

ENCLOSURE 1

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

REPORT NOS. 50-352/90-99; 50-353/90-99

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION

UNITS 1 AND 2

ASSESSMENT PERIOD: OCTOBER 16, 1990 - MARCH 14, 1992

BOARD MEETING DATE: MAY 12, 1992

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated Nuclear Regulatory Commission (NRC) staff effort to collect observations and data, and to periodically evaluate licensee performance based on this information. The SALP process is supplemental to the normal regulatory processes used to ensure compliance with NRC rules and regulations. SALP is to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management to improve the quality and safety of plant operations.

An NRC SALP Board, composed of the staff members listed below met on May 12, 1992, to review the collection of performance observations and data and to assess the licensee's performance at the Limerick Generating Station. This assessment was conducted in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria is provided in Attachment 1 to this report.

This report is the NRC's assessment of the licensee's safety performance at the Limerick Generating Station, Units 1 and 2, for the period October 16, 1990, to March 14, 1992.

The SALP Board was composed of:

Chairman:

C. W. Hehl, Director, Division of Reactor Projects (DRP), Region I (RI)

Members:

W. D. Lanning, Deputy Director, Division of Reactor Safety (DRS)

J. P. Durr, Acting Deputy Director, Division of Radiation Safety and Safeguards (DRSS)

A. R. Blough, Chief, Projects Branch 4, DRP

T. J. Kenny, Senior Resident Inspector, Limerick, DRP

C. L. Miller, Director, Project Directorate 1-2, Office of Nuclear Reactor Regulation (NRR)

R. J. Clark, Project Manager, NRR

Others in Attendance:

E. C. Wenzinger, Chief, Projects Branch 2, DRP

L. T. Doerflein, Chief, Projects Section 4A, DRP

J. J. Lyash, Acting Chief, Projects Section 2B, DRP

L. I. Scholl, Resident Inspector, Limerick, DRP

S. S. Sherbini, Senior Radiation Specialist, DRSS

R. A. McBrearty, Reactor Engineer, DRS

R. R. Keimig, Chief Safeguards Section, DRSS

C. J. Conklin, Senior Emergency Preparedness Specialist, DRSS

II. SUMMARY OF RESULTS

II.A Overview

Philadelphia Electric Company (PECo) management was committed to operating a safe and reliable nuclear power plant. The licensee staff's approach to the operation of the facility, the safety of the workers, and the protection of the health and safety of the public was conservative and utilized a strong root cause analysis program. PECo continued to have a strong radiological protection program clearly committed to the concept of maintaining doses as low as reasonable achievable, and worker exposure has been held to very low levels. Progress has been evident in the areas of Emergency Planning and Engineering and Technical Support, due largely to management attention in these areas as well as improvements in training and staffing. A self-assessment program has been established, and appears to be working.

However, declines were noted in the areas of Maintenance/Surveillance and Safety Assessment/Quality Verification. Inattention to detail, the lack of procedural adherence, and weaknesses in planning and oversight were the contributing factors in the maintenance decline. The NRC recognizes that there was a substantial reorganization of the maintenance work force and a changed approach to maintenance work activities that may have contributed to the decline. In the area of Safety Assessment/Quality Verification the Board found that PECo management has clearly demonstrated a strong safety focus. While overall performance continued to be excellent, management efforts to correct weaknesses such as those identified with the maintenance and motor operated valve programs were not effective. With these exceptions, PECo has exhibited a strong performance, and a conservative approach to the operation of Limerick for this SALP period.

II.B Facility Performance Analysis Summary

Functional Area	Rating, Trend Last Period	Rating, Trend This Period
Plant Operation	1	1
Radiological Controls	1	1
Maintenance/Surveillance	1	2
Emergency Preparedness	2 Improving	1
Security	1	1
Engineering/ Technical Support	2 Improving	1

<u>Functional Area</u>	<u>Rating, Trend Last Period</u>	<u>Rating, Trend This Period</u>
Safety Assessment/ Quality Verification	1	1 Declining

Previous Assessment Period: September 1, 1989 through October 15, 1990

Present Assessment Period: October 16, 1990 through March 14, 1992

III. PERFORMANCE ANALYSIS

III.A Plant Operations

III.A.1 Analysis

The previous SALP rated the Operations Functional Area as Category 1. The Unit 2 start-up and test program were rated very good. The transition to two unit operation was made with good results. The root cause analysis program continued to be a strength for analyzing operational events. Weaknesses were identified in the Operator Requalification Program and the Limited Senior Reactor Operator (LSRO) initial license program.

During this assessment period, both units were operated conservatively and safely, and also attained high capacity factors. This period included a 75 day refueling outage on Unit 2. There was one automatic trip on Unit 1 during the period due to equipment failure. There were also two forced outages due to equipment failure. One of the forced outages was for a leaking recirculation pump mechanical seal, and the other for a failed high pressure coolant injection (HPCI) system inboard steam supply valve.

The Limerick operators were knowledgeable and professional. During this assessment period, no reactor trips, transients, or forced outages were attributed to operator error. Plant shutdowns and startups were planned and performed well, and had few problems. Special evolutions such as the removal of a recirculation pump from service for motor-generator set brush replacement, and the removal of a main turbine-generator from service, were well-planned and usually practiced on the simulator prior to performance. The operators responded well to plant operating challenges.

Professionalism in the control room, and throughout the operations group, was very good. The control room was usually quiet, orderly and had very little congestion. One element that helped keep the control room traffic to a minimum was the designation of an area outside the control room where maintenance personnel interfaced with operators. System blocks and equipment tagging were directed from this area, freeing the control room personnel from the administrative tasks, and allowing them to concentrate on operational and equipment status issues when granting final permission to remove a system from service.

