**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
**REGION I**
**475 ALLENDALE ROAD**
**KING OF PRUSSIA, PA 19406-1415**

July 20, 2011

Mr. Timothy S. Rausch
Senior Vice President and Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Blvd.
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT NO. 05000387/2011007 AND 05000388/2011007

Dear Mr. Rausch:

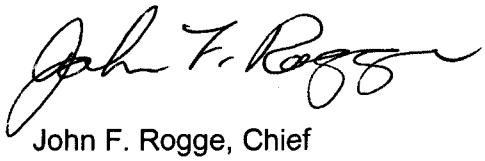
On June 24, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at Susquehanna Steam Electric Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed you and other members of your staff on June 24, 2011.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. The inspectors also reviewed some aspects of mitigation strategies for addressing large fires and explosions.

Based on the results of this inspection, two findings of very low safety significance (Green) were identified. The findings were also determined to be violations of NRC requirements. However, because of the very low safety significance, and because the findings were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC's Enforcement Policy. If you contest the NCVs in this report, you should provide a written response within 30 days of the date of this inspection report with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington D.C. 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Senior Resident Inspector at Susquehanna Steam Electric Station. In addition, if you disagree with the characterization of any findings in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the Senior Resident Inspector at Susquehanna Steam Electric Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with Title 10 of the Code of Federal Regulations Part 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARs) component of the NRC's document system, Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web Site at http://www.nrc.gov/reading-rm/adams.html (The Public Electronic Reading Room).

Sincerely,



John F. Rogge, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos. 50-387; 50-388
License Nos. NPF-14, NPF-22

Enclosure:
Inspection Report No 05000387/2011007 and 05000388/2011007
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

In accordance with Title 10 of the Code of Federal Regulations Part 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARs) component of the NRC's document system, Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web Site at http://www.nrc.gov/reading-rm/adams.html (The Public Electronic Reading Room).

Sincerely,

***/RA/***

John F. Rogge, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos. 50-387; 50-388
License Nos. NPF-14, NPF-22

Enclosure:
Inspection Report No 05000387/2011007 and 05000388/2011007
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Distribution: See next page

**SUNSI Review Complete: JFR (Reviewer's Initials) ADAMS ACC #ML112010427**
DOCUMENT NAME: G:\DRS\Engineering Branch 3\Young\SUSQ FP 2011007.docx
After declaring this document "An Official Agency Record" it **will** be released to the Public.
**To receive a copy of this document, indicate in the box:** **"C"** = Copy without attachment/enclosure **"E"** = Copy with attachment/enclosure **"N"** = No copy

| OFFICE | RI/DRS | | RI/DRS | | RI/DRP | | RI/DRS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NAME | KYoung/JER for | | WSchmidt/WLS | | PKrohn/PGK | | JRogge/JFR | | | |
| DATE | 7/18/11 | | 7/14/11 | | 7/18/11 | | 7/20/11 | | | |
| OFFICE | | | | | | | | | | |
| NAME | | | | | | | | | | |
| DATE | | | | | | | | | | |

OFFICIAL RECORD COPY

Distribution w/encl: (via E-mail)
W. Dean, RA **(R1ORAMAIL Resource)**
D. Lew, DRA **(R1ORAMAIL Resource)**
D. Roberts, DRP **(R1DRPMAIL Resource)**
J. Clifford, DRP **(R1DRPMAIL Resource)**
C. Miller, DRS **(R1DRSMail Resource)**
P. Wilson, DRS **(R1DRSMail Resource)**
P. Krohn, DRP
A. Rosebrook, DRP
E. Torres, DRP
S. Ibarrola, DRP
P. Finney, DRP, SRI
J. Greives, DRP, RI
S. Farrell, DRP, OA
S. Bush-Goddard, RI OEDO
D. Bearde, DRS
RidsNrrPMSusquehanna Resource
RidsNrrDorlLpl1-1 Resource
ROPreports Resource
J. Rogge, DRS
K. Young, DRS

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

| | |
|---|---|
| Docket Nos.: | 50-387, 50-388 |
| License Nos.: | NPF-14, NPF-22 |
| Report No.: | 05000387/2011007 and 05000388/2011007 |
| Licensee: | PPL Susquehanna, LLC |
| Facility: | Susquehanna Steam Electric Station, Units 1 and 2 |
| Location: | Berwick, PA 18603-0467 |
| Dates: | June 6, 2011 – June 24, 2011 |
| Inspectors: | K. Young, Senior Reactor Inspector, DRS (Team Leader)<br>W. Schmidt, Senior Reactor Analyst, DRS<br>J. Richmond, Senior Reactor Inspector, DRS<br>L. Scholl, Senior Reactor Inspector, DRS |
| Approved by: | John F. Rogge, Chief<br>Engineering Branch 3<br>Division of Reactor Safety |

Enclosure

## SUMMARY OF FINDINGS

IR 05000387/2011007, 05000388/2011007; 06/06/2011 – 06/24/2011; Susquehanna Steam Electric Station, Units 1 and 2; Triennial Fire Protection Team Inspection.

The report covered a two-week triennial fire protection team inspection by specialist inspectors. Two findings of very low significance were identified. These findings were determined to be non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" and the cross-cutting aspects were determined using IMC 0310, "Components Within the Cross-Cutting Areas." Findings for which the significance determination (SDP) does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

NRC-Identified and Self-Revealing Findings

**Cornerstone: Mitigating Systems**

- Green. The team identified non-cited violations of Susquehanna Unit 1 Operating License Condition 2.C.(6) and Unit 2 Operating License Condition 2.C.(3) for the failure to implement all provisions of the approved Fire Protection Program. Specifically, PPL had not adequately implemented a fire water supply system with two redundant 100% capacity fire water pumps and three sources of supply water. PPL's hydraulic analysis determined that after 20 minutes of single pump operation, two fire water pumps would need to operate to supply the design rated flow for several sprinkler systems required to be operable by the Susquehanna Steam Electric Station (SSES) Technical Requirements Manual. Subsequently, seven sprinkler systems were determined to be degraded because design flow rates could not be achieved and maintained by a single pump. PPL performed an operability evaluation that determined the affected sprinkler systems were capable of performing their intended functions at lower flow rates and for a shorter duration than originally specified by plant design. In addition, the Unit 2 cooling tower basin was determined to be inoperable as a sole source of supply water for the fire water system. An Operations Directive was issued to not align the fire water system to the Unit 2 cooling tower.

