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REGION I

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LICENSEE: Pennsylvania Power and Light Company (PP&L)

FACILITY: Susquehanna Steam Electric Station (SSES)
Berwick, Pennsylvania

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Area Inspected: This was an announced inspection to review the overall adequacy, implementation, and maintenance of the Susquehanna Steam Electric Station fire protection program. The inspection included selected verification of procedure implementation and evaluation of the technical adequacy of procedures and programs, to assure that the fire protection program was consistent with the technical specifications, technical requirements manuals, fire hazards analysis, and NRC safety evaluation reports. Assessments were made of plant fire equipment conditions and housekeeping by plant walkdowns and review of maintenance records. Evaluations were made of fire brigade and firewatch personnel qualifications. Program assessments, conducted by Pennsylvania Power and Light, were reviewed to evaluate the effectiveness of the audits performed. Surveillance tests and inspections related to fire protection were also reviewed. Program oversight was addressed to assess the extent and quality of management involvement.

Results: The inspector concluded that the fire protection program was clearly established and implemented. Policies reviewed were technically sound. Procedures appropriately designated personnel to implement the program, delineated training and qualification requirements, and provided very clear expectations and guidance for employees to understand and comply with the established policies and requirements. Recent changes to improve the quality of administrative and surveillance procedures were noted.

The inspector concluded that fire protection equipment material conditions were good and housekeeping, in general, was excellent. Corrective actions taken by the licensee in response to an identified deficiency regarding fire brigade equipment were found to be appropriate for preventing recurrence. Personnel interviewed were determined to be knowledgeable of station policy and procedures for reporting fires, firewatch duties, and responding to fires. Fireloading was properly maintained and within analyzed quantities. In general, good control of combustibles was found. Based on plant tours, the inspector concluded that fire systems were capable of providing protection against fire and were consistent with the defense-in-depth principle.

The inspector concluded that administrative controls were very good for governing activities and implementing program expectations to prevent fires from occurring, and maintaining fire protection defense-in-depth. These activities involved combustibles, system configurations, ignition sources, and system impairments.

Based on review of the audits identified in Attachment 2 and subsequent dispositions of identified findings, the inspector determined that audit inspection findings were appropriately assessed, and effective and timely corrective actions had been taken for the identified deficiencies. The inspector concluded that audits conducted were good for assessing fire program attributes, and fire protection quality assurance requirements had been properly reflected in SSES procedures.

The inspector determined that good training procedures had been developed and implemented. Lesson plans effectively presented program requirements. Training records were available, but not effectively maintained for auditability to review the training completed and qualification of each brigade member. The inspector concluded that the training program satisfied the fire program requirements.

The inspector concluded that fire drills had been performed that satisfied the requirements of the program plan. However, the fire training facility drill scenarios were found to be limited in scope and quantity for readying the fire brigade for various nuclear plant fire situations. Initiatives taken by the licensee to improve brigade effectiveness, including the use of referees and the response vehicle, were noted. The inspector found that the licensee's approach to assess and improve fire drill scenarios and subsequently, improve the performance assessment of all brigade members was adequate.

The inspector concluded that surveillance procedures were very good. These procedures provided good details and were effective for maintaining equipment and verifying operability. Test results and inspection records reviewed verified that equipment was in compliance with requirements and were based on appropriate acceptance criteria. Maintenance and inspection results were properly documented.

The vendor's acceptance criteria values for operational performance of fire barrier penetration seals were well supported by qualification test data and accurately presented on licensee drawings, specification guides, and

surveillance procedures. Training and guidance provided to seal installers and inspectors were determined to be thorough and good. In addition, the inspector concluded that excellent program controls had been established, implemented, and maintained for ensuring penetration seal integrity and area separation during a fire.

The inspector found the program management to be appropriately involved with the fire protection program. Program expectations were determined to be clearly represented and presented to site management and departments. Program improvements had been established based on in-depth reviews and prioritized within the continuing enhancement program/project.

The inspector concluded that the increased management attention and established initiatives were excellent. These initiatives included the enhancement project, fire program consolidation, and performance indicators. These initiatives have identified weaknesses, established and implemented corrective actions for many program attributes, and improved the effectiveness of the fire protection program. The licensee stated that further assessments would be conducted and improvements implemented. The inspector noted that senior site management support for the fire protection program was evident.

DETAILS

1.0 PURPOSE (NRC INSPECTION MODULE 64704)

The purpose of this inspection was to assess the overall adequacy, implementation, and maintenance of the fire protection program at the Susquehanna Steam Electric Station (SSES). The inspection included verifications of procedure implementation and evaluation of the technical adequacy of procedures and subprograms, to assure that the fire protection program was consistent with the technical specifications (TS), final safety analysis reports (FSARs), fire hazards analysis (FHA), and NRC safety evaluation reports. Assessments were made of plant fire equipment conditions and housekeeping by the performance of plant walkdowns and review of maintenance records. Evaluations were made of fire brigade and firewatch personnel qualifications. Program assessments conducted by Pennsylvania Power and Light (PP&L) were reviewed to evaluate the effectiveness of the audits performed. Surveillance tests, inspections, and maintenance activities related to fire protection, and management oversight of the program were also reviewed.