Blocking and system tag-outs were generally performed well. However, there were two cases early in the assessment period when portions of major safety systems were inadvertently made inoperable by errors in blocking the systems for maintenance. The systems involved were the "B" loop of the emergency service water (ESW) system and the standby gas treatment system (SGTS). Both events received prompt attention by all levels of station management and were thoroughly investigated. The systems were not out of service for long periods, and upon identification the degraded conditions were promptly corrected. No Technical Specification action statements were exceeded. PECO performed a thorough root cause analysis of these events and implemented effective corrective action.

Two cases were noted where operators failed to initiate proper corrective action for a stuck residual heat removal (RHR) heat exchanger service water valve, to declare the ESW system inoperable, and to notify appropriate management in response to a failed surveillance test step. The events, which occurred near the end of the SALP period, were not considered repetitive nor were they of serious safety significance because they received prompt attention and corrective action by licensee management.

Operations Department management continued to work at reducing personnel errors within the operations group, and the continued attention has achieved some progress in reducing the error rate. Management continues to stress procedural compliance, frequently reiterating their expectations for proper procedure use. Control of procedures located at satellite locations outside the control room was improved to prevent the use of out-of-date procedures. Also, four operators were assigned to the procedure writer group. This initiative has provided more thorough feedback on newly written and revised procedures. Feedback from the licensed operators, and the NRC, resulted in the Emergency Operating Procedures (EOPs) being reviewed for human factor considerations and revised to make them more user friendly. In addition, the initiative of having station and corporate engineers walk down systems has resulted in improvement of equipment material condition, the quality of the associated procedures, system line-up lists and drawings.

PECo's threshold for making reports to the NRC for equipment failures and other events was appropriate. The Resident Inspectors were usually informed of events almost immediately after they occurred. Reports to the NRC were prompt, complete, and thoroughly analyzed. Identification of the root causes for personnel errors and operational events continued to be a strength. Root cause analyses were performed on almost all events and were categorized into three areas; significant, conditionally significant and nonsignificant. The reports were distributed to management, up to and including PECo's President, depending on the category. There was evidence of improvement in the operation of the facility as a result of the analysis and corrective actions taken.

Plant housekeeping and fire protection activities were excellent. There was little or no debris within the plant. Fire zones were always clear of combustible products. There were roving fire watches that ensured these areas were clear of foreign objects. The units were also radiologically clean, with few inaccessible areas. A painting program for the walls and floors was initiated on Unit 1. This effort has improved the appearance of the plant and made the floors easier to decontaminate if a spill occurs. Components necessary for maintenance or design changes were appropriately stored and tagged as to their use during work periods and outages. Lay down areas were designated for storage purposes during work periods.

The Operations Department was fully staffed and was providing a clear career path for licensed operators. The six shift rotation of operators included a complement of seven Senior Reactor Operators (SROs) and eight Reactor Operators (ROs). Additional entrance level personnel have been hired to provide an input to the operator training program. SROs received additional training by participating in an eight week supervisor development

program. A shift worker college degree program was offered to all operators. At the end of the period, there were eight SROs, four ROs and five non-licensed operators enrolled in the program.

Two NRC requalification examinations and three initial exams involving 47 individuals were given in the assessment period. The licensed operator initial qualification, licensed operator requalification and non-licensed operator training programs were sound and generally effective. However, the requalification examination administered early in the assessment period identified repeat weaknesses in operator performance. At the NRC's request, PECO conducted self-assessment which confirmed that several previously identified weak areas had not been effectively corrected. PECO restructured the licensed operator requalification training group and devoted additional training in communications, teamwork and procedural compliance. The requalification examination administered late in the assessment period concluded that these weak areas were corrected and no generic weakness in the individual operator or crew performance was observed.

The last assessment period identified weaknesses in the fuel handling Limited Senior Reactor Operator (LSRO) training program. During this assessment period, the LSRO training program for Limerick was combined with a similar program at the Peach Bottom facility into a single program controlled by PECO Corporate Training. Toward the end of the SALP period NRC Examiners observed that the LSRO training program continued to display weaknesses as evidenced by inattention to detail and procedure performance errors.

Summary

Limerick Generating Station continues to be operated in a safe and conservative manner. There were few unplanned interruptions to the operation of the units. Startups, shutdowns, and special evolutions were well planned and executed. Management demonstrated an aggressive approach to root cause analysis. Identified problems, such as the blocking errors, were promptly corrected. Event reporting was prompt and thorough. Personnel errors have been reduced and procedures were improved through management attention. The units were well staffed and the operator training program were generally effective. The requalification training program improved during the assessment period, while the LSRO training program continued to exhibit weaknesses.

Board Comment:

Continuing difficulties with the LSRO training program and blocking and tagging detracted from otherwise excellent performance.

III.A.2 Performance Rating: Category 1

III.A.3 Recommendations: None

III.B Radiological Protection

III.B.1 Analysis

The radiological controls program was rated SALP Category 1 during the last assessment period. Strengths included good management involvement in plant activities, a good audit program, and an ongoing effort to improve the quality of the program. Staffing levels were also found to be good, and the staff was judged to be well qualified, with a good training program for new staff and for continuing training of existing staff. ALARA performance was also judged to be very good.

III.B.1.1 Radiation Protection

The strengths noted during the previous assessment period continued during this period. Management support for the program remained strong, as did control of locked high radiation areas and the survey instrument program, and there continued to be an effort to improve the program whenever a weakness or deficiency was identified. The self-assessment function, in the form of audits and incident-triggered reports and investigations, also continued to be a strong element in the program. The technical and oversight capabilities of the staff appeared good, and technical problems that arose were usually recognized and addressed.