  The team determined the failure to verify the adequacy of design to satisfy licensing basis requirements was a performance deficiency. This issue was more than minor because it was similar to NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," Example 3.k, which states that an analysis to verify the adequacy of design contained incorrect assumptions. The example concludes that the issue is more than minor if the error resulted in a condition where there was a reasonable doubt on the operability of the component. For this issue, a knowledgeable engineer could not determine the adequacy of design based on a review of the existing hydraulic analysis and associated design details without performing additional complex analysis and preliminary calculations. The team performed a Phase 1 Significance Determination Process screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected the fixed fire

protection systems category, and was screened to very low safety significance because the affected sprinkler systems were determined to have a low degradation rating. This finding did not have a cross-cutting aspect because it was determined to be a legacy issue and was not considered to be indicative of current licensee performance. (Section 1R05.03.1)

- Green. The team identified non-cited violations of Susquehanna Unit 1 Operating License Condition 2.C.(6) and Unit 2 Operating License Condition 2.C.(3) for the failure to implement all provisions of the approved Fire Protection Program. Specifically, PPL established acceptance criteria in the fire pump performance tests that was non-conservative compared to design basis requirements and the test acceptance criteria was insufficient to demonstrate that the fire pumps could provide sufficient pump pressure to satisfy required sprinkler system hydraulic needs. PPL performed an operability evaluation that determined the fire pumps were capable of performing their intended functions based on predicted flow rates and current pump degradation.

  The team determined the failure to establish acceptance criteria in annual pump performance tests that demonstrated the pumps would perform satisfactorily in service was a performance deficiency. This issue was more than minor because it was similar to NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," Example 3.k, which states that an analysis to verify the adequacy of design contained incorrect assumptions. The example concludes that the issue is more than minor if the error resulted in a condition where there was a reasonable doubt on the operability of the component. For this issue, a knowledgeable engineer could not determine whether pump performance was adequate to satisfy design needs based on a review of the existing pump test results, hydraulic analysis, and associated design details without performing additional complex analysis and preliminary calculations. The team performed a Phase 1 Significance Determination Process screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected the fixed fire protection systems category, and was screened to very low safety significance because the affected sprinkler systems were determined to have a low degradation rating. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program because annual fire pump performance testing in 2009 and 2010 identified significant pump degradation, but PPL failed to initiate a condition report or correct the condition. [IMC 0310, Aspect P.1(a)] (Section 1R05.03.2)

Other Findings

None

REPORT DETAILS

Background

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure (IP) 71111.05T, "Fire Protection." The objective of the inspection was to assess whether PPL Susquehanna, LLC has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and are being properly maintained at the Susquehanna Steam Electric Station (SSES), Units 1 and 2. The following fire areas (FAs) and fire zones (FZs) were selected for detailed review based on risk insights from the SSES Individual Plant Examination (IPE)/Individual Plant Examination of External Events (IPEEE):

- FA CS-20/FZ 0-28A-II, Unit 2, Division I, Equipment Room;
- FA CS-28/FZ 0-24D, Unit 1, Division II, Lower Relay Room;
- FA CS-32/FZ 0-27B, Unit 2, Division I, Upper Cable Spreading Room; and
- FA R-1F/ FZ 1-4D, Unit 1, Division I, 4.16 kV Switchgear Room.

Inspection of these areas/zones fulfills the inspection procedure requirement to inspect a minimum of three samples.

The inspection team evaluated the licensee's fire protection program (FPP) against applicable requirements which included plant Technical Specifications, Operating License Conditions 2.C.(6) for Unit 1, and 2.C.(3) for Unit 2, NRC Safety Evaluations (SEs), 10 CFR 50.48, 10 CFR 50, Appendix R, and Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1. The team also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), Section 9.5.1, and the fire protection review report (FPRR). The FPRR included the fire hazards analysis (FHA) and the post-fire safe shutdown analyses.

The team also evaluated aspects of one licensee mitigating strategy for addressing large fires and explosions as required by Operating License Conditions 2.C.(34) for Unit 1, and 2.C.(18) for Unit 2. Inspection of the strategy fulfills the inspection procedure requirement to inspect a minimum of one sample.

Specific documents reviewed by the team are listed in the attachment.

## 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (IP 71111.05T)

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the FPRR, safe shutdown analyses and supporting drawings and documentation to verify that safe shutdown capabilities were properly protected. The team ensured that applicable separation requirements of BTP CMEB 9.5-1, Section III.G

of 10 CFR 50, Appendix R, and the licensee's design and licensing bases were maintained for the credited safe shutdown equipment and their supporting power, control and instrumentation cables. This review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and associated support system functions.

b. Findings

No findings were identified.

.02 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to evaluate whether the observed material conditions of the fire area boundaries were adequate for the fire hazards in the area. The team compared the fire area boundaries, including walls, fire doors, fire dampers, penetration seals, electrical raceway fire barriers, and redundant equipment fire barriers to design basis requirements, industry standards, and the SSES fire protection program, as approved by the NRC, to identify any potential degradation or non-conformances.

The team reviewed selected engineering evaluations, installation work orders, and qualification records for a sample of penetration seals to determine whether the fill material was properly installed and whether the as-left configuration satisfied design requirements for the intended fire rating. The team also reviewed similar records for selected fire protection wraps to verify whether the material and configuration was appropriate for the required fire rating and conformed to the engineering design.