2.0 INSPECTION FINDINGS

2.1 Fire Program - Procedure Review and Implementation

Selected sections of the fire protection procedures, listed in Attachment 2 of this report, were reviewed by the inspector to verify that the fire protection program requirements, as described in the TS, fire protection safety evaluation reports, FSARs, and PP&L Fire Protection Review Report (FPRR), have been adequately implemented.

PP&L had established the fire protection program in Nuclear Department Procedure NDAP-QA-1110, Revision 0, "Fire Protection Program," to present requirements and departmental responsibilities for implementation and maintenance of the fire protection program. This program plan also described fire protection system design bases and defined controls for fire protection activities. Additional design bases information of the fire protection program was included in letters between PP&L and the NRC. The fire protection quality assurance requirements and responsibilities for controlling items and activities associated with the fire protection program, related systems, and/or emergency equipment for safety-related areas were presented in NDAP-QA-0151, Revision 1, "Quality Assurance Requirements for the Fire Protection Program and Related Systems." The scope of the fire protection quality assurance was defined as in sections of the Nuclear Department's Operational Quality Assurance program. Fire protection quality assurance features were denoted with a "F"-designated quality classification.

The inspector found that no single source design basis document (DBD) had been established for the fire protection program. The SSES Balance of Plant (BOP) Supervisor was satisfactied that design bases have been adequately established and documented in the procedures. In addition, the current guidance provided in test procedures was believed to provide verification of the design bases. The inspector found that the procedures referenced, but did not define, bases information. This information could substantiate the acceptability of future plant changes, as verified by fire protection staff engineers, as well as

other evaluations regarding systems and equipment. The inspector concluded that a DBD would provide a useful tool for current or future personnel, including the recently assigned fire protection system engineers. This tool would provide a convenient reference document in lieu of reviewing several various documents including TS, FSARs, FPRR, numerous letters between the NRC and licensee, and safety evaluation reports.

Numerous types of procedures provided guidance and supporting details for implementing and controlling the requirements of the fire protection program. Surveillance procedures and technical procedures developed by the Instrumentation and Controls, Engineering, Maintenance, and Operations departments were used to detail the testing required by NDAP-QA-1110. Administrative procedures were used to provide guidance and requirements for control of processes. Administrative procedures delineated responsibilities and described subprograms for controlling combustible materials, ignition sources, fire barrier penetrations, impairing fire protection systems, performing fire watches, and implementing compensatory measures for systems or equipment out of service. The inspector noted the excellent clarity and quality of the procedures. Surveillance procedures presented clear acceptance criteria, used for immediate field operability determinations. Administrative procedures presented very clear expectations and guidance. The inspector found the requirements for implementing compensatory measures during system impairments to be appropriate and consistently presented in procedures reviewed.

The inspector concluded that the fire protection program procedures clearly presented the requirements for those responsible for implementing and maintaining the fire program. Preventive maintenance and surveillance testing procedures provided excellent acceptance criteria, also allowing for immediate field operability determinations and implementation of stated requirements, as presented in the TS and FPRR. The inspector noted that several of the administrative and surveillance procedures reviewed had been revised for improved quality including clarity, responsibilities, and acceptance criteria.

The inspector reviewed the general employee training program to verify that workers had been provided the necessary information pertaining to fire program requirements. The general employee training program included information on hot work permits, fire door closure and use, types of fire suppression systems, reporting a fire, and responsibilities of personnel during a fire. In addition, NDAP-QA-0444, Revision 1, "Fire Alarm Response," provided guidance to all plant personnel for fire-related incidents. The inspector determined that adequate measures had been established for employees to understand and comply with requirements of the fire protection program.

In addition, the inspector reviewed the licensee's established controls for performing plant modifications. The purpose of this review was to verify that potential impact evaluations on fire protection were made prior to approval for modification installation. The inspector determined that engineering activities, that could affect fire protection documents and procedures, were well controlled by engineering procedures. The inspector found that PP&L Nuclear Department Procedure MFP-QA-2309, Revision 2, "Design Change Package/Engineering Change Order Preparation," was used for performing plant

modifications and required a fire protection review for assessing the potential impact on fire protection during the preliminary engineering phase. These reviews were required to be performed in accordance with MFP-QA-2308, Revision 2, "Design Inputs and Considerations." The inspector found the fire protection review criteria and additional guidance presented in the Design Standards Manual and Design Guides, including GDG-05, "Applicability Criteria for Design Considerations," to be thorough for assessing the impact of any proposed plant change against the design features needed for safe plant shutdown during and following a fire. The inspector concluded that good guidance for performing fire protection engineering reviews for plant changes had been established. The operations department was found to track the status of changes to the site fire protection systems, as determined by work group supervisors, in accordance with procedures NDAP-QA-0441, Revision 1, "Fire Protection System Status Control," and NDAP-QA-0302, Revision 2, "System Status And Equipment Control."

The inspector concluded that the fire protection program was clearly established and implemented. Policies reviewed were technically sound. Procedures appropriately designated personnel to implement the program, delineated training and qualification requirements, and provided very clear expectations and guidance for employees of many departments to understand and comply with the established policies and requirements. Recent changes to improve the quality of administrative and surveillance procedures were noted.