The selection and training program for health physics personnel, particularly for the health physics technicians, remained strong. The continuing training program for the technicians was also strong. A weakness in the hiring program, a self imposed restriction, had, in the past, prevented PECO from hiring experienced technicians into the program, but this has been corrected. Continuing training and professional development for technical staff such as radiation protection engineers was a program weakness that is still being effectively addressed by PECO. The staffing levels in the Health Physics organization continued to be very good, and vacancies that developed during this period were filled by qualified individuals.

Efforts in the area of ALARA remained PECO's most notable strength. Apparently as a result of a good water chemistry program, the source term and contamination levels on site remained quite low. This was supplemented by integration of ALARA thinking into the planning and work practices of all departments on site. In addition, PECO implemented a strong program to promptly eliminate, mitigate, or shield local radiation fields as they developed during power operations. The above activities also continued to have strong upper management encouragement and support, and the effort has resulted in a very low cumulative radiation exposures for this type of plant.

III.B.1.2 Environmental, Effluent, Radwaste and Chemistry Controls

Radiological Environmental Monitoring Program (REMP) and Effluent Controls

The instrumentation and equipment of the meteorological monitoring program were operable, calibrated and well maintained. PECo demonstrated a clear understanding of the technical aspects and analytical results regarding the REMP and Offsite Dose Calculation Manual (ODCM) requirements. PECo implemented a highly effective Quality Assurance/Quality Control program to assure the quality of the REMP sample analysis.

Excellent radioactive liquid and gaseous effluent control programs were implemented during the assessment period. Well-thought out calibration techniques were implemented for radioactive liquid and gaseous effluent radiation monitors. The air cleaning systems were tested and well maintained.

The Quality Assurance audits to assess the programmatic performance of both the REMP and Radioactive Effluent Control Programs were thorough and of very good technical depth. During this assessment period, PECo changed analytical laboratories for the REMP. The change was prompted by the closing of the previous laboratory. Any impacts associated with this change could not be assessed.

Radwaste/Transportation Program

PECo continued to implement a strong radioactive waste management and transportation program. The size and experience of the organization were very good and the staff has been stable. The training program records, however, were poorly maintained and there were no documented qualifications requirements for authorized shippers. Additionally, a minor program weakness was noted in determining the validity of scaling factors for individual shipments.

PECo fulfilled quality assurance audit Technical Specification requirements, although there was no radwaste transportation expert on the evaluation team, a minor weakness in the program. Quality control surveillances appropriately sampled some shipments, demonstrating a very good level of quality performance in this area. Generally, the radwaste/transportation programs have been implemented in an effective and stable manner.

Summary

PECo implemented an excellent overall radiological controls program during this assessment period. Some minor weak areas were identified, such as inattention to detail in establishing and implementing some site practices. A notable program strength was the continued maintenance of exceptionally low radiation and contamination levels in the plant, coupled with the implementation of a strong ALARA program. There were some technical and procedural problems identified in the radwaste program. The environmental and effluent monitoring programs remained highly effective, as did the radwaste/transportation program.

Board Comment:

During the recent outage, PECO experienced a significant breach of their health physics controls when an individual removed a radiological boundary marker and entered an area excluded by the radiation work permit. Subsequently, two other workers entered the same area in violation of the radiation work permit. The worker also was involved in a respiratory uptake of radiation. These issues, although not within this SALP cycle, are of concern, and need to be carefully evaluated by PECO.

III.B.2 Performance Rating: Category 1

III.B.3 Recommendations: None

III.C Maintenance/Surveillance

III.C.1 Analysis

During the previous SALP period the Maintenance/Surveillance Functional Area was rated as Category 1. The activities within these programs were well scheduled, planned and implemented. While management oversight was noted to be strong, the number of personnel errors was an identified weakness. The root cause analysis program was used effectively.

Maintenance

During this assessment period the Maintenance Department generally performed well, contributing to high capacity factors on both units. Major maintenance tasks, such as emergency diesel generator (EDG) overhauls, continued to be well controlled and have resulted in a high EDG reliability. However, performance of other routine corrective maintenance tasks, as discussed below, has demonstrated a weakness in the area of procedural adherence and attention to detail.

During this assessment period the Maintenance Department experienced significant changes in personnel due to a company sponsored early retirement program, and a program that permitted maintenance personnel to relocate to the site of their choice within the PECO

organization. Personnel from the Installation Department were also absorbed into the Maintenance Department during 1991. Within the Instrumentation and Controls (I&C) Branch, experienced vendor technicians were gradually replaced with PECO personnel. Technicians from the offsite Testing and Laboratory Group were reassigned to the I&C Branch during this period. These changes resulted in new personnel being incorporated in the Limerick Maintenance Department at all levels of the organization. These personnel changes were generally well controlled, however, some inefficiencies resulted due to the need for additional personnel training and the time required for the people to become acclimated to their new positions.

The maintenance work force was also realigned to implement a five craft cross-discipline work team approach. The teams are comprised of a foreman, job leaders and technicians specialized in one of the five disciplines: electrical, rotating machinery, valves, pressure vessel or repairman. All technicians received training in various phases of general maintenance tasks such as rigging, electrical, welding, etc., to broaden their knowledge and make them more effective team members. PECO has invested significant resources in technical training for the maintenance personnel. A formal training program was established and a retired fossil plant was renovated to provide a facility that permits extensive hands-on training to reinforce classroom training. The realignment to a team approach, and the improvements to the training program are good initiatives, however, the expected benefits in efficiency and improved quality have not yet been fully realized.

PECO began a "quality-to-the-line" program where maintenance activities are checked for quality by other mechanics rather than quality control personnel. This program started with the EDG maintenance. The EDG program has shown some good results.

The material condition and reliability of plant equipment have been good. This was evident during NRC safety system inspections where only very minor equipment deficiencies were identified. Safety system availabilities continued to be better than those assumed in the Probabilistic Risk Assessment (PRA). Although two equipment problems resulted in unplanned shut-downs (refer to Section IV.A), neither of these were attributable to inadequate maintenance practices.