In addition, the team reviewed the most recent test results for the Unit 1 lower relay room $CO_2$ fire damper functionality test, and inspection records of penetration fire barrier seals and fire separation barriers for the selected fire areas, to verify whether the inspection and testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The team evaluated the fire detection and suppression systems in the selected fire areas to determine whether they were installed, tested, maintained, and operated in accordance with NRC requirements and approved deviations, National Fire Protection Association (NFPA) codes of record, and the SSES Fire Protection Program (FPP), as

approved by the NRC. The team also assessed whether the suppression systems capabilities were adequate to control and/or extinguish fires associated with the hazards in the selected areas.

The team reviewed PPL's alternative analysis, performed in lieu of a full discharge test, for the carbon dioxide ($CO_2$) suppression systems to evaluate whether design input assumptions for room pressure integrity remained valid. In addition, the team assessed PPL's configuration controls to determine whether they were adequate to maintain room allowable leakage rates within the leakage limits specified in EC-013-0968, "$CO_2$ Mass Addition Requirements." The team reviewed functional testing, design specifications, and vendor requirements for the carbon dioxide ($CO_2$) and Halon suppression systems for the Unit 1 lower relay room. The team also reviewed and walked down the associated fire fighting strategies and $CO_2$ system operating procedures.

The team reviewed the as-built capability of the fire water supply system to verify whether design and licensing basis and NFPA code requirements were satisfied for the hazards involved. The team reviewed the fire water system hydraulic analyses to assess the adequacy of either the motor-driven or diesel-driven pump to supply the largest single hydraulic load on the fire water system plus concurrent fire hose usage. The team evaluated the motor-driven and diesel-driven pump performance tests to assess the adequacy of the test acceptance criteria, for pump minimum discharge pressure at the required flow rate, to satisfy design basis and hydraulic analysis requirements. The team also evaluated the underground fire loop flow test to verify whether the test adequately demonstrated that the flow distribution circuits were able to meet design basis requirements. In addition, the team reviewed the most recent pump and loop flow test results to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The team walked down accessible portions of the detection and suppression systems in the selected areas and major portions of the fire water supply system, including motor and diesel driven pumps and clarified water storage tank (CWST), interviewed system and design engineers, and reviewed selected open condition reports (CRs) to assess the material condition of the systems and components. In addition, the team reviewed the most recent test results for the fire detection and suppression systems in the selected fire areas to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The team also reviewed pre-fire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. The team independently inspected the fire brigade equipment, including personnel protective gear (i.e., turnout gear) and smoke removal equipment, to determine operational readiness for fire fighting.

b. Findings

.1 Redundant Fire Water Pump & Water Source Deficiency

Introduction: The team identified a finding of very low safety significance (Green) involving non-cited violations of SSES Unit 1 Operating License Condition 2.C.(6) and Unit 2 Operating License Condition 2.C.(3), for the failure to implement and maintain all aspects of the approved FPP, in that PPL had not adequately implemented a fire water supply system with two redundant 100% capacity fire water pumps and three sources of supply water, as required by the approved FPP. Specifically, PPL's fire water system hydraulic analysis determined that after 20 minutes of single pump operation, two fire water pumps would need to operate to supply the design rated flow for several sprinkler systems required to be operable by the SSES Technical Requirements Manual (TRM).

Description: The team used the following SSES licensing basis requirements to assess the adequacy of PPL's hydraulic analysis methodology:

- Two 100% redundant 2500 gpm, 125 psi fire pumps are provided.
- Three separate water sources (CWST, Unit 1 and 2 cooling tower basins).
- Fire pumps can draw water for any or all water sources.
- CWST capacity for fire protection is 300,000 gallons; cooling tower basins are 6 million gallons each.
- One fire pump can supply the largest single suppression system water demand (all sprinkler heads open), plus 500 gpm for hose streams.
- The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons.

Fire water system hydraulic analysis, EC-013-0022, "Fire Protection Piping Pressure Losses," determined the pressure available at the interface valves (i.e., OS&Y valve) between the fire water supply system and sprinkler or deluge systems. The purpose of the analysis was to verify that piping pressure losses at the design rated flow value for each sprinkler or deluge system was within the capacity of a single fire water pump (i.e., verification of design adequacy).

In reviewing EC-013-0022, the team identified a number of pre-action sprinkler systems with low margins between the minimum design pressure at the OS&Y valve and the calculated available pressure with the sprinkler system at its design rated flow. The sprinkler's design rated flow and the minimum design pressure needed at the OS&Y valve were determined in a separate vendor calculation, performed by the sprinkler system designer (e.g., Grinnell), in order to ensure that the sprinkler system could deliver the design specified water spray density per square foot to the area protected by the sprinklers. Three pre-action sprinkler systems had pressure margins of less than 3 psig, while several more had margins that ranged from 7 to 14 psig.

The team identified that the analysis was performed with a pump aligned to the CWST. The team determined the use of the CWST as the analyzed suction source for the pumps was non-conservative because the Unit 2 cooling tower provided a lower suction pressure to the pumps. The CWST minimum tank level was at elevation (Elev.) 695 foot (ft.), while the Unit 2 basin minimum level was at Elev. 687 ft., a difference of about 3.5 psig. The Unit 1 basin was about 15 ft. higher than the CWST. In addition, the team identified that PPL did not have any administrative or operational controls on the cooling tower minimum water level to ensure compensatory measures or fire protection impairments were taken if adequate suction pressure to the fire pumps was not available. PPL entered the Unit 2 cooling tower issue into their corrective action program (CRs 1420386 and 1421627). PPL's operability evaluation determined that the Unit 2 cooling tower could not supply sufficient suction pressure to a single fire water pump to satisfy the design rated flow demands for a number of sprinkler systems. PPL issued Operations Directive 11-05, which stated that the Unit 2 cooling tower can not be credited as an operable suction source for fire protection; if the Unit 2 cooling tower is aligned, then, appropriate fire system impairments are required. The team concluded that PPL's interim compensatory measure was appropriate and implemented in a timely manner, commensurate with the risk significance of this issue.