2.2 Facility Tour

The inspector toured accessible vital and non-vital areas of the site and inspected the fire protection water suppression systems, fire pumps, suppression piping and distribution systems, post-indicator valves, yard hydrants, contents of indoor and outdoor fire protection storage cabinets and sheds, emergency lighting patterns for access/egress routes for selected safety-related plant equipment areas, and the condition of fire brigade equipment. The tours also included inspection of fire detectors, alarm panels, positions of fixed automatic and manual suppression instruments, fire hose stations, fireloading, and fire doors. The inspector also discussed fire program requirements with assigned firewatch personnel encountered during a tour to assess the knowledge of these individuals and to attain feedback on their assumed responsibilities.

The inspector noted that tank gauges on fire equipment, including fire extinguishers, registered full. Halon tanks were verified to be full through documentation review. The inspector observed that fire doors latched properly and were clearly posted with door requirements regarding closure. Fire brigade members' clothes were in good condition and found to be adequately organized in the fire brigade sheds. Adequate variance in size and quantity of brigade equipment was noted. Access to fire suppression devices, both inside and outside the sheds, was not restricted by any materials or equipment. The inspector identified certain flashlights that were inoperable due to either failed or removed batteries. Other flashlights were found to provide little light. In addition, the inspector found a pair of brigade fire gloves missing from turnout gear stored in shed No. 1, located in the turbine building.

The inspector reviewed previously-completed monthly inventory sheets for the brigade sheds and found that certain items used by the brigade, as listed on the sheets, had been missing. In addition, Procedure NDAP-QA-0445, that requires the inventory review, failed to explicitly call for a quality inspection of the condition of stored brigade equipment. The licensee took immediate corrective actions to replace the missing batteries and gloves. In addition, the licensee posted signs outside each shed stating that equipment is for brigade use only to prevent any future removal of equipment. Two 7-volt lantern-type flashlights were placed in brigade shed Nos. 1 and 2 for enhanced illumination. Also, the licensee initiated a procedure change approval form (PCAF) to enhance NDAP-QA-0445 for guidance on qualitatively assessing equipment conditions during monthly inventories. The inspector considered these actions to be appropriate.

The fire suppression system pressure was verified by the inspector to be maintained greater than the required 85 psig both inside and outside the plant. Fire hose nozzles were found to be fully open, and fire hoses did not exhibit any cracks or fraying. The diesel-driven fire pump fuel storage tank contained an adequate supply of fuel. Terminal connections for the diesel-driven fire pump starting battery charger and battery bank were found to be clean, tight, and free from corrosion.

The inspector compared actual fireloading of selected plant fire areas, including the turbine building, Unit 1 high pressure coolant injection pump room, circulating water pump house, and "B" emergency diesel generator room with design basis loading values. Design values were presented in the FHA section of the FPRR, Fire Loading Summary Report SEA-CE-007, and maintenance LAN software system. Calorific values (BTU/lb) of materials observed were compared with the total BTU values and burn times analyzed for each area. The maximum fireloading values presented in the fireload summary reports, including controlled drawing C1929, were determined to be consistent with the FPRR based on the very large fire zones analyzed and approved by the NRC. As-found loading was within the maximum allowed values established. These values were presented in terms of equivalent fire duration (EFD), also called burn time, and were represented in minutes.

During a plant tour, the inspector found a few examples where two flammable liquids cabinets in the turbine building common area, elevation 729 feet, contained quantities of flammable materials that exceeded the fire ratings of the cabinets. In addition, safety cans were found stored on top of these cabinets. The licensee took immediate corrective actions to remove the excess combustibles and notify the assigned individual responsible for housekeeping in this specific area. The licensee presented documentation to demonstrate that these deficiencies had been previously identified and assigned for action by the fire protection site engineer on May 23, 1995, and again on June 2, 1995. At the time of this inspection, the assigned action due date had not yet expired.

This review also verified combinations of the suppression and detection systems present for each fire area, as documented on the pre-fire plans and verified as-found fire suppression system valve line-ups with mechanical

Procedure CL-013-0012, Revision 4, "Fire Protection Water Supply Systems." The inspector determined that the licensee had maintained good control of combustibles and system valve configurations, with the one exception noted.

The inspector found that PP&L had developed a plant housekeeping program and completed monthly inspections by assigned personnel. Work group supervisors and plant management were assigned to these inspections as detailed in NDAP-QA-0503, Revision 2, "Housekeeping Control." In general, housekeeping was excellent and good fire equipment material conditions were observed. The inspector randomly checked completed tag records on fire hose reels and portable fire extinguishers to verify that the required monthly surveillance inspections were performed. The monthly surveillance inspections for equipment were completed in accordance with stated requirements of the TS.

Based on interviews with personnel, both within and outside of the fire department, the inspector concluded that licensee personnel were knowledgeable of station policy and procedures for reporting fires, firewatch duties, and responding to fires. Additionally, good communications were noted between the site fire protection engineer and certain fire protection counterparts at other nuclear plants.

The inspector concluded that fire protection equipment material conditions were good and housekeeping, in general, was excellent. Corrective actions taken by the licensee in response to an identified deficiency regarding fire brigade equipment were found to be appropriate for preventing recurrence. Personnel interviewed were determined to be knowledgeable of station policy and procedures for reporting fires, firewatch duties, and responding to fires. Good communication was noted between the site fire protection engineer and counterparts at other nuclear plants. Fireloading was properly maintained and within analyzed quantities. In general, good control of combustibles was found. Based on this tour, the inspector concluded that fire systems were capable of providing protection against fire and were consistent with the defense-in-depth principle.