Several cases of inattention to detail and failure to follow procedures during maintenance activities were noted during this assessment period. These included three cases of failing to maintain material accountability on the refuel floor as required by procedure, maintenance personnel attempting to remove a control rod drive mechanism during the Unit 2 refueling outage while the control rod remained coupled and partially inserted, maintenance personnel failing to take corrective actions to resolve out of specification maintenance data on the EDG, and failing to identify and correct deficient emergency lighting. During a follow-up audit, PECO found that a significant percentage of maintenance tasks received both maintenance and quality control (QC) personnel failed to comply with procedural requirements.

Some problems were noted with the planning, execution and oversight of maintenance activities. For example, a welder was observed attempting to weld on a safety- system with water issuing from the joint. The job leader and a QC inspector were present, however, neither acted to stop the improper work practice. Weaknesses noted during performance of maintenance activity on a safety-related motor operated valve (MOV) included failing to follow the maintenance procedure, a lack of specific guidance on what was to be done to address the problem, and a failure to review the completed work package to ensure the problem was addressed.

In each of the above cases a root cause analysis was performed and corrective actions taken. However, station maintenance supervision did not always perform a thorough assessment of identified problems, and repeat offenses of procedural noncompliance continued throughout the assessment period.

Surveillance

Overall scheduling and performance of surveillance tests continued to be good. Few surveillance tests were missed and those missed were generally because of unique circumstances; not indicative of any programmatic problem. The A-day/B-day logic channel test schedule continued to prevent inadvertent coincident logic actuations, thus avoiding plant scrams and system isolations.

The surveillance program was administered by the Site System Engineering Group and was tracked using a computerized scheduling program. Actual test performance was the responsibility of several site departments including operations, system engineering, maintenance, I&C, chemistry, HP and security.

There were no reactor scrams or plant transients caused by surveillance test activities. The I&C group continued to improve on its prior record of good performance. The number of reportable events caused by I&C personnel errors during surveillance tests declined during this period. This was particularly significant since new technicians were phased into the department. Efforts to reduce personnel errors appear to have been particularly effective within the I&C group.

Although several reportable events were attributed to personnel error during surveillance activities, no particular cause was predominant and no adverse trend was noted. PECO performed a thorough root cause analysis on each event to minimize repetitive problems.

During previous SALP periods, weaknesses were noted with the implementation of the Inservice Testing (IST) Program. During this assessment period, a dedicated engineer was assigned to oversee the IST Program and improvements to the test procedures and results evaluations were noted.

Summary

Overall, the maintenance and surveillance programs were effectively implemented during this assessment period. No plant trips or transients occurred because of maintenance or surveillance activities. Significant training improvements are being implemented. Major maintenance tasks continue to be well controlled. Nonetheless, problems with inattention to detail and procedural adherence were noted during several maintenance activities. Some weaknesses were also noted with the planning and oversight of maintenance activities.

Management was not always effective in resolving these issues as evidenced by the repeated incidents of failure to adequately plan corrective maintenance tasks and to implement maintenance procedures.

III.C.2 Performance Rating: Category 2

III.C.3 Recommendations: None

III.D Emergency Preparedness

III.D.1 Analysis

During the last period Emergency Preparedness (EP) was rated Category 2, with an improving trend. That was based upon PECO effectively implementing the EP improvement plan, a demonstrated management involvement and commitment to quality, a well-developed training program, an appropriate discipline mix in the EP staff, and a good working relationship with off-site agencies. The SALP Board recommended the maintenance of resources needed to complete the long-term EP improvement plan, especially during completion of the common Limerick/Peach Bottom Emergency Operations Facility (EOF).

During this period, station and corporate management continued to be very effectively involved in EP. Management maintained emergency response qualifications, reviewed and approved emergency plan and procedure changes, participated in drills and exercises, and interfaced with state and local agencies. Management also formed a station and corporate management EP Council to address all areas of the program requiring management attention or resolution. The annual audit was thorough and critical, and received extensive management distribution. Corrective actions were actively pursued and properly documented and the list of outstanding open items throughout the assessment period was small. In addition, management committed the resources to build and outfit the common EOF and Emergency News Center for both Limerick and Peach Bottom. This state-of-the-art facility became operational on April 3, 1992.

EP training was highly effective. There were two graded exercises during this period. No exercise weaknesses were identified and overall performance was judged strong. This indicated training proficiency. Limerick conducted four integrated drills per year and more

than 50 mini-drills. Emergency Response Organization (ERO) members were required to participate in one mini-drill per year and in one integrated drill every three years. Most ERO members participated in several mini-drills per year and in an integrated drill every two years. In addition, walk-through drills conducted by NRC with operations and management personnel indicated high training proficiency. Classroom training was conducted throughout the year. The training program was well-defined. Documentation and scheduling were efficiently tracked by use of the Plant Information Management System.

During the period, PECO effectively resolved EP technical issues. For example, a plant modification was completed to install beacons in noisy areas of the plant to help ensure that personnel will be aware of conditions requiring a station evacuation. The licensee also upgraded the three-county siren notification system by providing a state-of-the-art computerized control system. This system allows for remote system polling, testing and identification of siren failures. Siren availability for 1991 was greater than 98%, exceeding FEMA availability requirements. In addition, a common dose projection model was implemented for use at Limerick and Peach Bottom, with appropriate training.

The EP staffing level was stable and personnel were determined to be very competent. The staff discipline mix included health physics, operations and engineering. The EP staff consisted of four personnel, with an additional member on loan during the assessment period from the corporate staff. That additional position was approved late in the period as a permanent part of the Limerick staff. Corporate and station EP staff duties and responsibilities were well defined, and all portions of the program were effectively implemented. The corporate staff had approximately 16 individuals to support on-site (Limerick and Peach Bottom) and off-site activities. The ERO was well defined with a goal of three deep staffing, and most positions were staffed four deep. All individuals were qualified for their respective positions.