The team identified a second non-conservative difference between licensing basis requirements and PPL's analytical methodology, in that EC-013-0022 stated:

- For large systems, with the CWST water level above Elev. 752 ft., a single pump will provide adequate flow and pressure for the initial 20 minutes; two pumps in operation at lower water level.
- For small systems at high elevation, minimum water levels are based on the maximum water level minus the system demand for 20 minutes.

The team's review of the analysis identified 3 pre-action sprinkler systems that were evaluated within the analysis as needing two pump operation to satisfy rated flow requirements after 20 minutes of single pump operation. A subsequent review by PPL identified a total of seven pre-action sprinkler systems that required two pump operation to satisfy design rated flow after 20 minutes. All seven sprinkler systems protected safety related equipment areas and were required to be operable by the TRM. PPL entered this issue into their corrective action program (CRs 1418013, 1419667, 1421795, and 1422262).

In response to this issue, PPL performed a preliminary calculation as part of a comprehensive operability evaluation which concluded that single pump operation could not supply design rated flow to the affected sprinkler systems for an extended period of time. PPL also concluded that the affected sprinkler systems could perform their intended functions, based on flow rates that were lower than the design specified values and for flow durations that were also shorter than originally specified by licensing requirements. The team reviewed PPL's operability evaluation and concluded that the reduced flow rates and durations satisfied NFPA 13, "Installation of Sprinkler Systems," requirements and appeared to be commensurate with the combustible loading and fire hazards in the affected areas.

The team identified an additional inconsistency between the analysis and the as-built system configuration. EC-013-0022 used a vendor pump curve to determine the design input value for pump developed head which was used to calculate available pressure to each sprinkler system. However, the curve used in the calculation did not match either vendor pump curve for the two installed fire pumps. Although the differences between the three pump curves appeared to be small, on the order of 1 or 2 psig, the curve used in the analysis appeared to be slightly non-conservative compared to the pump curve for the motor driven pump. PPL entered this issue into their corrective action program (CRs 1421627 and 1425748).

Analysis: The team determined that the failure to verify the adequacy of design to satisfy licensing basis requirements was a performance deficiency. Specifically, PPL did not adequately incorporate licensing basis requirements into the fire water system hydraulic analysis. As a result, design flow rates could not be achieved and maintained by a single fire water pump for all required sprinkler systems. PPL performed an operability evaluation and determined the affected sprinkler systems were capable of performing their intended functions at lower flow rates and for a shorter duration than originally specified by plant design. In addition, the Unit 2 cooling tower basin was determined to be inoperable as a sole source of supply water for the fire water system. An Operations Directive was issued to not align the fire water system to the Unit 2 cooling tower.

This issue was more than minor because it was similar to NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," Example 3.k, which states that an analysis to verify the adequacy of design contained incorrect assumptions. The example concludes that the issue is more than minor if the error resulted in a condition where there was a reasonable doubt on the operability of the component. For this issue, a knowledgeable engineer could not determine the adequacy of design based on a review of the existing hydraulic analysis and associated design details without performing additional complex analysis and preliminary calculations.

PPL's hydraulic analysis had assumed single fire pump operation was not required after an initial 20 minute period, and had only evaluated the CWST to determine whether adequate suction pressure was available to the fire pumps. As a result of these errors, the as-built design did not satisfy licensing basis requirements, and the Unit 2 cooling tower basin was subsequently determined to have insufficient suction pressure, such that seven affected sprinkler systems would not be capable of performing their intended functions whenever the Unit 2 cooling tower basin was aligned as the sole water source for the fire pumps. Therefore, this error represented a reasonable doubt of operability for the affected sprinkler systems. In addition, this finding adversely affected the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability and reliability of systems that respond to initiating events to prevent undesirable consequences.

The team performed a Phase 1 Significance Determination Process (SDP) screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected the fixed fire protection systems category, and was screened to very low safety significance (Green) because the affected sprinkler

systems were determined to have a low degradation rating. A low degradation rating was assigned because the affected sprinkler systems were subsequently determined to be capable of performing their intended functions at reduced flow rates. In addition, this issue did not affect the likelihood that a fire might occur. The team concluded that this performance deficiency was reasonably within PPL's ability to foresee and prevent.

This finding did not have a cross-cutting aspect because it was determined to be a legacy issue and was not considered to be indicative of current licensee performance.

Enforcement: Unit 1 License Condition 2.C.(6), and Unit 2 License Condition 2. C.(3), in part, required that PPL implement and maintain in effect all provisions of the approved FPP, as described in the FPRR. FPRR Section 4.1, "Fire Protection Water Supply Systems," in part, stated two fire pumps have three suction sources; two cooling tower basins and the CWST; and the largest single demand can be satisfied by one fire pump. In FPRR Table 5.0-1, "Susquehanna Design Compared with Branch Technical Position (BTP) 9.5-1," Item A.4, PPL stated that two 100% capacity pumps were provided, each capable of supplying the design flow rate at design pressure. In FPRR Table 5.0-1 Item E.2.(c), PPL stated that two 100% redundant fire pumps and three separate sources of water were provided, allowing the pumps to draw water from any or all sources. The NRC's BTP guidance for the fire water supply, as stated in FPRR Table 5.0-1 Item E.2.(e), required that the fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. In response to the BTP guidance, PPL stated that the capacity of the CWST was 300,000 gallons, and each cooling tower basin contained 6,000,000 gallons.