2.3 Administrative Controls

The inspector reviewed NDAP-QA-1110 and procedures listed in Attachment 2 to verify that the following attributes had been established for combustible materials and ignition source control to prevent fires and protect safety-related equipment:

- special authorization is required for the use of combustible, flammable, or hazardous explosive material in safety-related areas;
- all waste, debris, rags, oil, or other combustible materials resulting from completed work activities have been removed;
- transient combustibles are restricted and controlled in safety-related areas;
- housekeeping is properly maintained in areas containing safety-related equipment and components;

- smoking in safety-related areas is prohibited, except where "Smoking Permitted" areas have been specifically designated by plant management;

- requirements have been established for special authorization (permits) for activities involving welding, cutting, grinding, open flame, or other ignition sources, and that they are properly safeguarded in areas containing safety-related equipment and components;

- work authorization, construction permit, or similar arrangements are provided for review and approval of construction and maintenance activities that could lessen the safety of the facility; and

- fire reporting instructions for general plant personnel were developed.

The review of procedures and tours of the site identified acceptable conditions. Appropriate permit systems had been established to control ignition sources such as cutting and welding, the storage of combustible materials, and fire barrier/stop breaches. No hot work was observed by the inspector.

The inspector reviewed the administrative controls governing the removal or impairment action of any portion of the fire protection system. NDAP-QA-0441 presents the specific compensatory actions to be taken, TS requirements, and any special considerations to be reviewed for each plant firezone. The inspector concluded that effective measures had been implemented to maintain fire protection defense-in-depth during system impairments.

The inspector concluded that administrative controls were very good for preventing fires from occurring and maintaining fire protection defense-in-depth. These activities involved combustibles, system configurations, ignition sources, and system impairments.

2.4 Fire Program Audits

The licensee is required by the Quality Assurance (QA) program and TS to perform three types of audits of the fire protection program. The QA program verifies that requirements for design, procurement, installation, testing, and administrative controls for the fire protection program and safety-related/safe shutdown plant areas are satisfied. The audits include an independent fire protection and loss prevention program inspection and audit every 12 months, an audit of the facility fire protection program and implementing procedures every 24 months, and an inspection and audit of the fire protection and loss prevention program by a qualified outside fire consultant at least once each 36 months. The inspector reviewed the fire protection audit program to verify that these audits had been performed satisfactorily and in accordance with TS requirements.

The inspector noted that the audit scopes, findings, and observations were good and met the requirements of the program. The audits indicated that SSES maintained good control of the overall fire protection program. The inspector

verified that proper reviews and actions were taken to effectively resolve any identified deficiencies. Corrective actions were found to be implemented for resolving these deficiencies in a timely manner.

The licensee had established fire protection QA requirements in accordance with NRC Branch Technical Position 9.5-1, Appendix A. Each fire protection QA requirement, including design and procurement control, instructions, procedures, drawings, inspection testing, and records, was found to have an associated operational policy statement (OPS) established for implementation of the requirements.

Based on review of the audits identified in Attachment 2 and subsequent dispositions of identified findings, the inspector determined that audit inspection findings were appropriately assessed, and that effective and timely corrective actions had been taken for the identified deficiencies. The inspector concluded that audits conducted were good for assessing fire program attributes, and fire protection QA requirements had been properly reflected in SSES procedures.

2.5 Training

The inspector performed a review of PP&L training documents, as listed in Attachment 2, to verify that the licensee had developed and implemented procedures that require:

- announced and unannounced fire drills;
- a minimum of one drill per year for each fire brigade member;
- at least one backshift drill per year for each brigade member;
- maintenance of training records; and
- fire brigade training and retraining at prescribed frequencies.

The inspector determined that the fire brigade training requirements were documented in NDAP-QA-0445, Revision 1, "Fire Brigade." This procedure appropriately reflected the fire brigade requirements presented in the program plan. The NDAP was found to be organized, clear, and concise for presenting fire protection personnel duties, responsibilities, and requirements. The inspector noted, however, that no classroom continuing training was required nor given to fire brigade leaders beyond initial training provided in course FB-003, Revision 0, "Fire Brigade Leader Training." In addition, no written documentation was being maintained of leaders' hands-on training independent of drill participation. The licensee stated that recurring participation in drills kept brigade leaders qualified and adequately trained. The inspector reviewed several completed drill scenarios to evaluate critiques performed of brigade leaders' qualification and demonstration of leadership, command, and control. No problems were identified.

The inspector reviewed 1994 and 1995 training records for five selected fire brigade members to verify that they completed the required training, drill participation, annual hands-on training, and physicals. No discrepancies were noted. However, the inspector noted a weakness in the auditability of fire brigade members training records for verification of required classroom and hands-on training. This was found to be the result of using two different databases for tracking brigade members' qualifications. One database did not present the completion dates of drills nor individual courses, including quarterly training for auditability of training records. The licensee stated their intention to address this issue at the exit meeting. For the sampled review, all brigade members were found to be satisfactorily qualified. A sampling of lesson plans were reviewed. These documents were found to be well organized and clearly presented course material, program requirements, and expectations.