PECO continued to provide extensive support to off-site agencies. In addition to the siren system described above, the licensee supported training of off-site responders, provided for the annual media briefing, distributed the annual public information brochure and conducted frequent meetings with off-site agencies.

In summary, licensee implementation of the Limerick EP program was highly effective. Management involvement and support were evident. The training was excellent. This was exemplified in the licensee's performance during drills and exercises. The EP staff was competent and they resolved technical issues effectively. Both normal and ERO staffing were a strength. PECO continued to be involved with off-site agencies.

III.D.2 Performance Rating: Category 1

III.D.3 Recommendations: None

III.E Security

III.E.1 Analysis

During the previous assessment period, the Security Functional Area was rated as Category 1. That rating was based on the implementation of a very effective and performance-oriented security program that clearly had management attention and support.

During this assessment period, corporate and plant management interest in, and support for, the security program remained very evident through the funding and implementation of program improvements and enhancements. The more significant of these included the renovation of the main access control center, the installation of state-of-the-art search equipment and assessment aids, additional detection aids and lighting. Additionally, corporate and plant security personnel remained active in industry groups dealing with nuclear plant security, and resources were provided for non-required technical and personal improvement training courses, as described below.

Plant security management maintained effective communications and excellent rapport with other plant groups through active participation in the daily plant maintenance meetings and having a representative on the plant work flow task force during the refueling outage. This direct involvement in the work planning process significantly improved coordination and support, and provided a vehicle for identifying and resolving potential problems prior to the start of work. It also increased others' understanding of security considerations. A very positive attitude toward the security program was again displayed throughout this period by plant employees. Close and effective liaison with state and local law enforcement agencies was maintained through interface meetings and participation in contingency drills.

The NRC-required annual audit was conducted by PECO's Quality Assurance Department with the assistance of two consultants and two members of corporate security as technical specialists. It was comprehensive in scope and depth. PECO also continued the use of frequent self-assessments in an attempt to identify potential weaknesses before they became problems. Concerns or findings identified during the audits and assessments were promptly and effectively resolved.

During this SALP period, PECO's self-assessment program identified an integrity problem with a few contract security supervisors. PECO took prompt and extensive actions to determine the root cause of the problem, to correct it, and to prevent its recurrence plant-wide. This was reflective of PECO's comprehensive approach to quality assurance and corrective actions.

The training program was administered by the security force contractor with one supervisor, two instructors and a full time administrative clerk. Training facilities were good and professionally equipped and maintained. The training program was well structured, current, and effective, as evidenced by minimal personnel errors and a good enforcement history.

PECo also provided security force members with special training, such as a National Rifle Association course, and courses in supervisor enhancement, stress management, technical writing, and computer operations. Contingency drills routinely were conducted for training purposes and lesson learned from critiques were promptly included in the training program. The operations organization actively participated in these drills when the drill scenario involved plant operations.

PECo's proprietary security group was staffed adequately with very qualified, experienced and professional personnel. Staffing of the contract security force was consistent with program needs, as evidenced by the minimal use of overtime. Security officers exhibited a professional demeanor, good morale, and were very knowledgeable of their duties.

PECo submitted two one-hour security event reports during the period. They were not repetitive. PECO's event reporting procedures were comprehensive and clear, consistent with the NRC's reporting requirements and well understood by security supervisors. PECO also properly documented, tracked and analyzed loggable security event reports and took prompt and effective corrective actions as necessary.

An initial review of PECO's Fitness-for-Duty program was conducted early in February 1991, with follow-up review of its implementation later in the assessment period. PECO's program was found to be aggressive, comprehensive and responsive to the spirit and intent of the rule. Although some minor inconsistencies with the rule were identified by the NRC, they were corrected promptly.

PECo submitted one revision to the Guard Training and Qualification Plans under the provisions of 10 CFR 50.54(p). The revision was technically sound and demonstrated a thorough knowledge and understanding of NRC requirements and objectives.

In summary, PECO continued to maintain a very effective and performance-oriented security program. Corporate and plant management attention to and support for the program remained evident throughout the period. Improvements and enhancements to the program were made where necessary, to maintain its effectiveness. Excellent rapport and communications existed with other plant groups, which helped minimize the number and extent of problems. The audit and self-assessment programs remained effective, and enhanced program implementation. Staffing reflected program needs and the training program was strong. Program plans and procedures were well-written, understood and reflected a thorough and comprehensive understanding of regulatory requirements.

III.E.2 Performance Rating: Category 1

III.E.3 Recommendations: None

III.F Engineering/Technical Support

III.F.1 Analysis

During the previous SALP period, the Engineering and Technical Support Functional Area was rated Category 2 with an improving trend. Weaknesses identified during that period were incomplete engineering disposition of nonconformance reports, misapplication of Code requirements concerning inservice testing of pumps, and failure to involve operations personnel in Emergency Operating Procedure (EOP) satellite procedure development.

During this SALP period, some positive initiatives were taken by PECO to improve the safety and reliability of the plant. These include development of a safety barrier (doors, hatches, seals) control system, installation of full flow condensate polishing systems, replacement of troublesome static inverters, plans to replace elements of the service water system, development of design basis documents, a continued program of system walkdowns, and performance of safety system functional inspections.

A previous practice of improper removal of hatches and seals lead to operation in an unanalyzed condition. In response, PECO implemented aggressive corrective actions that resulted in improvements in plant safety through the controlled removal of hatches and barriers. Engineering performed an effective assessment of all barriers for fire protection, flood protection, and steam break accidents. This comprehensive action by engineering has resulted in the installation of a barrier control system, with all barriers now correctly marked to make personnel aware of their safety importance.