Contrary to the above, from initial plant construction until present, PPL failed to provide two redundant fire water pumps that could be supplied from any of three separate water sources. Specifically, EC-013-0022, "Fire Protection Piping Pressure Losses," determined that three pre-action sprinkler systems required two pump operation after 20 minutes of design rated flow. Subsequently, PPL determined that a single fire pump could not satisfy the design rated flow requirements for seven pre-action sprinkler systems for a two hour period. The affected pre-action systems protected safety related equipment and were required to be operable by Technical Requirements Manual 3.7.3.2. In addition, PPL determined that the affected sprinkler systems would not be capable of performing their intended functions whenever the Unit 2 cooling tower basin was aligned as the sole water source for the fire pumps. Because this finding was of very low safety significance (Green) and was entered into PPL's corrective action program (CR 1421627 and 1421795), this violation is being treated as a non-cited violation (NCV), consistent with Section 2.3.2.a. of the NRC Enforcement Policy. **(NCV 05000387, 388/2011007-01, Failure to Provide Redundant Fire Water Pumps)**

.2 Fire Water Pump Test Acceptance Criteria Deficiency

Introduction: The team identified a finding of very low safety significance (Green) involving non-cited violations of SSES Unit 1 Operating License Condition 2.C.(6) and Unit 2 Operating License Condition 2.C.(3), for the failure to implement and maintain all

aspects of the approved FPP, in that PPL performed annual fire pump performance testing that failed to demonstrate the pumps would perform satisfactorily in service. Specifically, the acceptance criteria in pump tests was non-conservative compared to design basis requirements and the test acceptance criteria was insufficient to demonstrate that the fire pumps could provide sufficient pump pressure to satisfy required sprinkler system hydraulic needs.

Description: TP-013-034, "Annual Diesel-Driven Performance Test," and TP-013-035, "Annual Motor-Driven Performance Test," performed multi-point flow tests to meet the requirements of NFPA 20, "Installation of Centrifugal Fire Pumps." Both test procedures stated that the annual multi-point test was required to compare the pump's actual performance with its rated pump curve, and was additionally required by PPL's insurance carrier. In addition, in FPRR Table 5.0-1 Item 2.(c), PPL stated that the fire pump installation conformed to NFPA requirements. NFPA 20 Section 3-2.1,"Factory and Field Performance - Characteristics," stated that fire pumps shall furnish not less than 150 percent of rated capacity at not less than 65 percent of total rated head. NFPA 20 Section 11-3.1 stated that the annual flow test of the pump shall be performed to determine its ability to continue to attain satisfactory performance at shutoff, rated, and peak loads (i.e., a multi-point flow test).

Both annual performance tests compared actual pump performance to the vendor pump curve at the 100% rated flow point and at the 150% rated flow point. Additional investigation was required if actual pump developed head was more than 10% below the curve (i.e., > 10% degradation). The test acceptance criteria of less than 10% degradation was only applied to the 100% flow point data, such that the multi-point performance test could be evaluated as satisfactory regardless of the amount of pump degradation at the 150% rated flow point (i.e., the peak load flow point required by NFPA).

The team determined the annual pump performance test acceptance criteria was non-conservative compared to design basis requirements. The team compared the performance test acceptance criteria to the design value of pump performance assumed in the hydraulic analysis. EC-013-0022 used a vendor pump curve to determine the design input value for pump developed head which was used to calculate available pressure to each sprinkler system. At a pump rated flow of 2500 gpm, EC-013-0022 used a value of 127 psig for pump head. However, the annual performance test would allow a pump to remain in service and be evaluated as acceptable with a developed pump head of up to 10% less than the pump curve. As a result, a pump would be considered operable with a pump head as low as 115 psig, which was about 12 psig below the value assumed in the hydraulic analysis. The most recent pump performance test determined that pump developed head was 118 and 120 psig at the 100% rated flow point (i.e., 5 to 6 % degradation) for the diesel and motor driven pumps, respectively. The team identified four pre-action sprinkler systems, required to be operable by the TRM, which had pressure margins of less than 10 psig. Therefore, the team concluded that the test acceptance criteria was insufficient to demonstrate the fire pumps could provide sufficient pump pressure to satisfy required sprinkler system hydraulic needs

and, therefore, did not demonstrate that the pumps would perform satisfactorily in service. PPL entered this issue into their corrective action program (CRs 1421627 and 1425748).

In addition, NFPA 20 required pump performance to be greater than 65% of rated pressure (i.e., about 81 psig) at 150% rated flow. Since at least 2005, the performance tests repetitively determined both fire pumps had significant degradation at the 150% flow point that ranged from 25 to 40% below the pump curve. The most recent pump performance tests determined that pump developed head was 63 psig and 62 psig at the 150% rated flow point for the diesel and motor driven pumps, respectively. A CR was written for these test failures in 2006 and subsequently closed in 2008 without correcting the condition. No additional CRs were initiated for the test failures in 2009 or 2010. PPL entered this issue into their corrective action program (CRs 1421627 and 1423332).

SO-013-001, "Monthly Diesel and Motor Driven Fire Pump Run," implemented several TRM surveillance requirements, including Technical Requirement for Surveillance (TRS) 3.7.3.1.5 and 3.7.3.1.8 to monthly operate each fire pump on recirculation, and TRS 3.7.3.1.15 to verify every 18 months that each fire pump developed at least 2500 gpm at a system head of 125 psig. The team noted that all sections of SO-013-001 were performed each month (i.e., the 18 month TRS requirement was performed monthly), and measured pump discharge pressure (i.e., pump developed head plus suction pressure) and compared it to an acceptance criteria of 125 psig. The team reviewed two TRS monthly pump tests and four annual pump performance tests and identified that pump suction pressures varied from 8 psig to as high as 25 psig, depending on the alignment of the suction sources. The most recent pump monthly test recorded suction and discharge pressures of 14 psig and 138 psig for the diesel driven pump, and 8 psig and 130 psig for the motor driven pump, respectively. Based on hydraulic system needs, the team determined that a pump discharge pressure of 125 psig was insufficient to demonstrate the fire pumps could provide sufficient pump pressure to satisfy required sprinkler system hydraulic needs and, likewise, did not demonstrate that the pumps would perform satisfactorily in service. In addition, a value of 125 psig was significantly less than the value relied upon in the hydraulic analysis to verify that system pressure at the pump (i.e., pump pressure plus suction pressure) could provide adequate flow to the required sprinkler systems. Therefore, the team concluded that the TRM surveillance criteria of 125 psig was non-conservative and did not verify continued operability of either the fire water pumps or the fire water system. PPL entered this issue into their corrective action program (CR 1427950).