The inspector determined that the training and material provided during recent fire brigade and firewatch training supported the course objectives and were effectively presented. Discussions held with firewatch personnel indicated that they were cognizant of their duties and responsibilities.

The inspector determined that good training procedures had been developed and implemented. Lesson plans effectively presented program requirements. Training records were available, but not effectively maintained for auditability to review the training completed and qualification of each brigade member. The inspector concluded that the training program satisfied fire program requirements.

2.6 Fire Drill/Fire Brigade

The inspector did not observe an actual fire brigade drill due to plant operational constraints during the inspection. The inspector reviewed previously-completed fire drill critiques to evaluate brigade practical training, effectiveness for fire extinguishment, and demonstrated understanding of fire attack strategies.

Fire drills are conducted for brigade members to demonstrate the following:

- An understanding of the fire attack strategy;
- the ability to assess the fire properly;
- an awareness of vital equipment in the area;
- effective communication with other brigade members;
- an awareness of additional hazards in the fire area; and
- search and rescue techniques.

The SSES fire brigade consisted of personnel trained to combat fires per NDAP-QA-0445. This procedure provided for the implementation of the training requirements presented in NDAP-QA-1110.

The inspector found that the fire scenarios, created to evaluate brigade responses, had good objectives, adequately set up the scenarios, and provided information regarding expectations including fire attack strategies. Evaluation criteria had also been established for the control room and fire brigade leader, as well as the brigade. However, the inspector identified that fire training facility scenarios were very limited in scope and quantity for readying the fire brigade for various nuclear plant fire situations. Subsequently, the inspector recognized that the assessments made of brigade leaders' demonstrated leadership, command and control, and brigade member assessments for knowledge/judgement, skills, and firefighting readiness were limited also. This was due to the drill scenarios not being very challenging. Therefore, knowledge and abilities of brigade personnel were not thoroughly demonstrated.

The licensee stated that the emergency planning department had established a task force to develop new and more challenging fire scenarios prior to this inspection. The inspector concluded that the licensee's approach to assess and improve the scenarios was adequate.

The inspector noted SSES's implemented initiatives to improve drill effectiveness. These initiatives included the use of referees and a response vehicle during fire drills. The purpose of the referees was to monitor drill participants' performance at various fire scene locations. Also, the licensee utilized a fire brigade response vehicle containing firefighting equipment for improving the expediency for arrival at a fire scene.

A sampling of pre-fire strategy plans was reviewed. These plans were used by brigade members for developing firefighting strategies, identification of fire fighting equipment, and fire area layouts for specific plant areas. The inspector determined that the plans adequately presented major safe shutdown equipment, ventilation systems, potential hazards, detection and suppression equipment, and any specialized firefighting equipment found in each area. However, the inspector found the monochromatic pre-fire plans did not permit quick or easy identification of fire area attributes, including detection and suppression equipment.

The inspector concluded that fire drills had been performed that satisfied the requirements of the program plan. However, the fire training facility drill scenarios were found to be limited in scope and quantity for readying the fire brigade for various nuclear plant fire situations. Initiatives taken by the licensee to improve brigade effectiveness, including the use of referees and the response vehicle, were noted. The inspector found that the licensee's approach to assess and improve fire drill scenarios, and subsequently improve the performance assessment of all brigade members, was adequate.

2.7 Fire Equipment Maintenance and Inspection

The inspector reviewed selected surveillance, maintenance, and inspection procedures for fire protection equipment, to verify that the procedures provided sufficient detail and were technically sound. Attachment 2 contains a list of the completed surveillances from which selected sections were

reviewed by the inspector. In addition, a sample of completed test results and inspection records were reviewed to verify compliance with TS and the program plan, and that procedure implementation was appropriately documented.

Based on this review, the inspector concluded that procedures were very good. These procedures provided good details and were effective for maintaining equipment and verifying operability. Test results and inspection records reviewed documented that equipment was in compliance with requirements and were based on appropriate acceptance criteria. Maintenance and inspection results were properly documented.

2.8 Fire Barrier/Penetration Seals

The inspector reviewed the fire barrier program to verify the adequacy of penetration seal installations, qualification, and inspection activities. This review also assessed the appropriateness of acceptance criteria established for penetration seals to validate operability and degradation, that could prevent fire barriers from providing effective separation during a fire.

The fire barrier program was presented in NDAP-QA-0446, Revision 1, "Fire Barrier Program." Administrative controls applied to penetration seals were presented in NDAP-QA-1204, Revision 1, "Penetration Sealing." This procedure defined the administrative controls applied to the design, installation, evaluation, repair, and inspection of penetration seals. The site modification group (SMG) had technical accountability for the seal program, including inspection and surveillance activities, as presented in TS 3.7.7, "Fire Rated Assemblies." SSES plans to transfer this program to one of the two new fire protection system engineers as soon as possible. The enhancement project due date for this task was by May 1995. The maintenance production support services group (PSER) was responsible for the performance of work assigned by the SMG. The seal vendor, BRAND/BISCO, performed all design and installation services.