The installation of full flow condensate polishing systems was intended to improve plant water chemistry and reduce corrosion products, lowering the already low radiation levels within the primary system. Additionally, static inverters that have caused spurious actuations in the security and reactor protection systems, are being replaced with new state of the art inverters during the next refueling outage on each unit. These efforts by the licensee are examples of engineering involvement and efforts to improve operations and enhance plant safety.

PECO has established a "Raw Water Task Force" to ensure that all design and operability requirements of the raw water systems are met. The task force, comprised of members from engineering, chemistry, and project management, focused its attention on design of modifications to correct corrosion problems. Techniques were developed for identifying corrosion and evaluating new materials that will prevent further corrosion. A significant part of the task force effort was directed toward finding ways to maximize system and component availability. Because of task force findings and recommendations, portions of the service water system will be replaced during future outages with piping that is corrosion resistant.

A major effort of the Nuclear Engineering Division (NED) was the preparation of design basis documents. PECO was devoting significant time and resources to this important program and has completed documents for eight safety systems to date.

Compared to the last assessment period, based on WRC safety system evaluations, fewer problems and improved system conditions were observed because of a rigorous walkdown program by NED. System engineers from NED and Limerick did periodic walkdowns of safety systems for which they have responsibility. As a result, station drawings, system material conditions, and operating procedures have improved.

Corporate and site engineers took aggressive action to correct cable separation problems that were the subject of two Licensee Event Reports. All identified cable separation problems have been resolved. PECO site management was actively involved in the resolution and correction of all cable separation discrepancies.

PECO engineers, aided by contractors, performed safety system functional inspections (SSFI) to obtain relevant information associated with design, operation, testing, maintenance and training. Systems completed include the diesel generator and AC emergency electrical system, the high pressure coolant injection system (HPCI), and the service water system. The discrepancies found are being tracked and corrected by PECO engineering. This was an important initiative by PECO, and displayed appropriate plant safety perspective.

Other initiatives undertaken during the period were directed at improvement of the effectiveness of engineering in assisting plant operation. These included the use of probabilistic risk assessment (PRA) considerations in the management of system outages, improvement of the modification process, development of a project management training program plan, and site organization changes.

By using PRA methodology, PECO has instituted plant shutdown risk management during outages. Risk factors caused by the absence of a particular system, were factored into outage plans. Considerations such as time out of service, testing supporting systems, and an assessment of plant and environmental conditions were integrated into planning the outages. This program has resulted in important safety enhancements during plant outages.

A revision to the modification process known as "Modification Process Integration," (MPI) resulted in modification packages that were of excellent quality. The modification process change included more site participation in the preplanning stage. MPI incorporates a team approach to analysis and resolution of perceived problems prior to field installation. Modifications implemented under the new process require less rework, fewer field changes, and less time for installation and testing. Design review boards performed in-depth reviews of selected modifications at Limerick focusing on technical adequacy, process weaknesses, and means to improve the modification process. The use of the design review board was effective in centering management attention on the modification process and resolution of problems.

A team inspection by the NRC, near the end of the assessment period, evaluated the adequacy of PECO actions to assure the reliability of motor-operated valves (MOVs). The team concluded that the engineering and technical support response to Generic Letter (GL) 89-10, "Safety Related Motor-Operated Valve Testing and Surveillance," was not effective in that the program did not meet the intent of the GL in the area of design-basis reviews, scope and trending. Test equipment inaccuracy was not considered when setting torque switches, resulting in switches being set marginally above the minimum required torque setting for several valves. This led PECO to declare a core spray system primary containment isolation valve inoperable. Additionally, guidance documents for performing switch setting calculations were inadequate for the evaluation of valve performance. Management attention to the program was ineffective in that a decision had not been made regarding the extent of design-basis testing two years after the issuance of the GL 89-10.

Although weaknesses were evident in the MOV design basis test program and in specification of switch settings, the onsite Maintenance Engineering Branch was very active in the development of the program associated with the acquisition of new diagnostic test equipment for MOVs. The test equipment was effectively employed for the diagnosis of MOV problems, as exemplified by the replacement of a yoke clamp on a HPCI system MOV that was identified as defective by diagnostic testing. An extensive test program has been planned for the 1992 Unit 1 refueling outage during which more than 100 MOVs are scheduled to be tested.

The NED/Project Management (PM) Training Program Plan, developed by the Nuclear Training Section with help from NED, provided guidance and direction for training activities that prepared NED/PM personnel to perform engineering, design, and managerial tasks to support Limerick. This program consisted of initial training for new engineers, continuing training for experienced engineers (refresher training), and specialized skills training, including on-the-job training for selected individuals used as specialists.

The NED organization remained largely unchanged during this SALP period. At the end of the period a change was implemented to split the site branch of NED into the Mechanical/Civil Engineering Branch and Electrical/I&C Engineering Branch. This reorganization was intended to enhance support to the site. Good communication methods employed between NED and the site included staff rotation, monthly site interface meetings, frequent telephone conversations with site management, and mutual participation on modifications. Training bulletins, in which specific items were discussed, were issued to the site when required.

In response to the last SALP assessment regarding the engineering disposition of nonconformance reports (NCR), PECO provided training on documenting those dispositions. A review of subsequent NCRs issued and dispositioned demonstrated that PECO's efforts have been successful.