In response to these issues, PPL revised an existing operability evaluation, originally performed for a design analysis deficiency (see Section 1R05.03.1 above), to include degraded fire water pump performance. PPL concluded that the fire water pumps and sprinkler systems could perform their intended functions, based on flow rates that were lower than the design specified values, but still satisfied NFPA 13, "Installation of Sprinkler Systems," requirements. The team reviewed PPL's operability evaluation and concluded it appropriately considered the actual performance level of the fire pumps.

The SSES FPP, as approved by the NRC, required PPL to implement quality assurance (QA) criteria to fire protection activities in accordance with the requirements of NRC's Appendix A to BTP APCSB 9.5-1. The BTP QA criteria for test control of fire protection activities required a test program be established and implemented to assure that testing was performed and verified to demonstrate conformance with design and system readiness requirements. In addition, test results should be properly evaluated and acted on. OPS-14, "Control of Inspection and Testing," implemented PPL's QA criteria for test control of fire protection activities. OPS-14 Section 6.2.2 stated that testing shall be performed which demonstrates that components will perform satisfactorily in service. In addition, the BTP QA criteria for corrective actions required that measures should be established to assure that conditions adverse to fire protection, such as failures, deficiencies, deviations, and non-conformances are promptly identified, reported, and corrected. OPS-5, "Deficiency Control System," implemented PPL's QA criteria for fire protection corrective actions. PPL's corrective actions program required fire protection deficiencies be identified and corrected. The team determined that PPL had not adequately implemented the required QA criteria for fire pump testing, in that the combined tests did not demonstrate that pump performance conformed to design requirements or would perform satisfactorily in service. The team also determined that PPL had not adequately implemented the required QA criteria for identification and correction of deficiencies, in that the fire pumps did not satisfy testing requirements (e.g., > 10% pump degradation) and did not satisfy NFPA requirements, but no condition report had been issued and the condition had not been corrected. PPL entered these issues into their corrective action program under the CRs listed above.

Analysis: The team determined that the failure to establish acceptance criteria in annual pump performance tests that demonstrated the pumps would perform satisfactorily in service was a performance deficiency. Specifically, PPL established acceptance criteria in the fire pump performance tests that was non-conservative compared to design basis requirements and the test acceptance criteria was insufficient to demonstrate that the fire pumps could provide sufficient pump pressure to satisfy required sprinkler system hydraulic needs.

This issue was more than minor because it was similar to NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," Example 3.k, which states that an analysis to verify the adequacy of design contained incorrect assumptions. The example concludes that the issue is more than minor if the error resulted in a condition where there was a reasonable doubt on the operability of the component. For this issue, a knowledgeable engineer could not determine whether pump performance was adequate to satisfy design needs based on a review of the existing pump test results, hydraulic analysis, and associated design details without performing additional complex analysis and preliminary calculations. In addition, this finding adversely affected the procedure quality attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability and reliability of systems that respond to initiating events to prevent undesirable consequences.

The team performed a Phase 1 Significance Determination Process (SDP) screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected the fixed fire protection systems category, and was screened to very low safety significance (Green) because the affected sprinkler systems were determined to have a low degradation rating. A low degradation rating was assigned because the affected sprinkler systems were subsequently determined to be capable of performing their intended functions at reduced flow rates. In addition, this issue did not affect the likelihood that a fire might occur. The team concluded that this performance deficiency was reasonably within PPL's ability to foresee and prevent.

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program. The licensee implements a corrective action program (CAP) with a low threshold and identifies issues completely and in a timely manner. In 2009 and 2010, annual fire pump performance testing identified significant pump degradation, but PPL failed to initiate a condition report or correct the condition. [IMC 0310, Aspect P.1(a)]

Enforcement: Unit 1 License Condition 2.C.(6), and Unit 2 License Condition 2. C.(3), in part, required that PPL implement and maintain in effect all provisions of the approved FPP, as described in the FPRR. FPRR Section 1.1, in part, stated that the FPRR describes and demonstrates compliance to the requirements of NRC's Appendix A to BTP APCSB 9.5-1. UFSAR Section 17.2.2, in part, stated that a quality assurance (QA) program shall be applied to implement the QA criteria listed in the BTP. FPRR Table 5.0-1, "Susquehanna Design Compared with BTP 9.5-1," Item C.5, "Quality Assurance Program - Test and Test Control," stated the BTP guidance for test control of fire protection activities, in that a test program should be established and implemented to assure that testing is performed and verified to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on. FPRR Table 5.0-1 Item C.8, "Quality Assurance Program - Corrective Action," stated the BTP guidance for corrective actions, in that measures should be established to assure that conditions adverse to fire protection, such as failures, deficiencies, deviations, and non-conformances are promptly identified, reported, and corrected. NDAP-QA-0449, "Fire Protection Program," Section 6.2, "Quality Assurance," stated that OPS-1-P, "Quality Assurance for the Fire Protection Program," defined the quality assurance program requirements for the fire protection program. OPS-1-P Section 6.6, "Test and Test Control," stated testing of fire protection equipment shall be conducted in accordance with OPS-14, "Control of Inspection and Testing." OPS-14 Section 6.2.2, in part, stated that testing shall be performed which demonstrates that components will perform satisfactorily in service.