PP&L Specification C-1027, Revision 6, "Design And Installation Of Penetration Seals," specified the requirements for sealing barrier openings and qualification, verification, and documentation of the installations. PP&L Specification 1072, Revision 4, "The Inspection Of Fire Barriers For Compliance With SSES Technical Specifications," presented or referenced the acceptance criteria and evaluation criteria for all six types of penetration seals qualified for use at SSES. Each type varied with the material used to seal the penetration. Materials included foam, grout, welds, caulking, and combinations of materials.

Visual inspections of penetration seals are performed every 18 months per surveillance procedures SE-013-006, SE-113-006, and SE-213-006. These inspections are performed to ensure that required barriers are not degraded and remain operable. SSES operational performance of each penetration is evaluated as follows:

- operable with no damage;

- operable with minor damage - compensatory measures not required, repair is optional;

- inoperable - compensatory measures required until repair is completed.

The inspector found that penetration seal details and sealing requirements were consistently represented on PP&L X-series controlled drawings, within a penetration seal database, and on BISCO/BRAND production procedures. The inspector examined selected penetration seals during a general plant tour to assess the physical properties and appearance. No discrepancies were identified. However, the inspector noted that only external seal features could be verified by visual inspections.

The inspector reviewed documentation supporting:

- the adequacy of type "A" penetration seal installations and testing performed by the vendor to support qualification;

- the training and qualifications of seal installers and inspectors; and

- previously-completed licensee inspections to verify seal operability.

The inspector reviewed BISCO/BRAND quality procedures that documented the testing performed on all seal types and acceptance criteria for each seal detail, as validated by the destructive examinations. These destructive examinations demonstrated that the fire barrier penetrations had withstood the fire endurance test without the passage of flame or ignition of cables on the unexposed side, for a period of time equivalent to the barrier fire resistance rating. Fire endurance tests and subsequent hose stream tests of BRAND/BISCO penetration seal designs were performed by independent testing laboratories, including Omega Point, Underwriters' Laboratories, and Construction Technology, a Division of Portland Cement Company. Construction Technology performed more than 90% of the tests, as specified by BRAND/BISCO standards. The inspector found the vendor's acceptance criteria values to be well supported by the testing performed. This testing was satisfactorily performed in accordance with the American Society Testing Materials (ASTM) Standard E-119, "Fire Test of Building Construction and Materials," Institute of Electrical and Electronics Engineers (IEEE) Standard 634-1978, "Standard Cable Penetration Fire Stop Qualification Test," and American Nuclear Insurers/Mutual Atomic Reinsurance Pool (ANI/MAERP) Standard, "Standard Methods of Fire Tests of Cable and Penetration Fire Stops." These standards fulfill the requirements presented in NRC Branch Technical Position 9.5-1 (NUREG 0800).

A sample review of X-series drawings for type "A" seals used as 3-hour fire barriers appropriately reflected the as-built details and design criteria as presented on the vendor's qualification documentation (performance verification checklists). The same acceptance criteria including dimensions for seal gaps, cracks, gouges, or contractions were presented in SSES

Specification C-1072 and SSES surveillance procedures. SSES Project Study EC-012-1014, Revision 0, "Evaluation Criteria For Type 'A' Penetration Seals Which Contain Gaps," verified PP&L's acceptability of the vendor's values for operational performance of each seal based on the vendor's test results.

The inspector reviewed the training provided to substantiate the qualifications of vendor and SSES personnel responsible for installation and inspection of penetration seals, respectively. Seal installers were found to become qualified by evaluation and approval of the lead quality control (QC) BISCO/BRAND employee on site. Seal installers were evaluated through interviews and hands-on performance in accordance with American Nuclear Society Institute (ANSI) Standard N45.2.6-1978, "Qualification of Installation, Examination, and Testing Personnel for Nuclear Power Plants." The inspector found the training and guidance provided to installers to be thorough and easily understandable. However, the inspector noted that no written criteria had been developed to evaluate and document the knowledge and abilities of installers. The vendor representative stated that this issue had been previously identified, and written criteria had been established in draft form and should be implemented by September 1995. The inspector noted that BISCO/BRAND was a PP&L QA-approved vendor. Therefore, the vendor's QA was relied upon to verify as-built penetration drawings with installed seals. The inspector concluded that the vendor's plans to establish written evaluation criteria for seal installers were good.

The inspector found that the training requirements for seal inspectors were presented in two on-the-job-training (OJT) guides, FP-601, Revision 1, "Fire Barrier Inspector" and MC662, Revision 2, "Penetration Seal Training." The inspector concluded that training and guidance provided to inspectors were good, and appropriately substantiated the qualification of personnel tasked with performing the 18-month visual inspections of seals. These inspections were documented in accordance with the surveillance procedures mentioned above.

The inspector reviewed documentation of previously-completed penetration surveillances as listed in Attachment 2. This review was conducted to verify proper inspection performance and implementation of adequate corrective actions for identified discrepancies. The SMG, retitled modifications installations group (MIG), was found to generate the surveillance inspections, conduct pre-installation tailboard meetings with the qualified seal inspectors to review work scope and inspection criteria, perform documentation reviews, and monitor the performance of seal inspections. In addition, the responsible MIG engineer performed operability evaluations of inspection results. Interviews held by the inspector with MIG engineers revealed firm understanding and knowledge of program requirements, responsibilities, and penetration criteria for operability. Corrective actions were found to be properly implemented for identified degradations. No discrepancies were identified.