NED analyses and submittals to the NRC were generally of high quality and reflected an

understanding of safety issues and regulatory concerns. Engineering evaluations related to licensing amendments and responses to NRC Bulletins and Generic Letters were comprehensive and technically sound. For example, PECO's request to operate Unit 1 in the fourth cycle with an indication in the recirculation riser nozzle N2H-to-safe end weld was well documented and contained sufficient technical information to show that continued operation of Unit 1 with the indication was acceptable. During the SALP period, the NRC completed review of PECO's First Ten-Year Interval Inservice Inspection Program for Limerick Unit 2. PECO submitted a well-organized and complete program that indicated an understanding of the regulations and the purpose of the ASME Code. The submittal demonstrated the program's compliance with the regulations and the Technical Specifications. Relief requests were adequately justified.

PECO's response to the Station Blackout Rule (10 CFR 50.63) indicated that they had a good understanding of the technical issues involved and that management was adequately involved in the licensing process and was exercising adequate control over the engineering/technical staff.

During the period, the NRC completed review of PECO's response to GL 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," including issuance of associated Technical Specifications. PECO's responses were comprehensive and enabled the staff to conclude that the responses to the five specific items and 13 staff positions in GL 88-01 were fully acceptable.

Summary

Overall, engineering provided high quality support to plant activities. During this SALP period, initiatives were taken to improve the safety and reliability of the plant and to increase the effectiveness of engineering in assisting plant operation. Actions included identification, evaluation, and modification of systems affecting plant safety. Organizational adjustments, modifications process improvements, and training increased engineering effectiveness. Observed weaknesses during the SALP period were identified and appropriate action taken toward improvement.

III.F.2 Performance Rating: Category 1

III.F.3 Recommendations: None

III.G Safety Assessment/Quality Verification

III.G.1 Analysis

The previous SALP rated the Safety Assessment/Qualification Verification Functional Area as Category 1. Strengths noted were the active role management took in the assurance of quality, the proactive self-assessment program, the involvement of the consolidated Nuclear

Quality Assurance Department, the comprehensive and thorough evaluations by the Plant Operations Review Committee (PORC) and the Nuclear Review Board (NRB), the actions corporate management had taken to improve the quality of engineering and technical support and emergency preparedness, the ALARA program, the excellent operational record and a solid root cause analysis program. However, weaknesses involving insufficient management attention to the licensed operator requalification training program and effectiveness in resolving deficiencies in Maintenance were identified.

Management involvement and control to assure quality were evident throughout this assessment period. Site management exhibited a commitment to excellence in safety and provided the necessary policies, personnel, leadership and staffing. Site management generally took prompt corrective action for problems identified by the root cause analysis program. PECo continued to use its safety review committees as effective tools in assessing and improving plant operation. The PORC, Independent Safety Engineering Group (ISEG) and the NRB continued to provide good oversight of station activities.

The root cause analysis program had a low threshold for when a detailed analysis was performed. The program was strongly supported by all levels of management and all reports were signed by the Plant Manager. Distribution of the completed reports was made throughout the organization. Senior Management directed the NRB to follow-up on more significant findings identified by the root cause analyses. The follow-up generally yielded positive changes to plant operations.

PECo completed a self-assessment in the fall of 1991 that included the evaluation of all departments, and emphasized finding better ways to resolve the identified problems. All teams, branches, sections and divisions within PECo Limerick and Corporate participated in the process. Their major effort has been the reduction of personnel errors. The program has been successful in identifying and correcting ALARA concerns, operational and training deficiencies, and informing corporate management of degrading conditions that may be present within the station. However, the program and subsequent root cause analysis, was not fully successful in identifying potential problems with the Nuclear Maintenance Department, the onsite maintenance organization and the quality assurance organization.

Several actions have been taken to reduce human error. The PECo Operations Department approached the problem vigorously. The night orders, letters to operators, and training sessions have been successful in reducing errors in the operations area. Other Limerick departments have remained at or below the level of personnel errors noted in their last assessment.

Licensee Event Reports (LERs) were written onsite by the Regulatory Group, aided by the root cause analysis group. The LERs were well written, with clear event descriptions. When in-depth engineering analysis and evaluation were required, the problem was referred to corporate engineering for solution. These solutions were generally very good. The LERs were generally submitted on time.

PECo responses to NRC Generic Letters and Bulletins have generally shown a clear understanding of the issues involved. The responses have been submitted in a timely manner with acceptable proposed resolutions. One exception was the discrepancies identified by the NRC MOV Team Inspection where, two years after the issuance of GL 89-10, a clear approach to MOV operation and testing was not fully in place. License amendments contained good supporting analyses and needed little additional information. The discussion of no significant hazards considerations (NSHC) within the amendment applications was thorough and complete, however, some safety evaluations were weak.

PECo continued to demonstrate its capabilities in the field of risk assessment. PECO's consideration of the safety impact of site activities, relative to their effect on the PRA, continued to improve. This was evident in the operations, maintenance, and engineering areas. Its individual plant evaluation (IPE) methodologies were frequently used to improve operating procedures and training, accident management strategies, and to prioritize preventive and corrective maintenance activities. All of these activities were directed to minimizing the risks to public health and safety.

Site personnel continued to be committed to safe operations. Technical decisions were well thought out and tended to be conservative from a safety viewpoint. Corporate and senior management involvement was also evident. PECO volunteered to be part of an NRC sponsored program to assess how management style can directly affect the safe operation of a nuclear facility. The effort took three weeks and involved extensive support from the PECO staff.

However, some weakness in management oversight effectiveness was noted during the period. For example, within the maintenance area there were repeat violations involving tool and material controls over the open reactor vessel and spent fuel pool. Initial corrective actions were not effective. The NRC identified weakness in maintenance and quality control personnel procedural compliance and planning. When the station qualified reviewer program was implemented, weak management oversight was evident. Upon identification, by the NRC, PECO took the necessary corrective actions. Since the implementation of these actions, no further problems have been identified.

Quality assurance audits were good and identified programmatic issues. However, as discussed in previous sections, QC oversight in the areas of maintenance planning and work performance were not effective in preventing problems.