Contrary to the above, from 2005 until present, TP-013-034, "Annual Diesel-Driven Performance Test," and TP-013-035, "Annual Motor-Driven Performance Test," utilized test acceptance criteria which did not demonstrate conformance with design and system readiness requirements and, therefore, failed to demonstrate that either pump would perform satisfactorily in service. Specifically, the approved test acceptance criteria was pump head degradation at the 100% operating point of less than 10%, which would result in a pump being considered acceptable with a pump head as low as 115 psig.

However, EC-013-022 used a design input for pump head, from a vendor pump curve, to calculate available pressure to individual sprinkler systems. At the pump rated flow of 2500 gpm (i.e., 100% operating point), the hydraulic analysis used 127 psig for pump developed head. The hydraulic analysis did not include any margin for pump testing, and four sprinkler systems, required to be operable by the Technical Requirements Manual, did not have sufficient pressure margin between the required pressure and the available pressure, based on design input values taken directly from the pump curve.

In addition, National Fire Protection Association (NFPA) 20 required pump performance to be at least 65% of rated pressure (i.e., about 81 psig) at 150% rated flow. The fire pump performance tests also used an acceptance criteria of 10% degradation at the 150% flow point, and required additional investigation if degradation greater than 10% was determined. Since 2005 until present, the pump performance tests determined that each fire pump had degradation that ranged from 25 to 40% (i.e., 50 to 65 psig) at the 150% flow point. A condition report (CR) was written for this degraded condition in 2006, but subsequently closed in 2008 without correcting the problem. No additional CRs were initiated for the identified degraded conditions in the 2009 or 2010 tests, and no additional evaluations or investigations were performed.

Because this finding was of very low safety significance (Green) and was entered into PPL's corrective action program (CR 1421627 and 1421795), this violation is being treated as a non-cited violation (NCV), consistent with section 2.3.2.a. of the NRC Enforcement Policy. **(NCV 05000387, 388/2011007-02, Failure to Establish Adequate Test Acceptance Criteria for Fire Pump Performance Testing)**

.04 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The team performed document reviews and plant walkdowns to verify that redundant trains of systems required for hot shutdown, which are located in the same fire area, are not subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team verified that:

- A fire in one of the selected fire areas would not indirectly, through production of smoke, heat or hot gases, cause activation of suppression systems that could potentially damage all redundant safe shutdown trains;

- A fire in one of the selected fire areas (or the inadvertent actuation or rupture of a fire suppression system) would not indirectly cause damage to all redundant trains (e.g., sprinkler caused flooding of other than the locally affected train); and,

- Adequate drainage is provided in areas protected by water suppression systems.

b. Findings

No findings were identified.

.05 Shutdown Capability – Normal and Alternative

a. Inspection Scope

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings (P&IDs), electrical drawings, the UFSAR and other supporting documents for the selected fire areas to verify that the licensee had properly identified the systems and components necessary to achieve and maintain safe shutdown conditions.

The team assessed the adequacy of the selected systems and components for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. This review included verification that alternative post-fire shutdown could be performed both with and without the availability of offsite power. Plant walkdowns were also performed to verify that the plant configuration was consistent with that described in the safe shutdown and fire hazards analyses. The team verified that the systems and components credited for use during shutdown would remain free from fire damage.

The team verified that the training program for licensed and non-licensed operators included alternative shutdown capability. The team also verified that personnel required for safe shutdown using the normal or alternative shutdown systems and procedures are trained and available onsite at all times, exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of procedures utilized for post-fire shutdown and performed an independent walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits.

Specific procedures reviewed for normal and alternative post-fire shutdown included the following:

- ON-100-009, Control Room Evacuation, Rev. 22;
- ON-200-009, Control Room Evacuation, Rev. 23; and
- ON-013-001, Response to Fire, Rev. 29.

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area. The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to ensure the tests are adequate to ensure the functionality of the alternative shutdown capability.

b. Findings

No findings were identified.

.06 Circuit Analysis

a. Inspection Scope

The team verified that the licensee performed a post-fire safe shutdown analysis for the selected fire areas and the analysis appropriately identified the structures, systems, and components important to achieving and maintaining safe shutdown. Additionally, the team verified that the licensee's analysis ensured that necessary electrical circuits were properly protected and that circuits that could adversely impact safe shutdown due to hot shorts or shorts to ground were identified, evaluated, and dispositioned to ensure spurious actuations would not prevent safe shutdown.

The team's review considered fire and cable attributes, cable routing, potential undesirable consequences and common power supply/bus concerns. Specific items included the credibility of the fire threat, cable insulation attributes, cable failure modes, and actuations resulting in flow diversion or loss of coolant events.

The team also reviewed cable raceway drawings and cable routing databases for a sample of components required for post-fire safe shutdown to verify that cables were routed as described in the safe shutdown analysis. The team also reviewed equipment important to safe shutdown, but not part of the success path, to verify that the licensee had taken appropriate actions in accordance with the design and licensing basis and NRC Regulatory Guide 1.189.

Cable failure modes were reviewed for the following components:

- FI-25105, RHR System Flow Indicator;
- HV 249 F012 and HV 249 F013, RCIC Pump Discharge Valves;
- HV 249 F010, RCIC Pump Suction Valve; and
- HV 251 F008 and HV 251 F009, RHR Pump Suction Valves.

The team reviewed a sample of circuit breaker coordination studies to ensure equipment needed to conduct post-fire safe shutdown activities would not be impacted due to a lack of coordination that could result in a common power supply or common bus concern.

The team verified that the transfer of control from the control room to the alternative shutdown location(s) would not be affected by fire-induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).

b. Findings

No findings were identified.

.07 Communications

a. Inspection Scope

The team reviewed safe shutdown procedures, the safe shutdown analysis, and associated documents to verify an adequate method of communications would be available to plant operators following a fire. During this review, the team considered the effects of ambient noise levels, clarity of reception, reliability, and coverage patterns. The team also inspected the designated emergency storage lockers to verify the availability of portable radios for the fire brigade and for plant operators. The team also verified that communications equipment such as repeaters and transmitters would not be affected by a fire.

b. Findings

No findings were identified.