The inspector found the surveillances and associated data sheets to be of outstanding quality. Penetration seal data, inspection criteria, and evaluation criteria were based on specific seal design and were clearly presented for each seal. The inspector verified that accurate information was

presented to seal inspectors to effectively validate the condition of penetration seals and ensure proper seal integrity for maintaining separation during a fire.

The inspector concluded that the vendor's acceptance criteria values for operational performance of penetration seals were well supported by qualification test data and accurately presented on PP&L drawings, specification guides, and surveillance procedures. Training and guidance provided to seal installers and inspectors were determined to be thorough and good. In addition, the inspector concluded that excellent program controls had been established, implemented, and maintained for ensuring penetration seal integrity and area separation during a fire.

2.9 Management Oversight

The manager of nuclear systems engineering is responsible for implementation of the site fire protection program. The supervisor of balance of plant (BOP) systems department is responsible for providing oversight and direction of the program. The inspector held a discussion with the BOP systems supervisor regarding fire protection system improvements, performance indicators, expectations, and satisfaction level with the program. The purpose of this review was to assess the oversight and involvement by line management for effective implementation and maintenance of the fire protection program.

The inspector found that increased attention and manpower had been afforded to the program over the past 2 years. The licensee had consolidated and transferred the corporate program functions to the site except for continuing Thermo-Lag evaluations that remain at their Allentown office. This first initiative was taken to improve the program by streamlining processes, removing duplicate work, and reorganizing the program for better effectiveness with consideration for user-friendliness. This consolidation initiated other program improvements including the establishment of a senior project engineer and performance indicators for improved assessment of program performance.

The licensee implemented an expanded program/project review of fire protection system/program and surveillance responsibilities, with site departments/groups to attain feedback on weaknesses and strengths, and to discuss management expectations. In addition, a historical review was made of troubled program areas identified or included in licensee event reports, noncompliance reports, and significant operating occurrence reports to assess and modify corrective actions, as appropriate. Based on these reviews, the licensee established internal commitments for resolution of their findings.

Another initiative taken by fire protection management included the implementation of quarterly program self-assessments. The QC department provided guidance for the development of these assessments. Assessments were evaluated by the recently assigned senior project engineer and provided timely information used by management to gauge the effectiveness of implemented changes. In addition, the senior project engineer developed, tracked, and presented monthly performance indicator data to management. This data illustrated trends for open items including work authorizations and entered limiting conditions for operation (LCOs) and fire protection issues planned

for receiving priority attention. The inspector noted that senior site management support for the fire protection program was evident. This support was evident through the approvals for implemented and planned modifications.

The inspector determined that the establishment and use of performance indicators was excellent. Performance indicators were used to inform many site departments and groups of program status and planned actions regarding fire protection. The inspector noted, from review of all 1995 monthly performance indicator reports through May, that, in general, pertinent information was provided with appropriate narrative descriptions of trends. The inspector concluded that excellent assessments of program performance had been made, and were appropriately presented to site management.

The inspector found the BOP supervisor to be appropriately involved with the fire protection program. Program expectations were determined to be clearly represented and presented to site management and departments. Program improvements had been established based on in-depth reviews and prioritized within the continuing enhancement program/project. Further, actions to improve program quality were planned by the licensee.

The inspector concluded that the increased management attention and established initiatives, including the enhancement project, program consolidation, and performance indicators were excellent. These initiatives have identified weaknesses, established and implemented corrective actions for many program attributes, and improved the effectiveness of the fire protection program. The licensee stated that further assessments and improvements would be conducted. The inspector noted that senior site management support for the fire protection program was evident.

3.0 EXIT MEETING

The inspector met with PP&L personnel, denoted in Attachment 1 of this report, at the conclusion of the inspection on June 9, 1995. The scope of the inspection and inspection results were summarized. The inspector informed the licensee that further NRC in-office review would be performed of completed surveillances once the site fire protection engineer forwarded this information to the regional NRC office. The inspector stated that any identification of discrepancies would be discussed at another exit meeting by telephone. The licensee agreed with this inspection extension. During this meeting, the licensee acknowledged the inspection findings and confirmed their plans to further evaluate the auditability of fire brigade members' training and qualification, as detailed in this report. The licensee stated that the inspection findings presented had merit, would be addressed, and corrective actions would be taken where determined to be appropriate. The inspector received proprietary material during the inspection and used the material only for technical reference. No part of the material was knowingly disclosed in this inspection report. The inspector's review of completed surveillances did not identify any discrepancies.

Attachments:
1. Persons Contacted
2. Documents Reviewed

ATTACHMENT 1

Persons Contacted

Pennsylvania Power and Light Company

K. Chambliss	Manager, Nuclear Operations
*T. Dalpiaz	Manager, Nuclear Maintenance
*S. Davis	Site Fire Protection Engineer
D. Gandenberger	Supervisor, Maintenance Production Services
*R. Kichline	Project Licensing Specialist
*G. Kuczynski	Manager, Nuclear Plant Services
*L. O'Neil	Supervisor, Balance of Plant Systems
*J. O'Sullivan	Supervisor, Modification Design
*H. Palmer	Manager, Nuclear Systems Engineering
*R. Prego	Supervisor, Surveillance Records
*J. Tripoli	Senior Project Engineer, Nuclear
R. Wehry	Licensing Engineer
*W. Williams	Project Licensing Specialist
H. Woodeshick	Special Assistant to the President
*D. Zaprazny	Project Engineer, Site Modifications Group

United States Nuclear Regulatory Commission

*B. McDermott	Resident Inspector, Susquehanna Station

* Indicates those in attendance at the exit meeting held on June 9, 1995.

