or provided by either the contractor or the licensee, and unless the individual was and had previous training, the only other training to which the person is subjected is on-the-job. This item is further discussed in Section 2.0, PERSONNEL SELECTION, QUALIFICATION AND TRAINING.

ANNEX A

EXIT MEETING AND LICENSEE COMMITMENTS

References: (a) Letter from F. P. Librizzi, General Manager, Electric Production, to B. H. Grier, Director, NRC Region I (Philadelphia), dated March 7, 1980. Subject: Health Physicist Availability.

(b) Letter from F. P. Librizzi, General Manager, Electric Production, to B. H. Grier, Director, NRC Region I (Philadelphia), dated March 24, 1980. Subject: Radiation Protection Program, Salem Generating Station.

(c) Letter from E. H. Crosby, General Manager, Rad Services, Inc., to H. M. Midura, Salem Station Manager, dated March 21, 1980.

On February 26, 1980 a meeting was held at the NRC Region I (Philadelphia) Office between Mr. F. P. Librizzi, Vice President, Electric Production, PSE&G (with principal members of his staff), and Mr. J. M. Allan, Deputy Director, NRC Region I (with other members of that office).

The purposes of the meeting was to summarize the findings of the appraisal, to highlight particular concerns and to solicit commitments from the licensee regarding improvements in the Radiation Protection Program. To this end the following commitments were made:

Item of Concern	Licensee Action
Lack of a viable alternate to the RPM to act in his absence.	Reference (a) provides the licensees commitment to establish the Corporate Health Physicist as an alternate to the RPM on an interim bases until a qualified alternate was acquired as a member of the station's staff. In further clarifications of this interim action, the licensee agreed to establish methods to keep the Health Physicist current on the Radiation Protection Program and radiological status of the facility (including communications with the RPM and onsite reviews).

Item of Concern	Licensee Action
Inordinate reliance on contracted health physics personnel.	Reference (b) provides the licensee's commitment to develop a plan along with an implementing schedule to reduce dependence on contracted personnel by July 1, 1980.
Lack of stabilization of contractor work force particularly supervisory personnel.	Reference (b) provides the licensee's commitment to stabilize contracted supervisory personnel in accordance with a new agreement negotiated with the contractor's organization as documented in Reference (c).
Lack of any training provision for contracted health physics personnel.	Reference (a) provides a licensee's commitment to establish a training program for all contracted health physics personnel. Such a program was implemented on March 1, 1980.
Lack of an established retraining program for PSE&G and contractor personnel in the Radiation Protection group.	Reference (a) provides the licensee's commitment to provide an annual retraining (requalification) program for all radiation protection personnel.
Lack of any description of the overall training system and associated documentation requirement.	Reference (a) provides the licensee's commitment to revise the Stations Performance Department Manual by March 14, 1980.

ANNEX B

PERSONS CONTACTED

Principal Licensee Personnel

F. Librizzi, Vice-President, Electric Production, PSE&G
H. Midura, Station Manager
H. Heller, Manager, Nuclear Generation, PSE&G
J. Zupko, Chief Engineer
R. Silverio, Assistant to the Manager
L. Miller, Station Performance Engineer
N. Millis, Health Physicist, PSE&G
R. Swetnam, Senior Performance Engineer - Health Physics
J. Geller, Senior Performance Engineer - Chemistry

Other Persons Contacted

E. Nielsen, Administrative Assistant, RSI
R. Shult, Procedure Coordinator, RSI
W. Schwenn, HP Instructor, RSI
W. Hunkele, Technical Supervisor, Salem
P. Greenbaum, Technical Supervisor, RSI
D. Godlewske, Technical Supervisor, Salem
F. Huwe, Technical Supervisor, RSI
E. Surmacz, Rad Waste Assistant, RSI

In addition, other personnel (technicians, operators and contractors) were interviewed by the auditors of the performance of this appraisal.

ANNEX C

DOCUMENTS REVIEWED

Title V, Code of Federal Regulations, Chapter 1

NUREG-0578, TMI Lessons Learned Task Force Status Report and Short-Term Recommendations

Regulatory Guide 1.33, Rev. 2, Quality Assurance Program Requirements (Operations), February 1978

Regulatory Guide 8.14, Personnel Neutron Dosimeters

ANSI N-13.11, Criteria for Testing Personnel Dosimetry Performance

ANSI 18.1-1971, "Selection and Training of Nuclear Power Plant Personnel"

ANSI N323-1978, Radiation Protection Instrumentation Test and Calibration

ANSI N324, Performance of Thermoluminescence Dosimetry Systems

ANSI-N-343, Internal Dosimetry for Mixed Fission and Activation Products

Technical Specifications 50-272

Station Performance Department Manual

Station Radiation Protection Manual

Station Administrative Procedure AP-17, Operational Quality Assurance Program

Implementing Procedure OI-5, Audits

Audit 79-3-N1-13, Radiation Control, dated August 31, 179

Audit 79-3-J.1-8, Waste Management, dated March 1, 1979

Audit 79-3-C.2-10, Appendix "B" Technical Specifications, dated June 30, 1979

Audit 79-3-C.2-15, Appendix "B" Technical Specifications, dated September 30, 1979

Station Administrative Procedure AP-24, Radiological Safety Program

Station Procedure PD-3.5.001, Sampling of the Reactor Coolant

Station Procedure PD-3.5.061, Sampling the Containment Atmosphere

Station Procedure PD-3.8.016, Gaseous Radwaste Release Calculations, Rev. 2

Station Procedure PD-15.1.010, Radiation Signs and Barriers

Station Procedure PD-15.1.012, Post Operation Debriefing

Station Procedure PD-15.1.013, Radiation Exposure Permit/Extended Radiation Exposure Permit

Station Procedure PD-15.2.001, New Station Employee Indoctrination

Station Procedure PD-15.2.012, TN Retraining

Station Procedure PD-15.2.013, TN Training Requirements

Station Procedure PD-15.2.002, Visitor and Contractor Indoctrination

Station Procedure PD-15.3.002, PSE&G Personnel Registration and TLD Issue

Station Procedure PD-15.3.003, Contractor Registration and Dosimetry

Station Procedure PD-15.3.004, Self Reading Pocket Dosimeter Reading and Rezero

Station Procedure PD-15.3.006, TLD Exposure Determination

Station Procedure PD-15.3.007, Periodic TLD Card Exchange

Station Procedure PD-15.3.012, Response Check on TLD Material

Station Procedure PD-15.3.014, Alert System for Personnel Exposure Control

Station Procedure PD-15.3.017, TLD Termination

Station Procedure PD-15.3.019, Lost-Damaged Offscale Dosimeter or TLD

Station Procedure PD-15.3.020, Report of Over-Exposure to Ionizing Radiation

Station Procedure PD-15.3.021, Special Personnel Monitoring

Station Procedure PD-15.6.008, Use of Portable Shielding

Station Procedure PD-15.7.008, Handling and Tagging of Samples

Station Procedure PD-15.9.002, Background and Efficiency Determination on BC-4 and SCA-4 Counting Instruments

Station Procedure PD-15.9.004, Calibration of the Radiation Monitor, Model RM-14

Station Procedure PD-15.9.009, Calibration of Eberline Portable Neutron Rem Center, PNR-4

Station Procedure PD-15.9.011, Calibration of Teletector 6112

Station Procedure PD-15.9.023, Calibration of Snoopy NP-2 Neutron Meter

Station Procedure PD-15.11.009, Bioassay Program

Salem Generating Station Emergency Plan

Emergency Procedure EP-I-20, Recovery Operations

Emergency Procedure EP-II-1, Conducting Emergency Plan Drills