Early in the period the Operations Department had several blocking errors, and twice failed to make a proper operability determination. However, operations management aggressively pursued root cause evaluations and promptly took corrective actions. Inspector observations have not identified similar problems toward the end of the assessment period.

Summary

PECo was committed to the operation of a safe nuclear power plant and has continued to manage the operation of Limerick well. They have implemented aggressive root cause analysis and self-assessment programs, and the concerns identified were generally resolved in a timely manner. However, additional PECO management attention is needed to address MOV, procedural compliance, and personnel error weaknesses, most notably in maintenance. Operations, EP and Engineering Support performance improved over that observed during the last SALP cycle.

III.G.2 Performance Rating: Category 1 Declining Trend

III.G.3 Recommendations: None

Board Comment:

It is recognized, by the Board, that PECO has maintained an aggressive posture toward operating Limerick in a safe manner. Management has clearly demonstrated their safety focus and their desire to protect plant personnel and public health and safety. In general, performance in this functional area continued to be excellent. However, the Board noted that management's efforts toward the correction of certain issues, stated within the text, were not fully effective. These isolated lapses in oversight indicated a decline in the overall level of performance and should be closely evaluated by licensee management.

IV. SUPPORTING DATA AND SUMMARIES

IV.A Licensee Activities

Unit 1 was in a refueling outage at the beginning of the SALP period while Unit 2 was at 100 percent power. On December 17, 1990, Unit 1 was returned to service following the refueling outage.

Between November 14, 1990, and February 20, 1991, there were four occasions when the Unit 2 main turbine was taken off line to repair electro-hydraulic control (EHC) system fluid leaks.

On March 22, 1991, Unit 2 was manually scrammed from 96 percent power to complete a full load rejection test that remained from the start-up test program. The test was successful and Unit 2 entered its first refueling outage.

On April 12, 1991, Unit 1 experienced a reactor scram from 100 percent power due to a loose copper link that interrupted DC control power to the EHC system and caused a turbine trip. The copper link and four other similar assemblies were replaced with lugged hard wire connectors. The unit was returned to service on April 16, 1991.

On June 1, 1991, Unit 1 was reduced in power and subsequently shut down to repair a mechanical seal leak on the "1B" reactor recirculation pump. The seal, which had been in service approximately 5 years, was replaced and the unit was returned to service on June 13, 1991.

On June 5, 1991, Unit 2 was returned to service following its refueling outage. Unit 2 operated at or near 100 percent power through the end of the SALP period.

On December 18, 1991, Unit 1 was shutdown to repair failed HPCI system inboard steam supply isolation valve. The valve had been closed for other maintenance. The valve could not be reopened because a faulty spring pack prevented the closing torque switch from deenergizing the motor, resulting in a burned up motor. Repairs were made and the unit was returned to service on January 1, 1992. Unit 1 continued to operate at or near 100 percent power for the remainder of the SALP period.

The EHC system was refurbished during the Unit 2 refueling outage. Unit 1 had previously been reworked. This work has eliminated the chronic EHC problems.

IV.B NRC Inspection and Review Activities

Three NRC Resident Inspectors were assigned to Limerick at the beginning of the assessment period. One inspector was reassigned to Peach Bottom on April 6, 1991. NRC team inspections were conducted in the following areas.

- System Approach to Training (Training for Requalification Program and Limited Senior Reactor Operator Program) inspection, conducted May 13 - 17, 1991, to assess PECO's approach to training.
- Probabilistic Risk Assessment inspection, conducted July 15 - 26, 1991, to assess the effectiveness toward enhancing plant safety based on plant specific Probabilistic Risk Assessment studies for Limerick Generating Station.
- Motor Operated Valve inspection, conducted January 13 - 17, 1992, to assess PECO MOV program development in response to Generic Letter 89-10, "Safety Related Motor-Operated Valve Testing and Surveillance."

ATTACHMENT I

SALP EVALUATION CRITERIA

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations in that area. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

- Assurance of quality, including management involvement and control;
- Approach to the identification and resolution of technical issues from a safety standpoint;
- Enforcement history;
- Operational events (including response to, analysis of, reporting of, and corrective actions for);
- Staffing (including management); and
- Effectiveness of training and qualification programs.

Based upon the SALP Board assessment, each functional area evaluated is classified into one of three performance categories. The definitions of these performance categories are:

Category 1: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a superior level of performance. NRC will consider reduced levels of inspection effort.

Category 2: Licensee management attention to the involvement in nuclear safety or safeguards activities resulted in a good level of performance. NRC will consider maintaining normal levels of inspection effort.

Category 3: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in an acceptable level of performance; however, because of the NRC's concern that a decrease in performance may approach or reach an unacceptable level, NRC will consider increased levels of inspection effort.

Category N: Insufficient information exists to support an assessment of licensee performance. These cases would include instances in which a rating could not be developed because of insufficient licensee activity or insufficient NRC inspection.

The SALP Board may assess a functional area and compare the licensee's performance during a portion of the assessment period to that during an entire period in order to determine a performance trend. Generally, performance in the latter part of a SALP period is compared to the performance of the entire period. Trends in performance from one period to the next may also be noted. The trend categories used by the SALP Board are as follows:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period and the licensee had not taken meaningful steps to address this pattern.

A trend is assigned only when, in the opinion of the SALP Board, the trend is significant enough to be considered indicative of a likely change in the performance category in the near future. For example, a classification of "Category 2, Improving" indicates the clear potential for "Category 1" performance in the next SALP period.

It should be noted that Category 3 performance, the lowest category, represents acceptable safety performance. If at any time the NRC concluded that a licensee was not achieving an adequate level of safety performance, it would then be incumbent upon NRC to take prompt appropriate action in the interest of public health and safety. Such matters would be dealt with independently from, and on a more urgent schedule than, the SALP process.