ATTACHMENT 2

Documents Reviewed

Procedures Reviewed:

Nuclear Department Procedures:

NDAP-QA-1110,	Rev. 0,	"Fire Protection Program"
NDAP-QA-0440,	Rev. 1,	"Control of Transient Combustible/Hazardous Materials"
NDAP-QA-0441,	Rev. 1,	"Fire Protection System Status Control"
NDAP-QA-0442,	Rev. 1,	"Control of Ignition Sources: Cutting, Welding, and Hot Work Permits"
NDAP-QA-0444,	Rev. 1,	"Fire Alarm Response"
NDAP-QA-0445,	Rev. 1,	"Fire Brigade"
NDAP-QA-0446,	Rev. 1,	"Fire Barrier Program"
NDAP-QA-0503,	Rev. 2,	"Housekeeping Control"
NDAP-QA-0443,	Rev. 1,	"Firewatch Procedure"
MFP-QA-5240,	Rev. 1,	"Technical Specification Fire Rated Penetration Seal Surveillance Program"
NDAP-QA-1204,	Rev. 1,	"Penetration Sealing"
MFI-5250,	Rev. 0,	"Instructions for Penetration Breach and Reseal"

Lesson Plans:

FB001, Rev. 1, "Fire Brigade I - Harwood"
FB002, Rev. 1, "Initial Fire Brigade Training"
FB003, Rev. 0, "Fire Brigade Leader Training"
FB017, Rev. 0, "Plant Fire Protection"
FB018, Rev. 0, "Fire Hazard Identification"
FB019, Rev. 0, "Plant Firefighting Plan"
FB020, Rev. 0, "Fire Brigade Safety"
FB021, Rev. 0, "Fire Protection Review"
FB022, Rev. 0, "Hazardous Materials"
FB024, Rev. 0, "Fire Brigade II - Harwood"

On-The-Job Training Guides:

FP-601, Rev. 1, "Fire Barrier Inspector"
MC662, Rev. 0, "Penetration Seal Training"
CS626, Rev. 0, "Penetration Seal Training"

Surveillance/Test Procedures:

TP-213-002,	Rev. 0,	"3-year Main and Auxiliary Transformer Deluge Systems Full Flow Test", 5/94
SO-013-008,	Rev. 5,	"Monthly Hose House 1FH122 and 1FH104 Inspection"
SM-013-007,	Rev. 4,	"Six Month Inspection of Hydrants 1FH122 and 1FH104"

Completed Surveillances:

SO-013-001,	Rev. 10,	"Weekly Diesel and Motor Driven Fire Pumps"; 4/2/95, 4/9/95, 4/17/95, 4/21/95
SO-013-002,	Rev. 9,	"Annual Cycling of Fire Protection Systems Valves"; 7/94, 11/94 partial
SE-013-003,	Rev. 4,	"18-month CO_2 System Functional Test"; 3/93, 8/94
SE-113-006,	Rev. 1,	"18-month Inspection of Unit 1 Technical Specification Related Fire Rated Penetration Seals"; 19/93, 4/95
SE-213-006,	Rev. 0,	"18-month Inspection - Unit 2 Penetration"; 3/94

Completed Surveillances continued:

SE-213-007, Rev. 2,	"18-month Inspection of Unit 2 Fire Barriers"; 2/95
SM-213-010, Rev. 4,	"18-month Inspection - Unit 2 Penetration"; 11/92
SE-113-007, Rev. 0,	"18-month Inspection of Fire Barriers"; 9/93, 3/95
SM-113-008, Rev. 0,	"6-month Halon Cylinders Inspection and Weight"; 1/95
SO-113-009, Rev. 5,	"3-year Sprinkler Nozzle Air Flow Test"; 7/94
SE-213-008, Rev. 2,	"6-month Inspection Unit 2 Fire Doors"; 2/95
SE-213-005, Rev. 3,	"18-month Functional Test and Visual Inspection of Fire Protection Sprinkler Systems"; 2/94
FP-OTP- 001, Rev. 2,	"Annual Fire Pump Multi-Point Performance Test"; 9/90
SE-013-001, Rev. 4,	"3-year Fire Protection System Flow Test"; 9/94
SO-013-010, Rev. 2,	"Monthly FP System Valve Alignment Check"; 4/95, 4/95

Specifications:

C-1072, Rev. 4,	"The Inspection of Fire Barriers for Compliance with SSES Technical Specifications"
C-1027, Rev. 6,	"Technical Specification for Design and Installation of Penetration Seals"

Design Standard:

CDS-03, Rev. 3,	"Maintaining Combustible Loading Analysis"

QA Audits Reviewed:

Triennial FP Program	Audit No. 92-060	August 5, 1992
Triennial FP Program	Audit No. 93-072	July 21, 1993
Annual FP Program	Audit No. 94-053	October 17, 1994