.08 Emergency Lighting

a. Inspection Scope

The team walked down the emergency lights in the selected fire areas to independently evaluate the placement and coverage areas of the lights. The team assessed whether the lights provided adequate illumination on local equipment and instrumentation, required for post-fire safe shutdown, to ensure local operations could be reliably performed under expected post-fire conditions. Emergency light placement was also evaluated to determine adequate illumination of local area access and egress pathways.

The team verified whether the emergency light batteries were rated for at least an eight-hour capacity. Preventive maintenance procedures, completed surveillance tests, and battery replacement practices were also reviewed to evaluate whether the emergency lighting was being maintained in a manner that would ensure reliable operation.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The team verified that the licensee had evaluated the need for any dedicated repair procedures, equipment, and materials to accomplish repairs of components required for cold shutdown which might be damaged by the fire to ensure cold shutdown could be achieved within the time frames specific in their design and licensing bases. The team confirmed that the safe shutdown analysis for SSES did not identify any systems or components that would require repairs to achieve cold shutdown.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were in place for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment, passive fire barriers, or pumps, valves or electrical devices providing safe shutdown functions or capabilities). The team also verified that the short term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings were identified.

.11 Fire Protection Program Changes

a. Inspection Scope

The team reviewed recent changes to the approved fire protection program to verify that the changes did not constitute an adverse effect on the ability to safely shutdown.

b. Findings

No findings were identified.

.12 Control of Transient Combustibles and Ignition Sources

a. Inspection Scope

The team reviewed PPL's procedures and programs for the control of ignition sources and transient combustibles to assess their effectiveness in preventing fires and in controlling combustible loading within limits established in the FHAR. A sample of hot work and transient combustible control permits were reviewed to assess the adequacy of the SSES fire protection program administrative controls. The team performed plant walkdowns to independently verify whether transient combustibles and ignition sources were being properly controlled in accordance with the administrative controls.

b. Findings

No findings were identified.

.13 Large Fires and Explosions Mitigation Strategies

a. Inspection Scope

Due to inspection activities regarding TI 2515/183, Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event, as documented in SSES inspection report 2011008, the team limited the scope of this inspection to ensuring corrective actions for the identified deficiencies/vulnerabilities were entered into the licensee's corrective action program. Additionally, the team verified the large fires and explosions equipment storage facility was properly equipped and the equipment was being maintained. The team also witnessed a training exercise regarding laying fire hose from the cooling towers to the reactor building as part of a mitigating strategy. The team verified that SSES personnel could complete fire hose laying activities in the required time to supply cooling water to various areas of the plant if needed. These activities constituted review of one mitigating strategy to verify that SSES continued to meet operating license condition 2.C.(34) for Unit 1 and 2.C.(18) for Unit 2.

b. Findings

No findings were identified.

## 4. OTHER ACTIVITIES [OA]

4OA2 Identification and Resolution of Problems (IP 71152)

.01 Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The team reviewed a sample of condition reports associated with fire protection program and post-fire safe shutdown issues to determine whether PPL was appropriately identifying, characterizing, and correcting problems in these areas, and to assess whether the planned or completed corrective actions were appropriate. The condition reports reviewed are listed in the attachment.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented their preliminary inspection results to Mr. Timothy S. Rausch, Senior Vice President and Chief Nuclear Officer, and other members of the site staff at an exit meeting on June 24, 2011. No proprietary information was included in this inspection report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

T. Rausch, Chief Nuclear Officer
R. Kearney, Site Vice President
J. Helsel, Plant Manager
T. Austin, Training, Fire Brigade
E. Banks, Manager, Effluents
W. Bishop, General Manager, Work Management
B. Bribce, Effluents Supervisor
T. Case, Emergency Lighting System Engineer
S. Davis, Manager, Emergency Planning
J. Emmett, Quality Assurance
T. Gorman, Design Engineering
K. Graham, Regulatory Affairs Contractor
T. Iliadis, Operations, General Manager
J. Krais, Station Engineering, Manager
J. Lex, Nuc. Inst. Supervisor
S. Maguire, Fire Protection System Engineer
B. Mattern, Site Engineering, Corrective Action Coordinator
J. McCormick, Chemistry Engineer
M. Mjaatvedt, Design Engineering, Manager
F. Negvesky, Emergency Lighting System Engineer
J. Newsone, Manager Performance Contracting Services
T. O'Conner, Fire Protection Engineer, Contractor
P. O'Malley, QA Manager
M. Oman, Foreman, Effluents
B. O'Rourke, Regulatory Affairs
R. Pagodin, Nuclear Engineering, General Manager
J. Petrilla, Regulatory Affairs, Manager
J. Reilly, Maintenance PM Coordinator
D. Ritter, Site Systems Engineering
M. Rochester, Regulatory Affairs Supervisor
J. Scopelliti, Community, Relations Manager
R. Smith, Programs, General Manager
R. Vazquies, Design Engineer
J. Williams, Operations
L. Yupco, Technical Assistant to CNO

NRC

J. Rogge, Chief, Engineering Branch 3, Division of Reactor Safety
W. Schmidt, Senior Risk Analyst, Division of Reactor Safety
P. Finney, Senior Resident Inspector, Susquehanna Steam Electric Station
J. Greives, Resident Inspector, Susquehanna Steam Electric Station
D. Frumkin, Fire Protection Branch, Division of Risk Assessment, NRR
P. Qualls, Fire Protection Branch, Division of Risk Assessment, NRR

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NONE

Opened and Closed

| | | |
|---|---|---|
| NCV | 05000387,388/2011007-01 | Failure to Provide Redundant Fire Water Pumps (Section 1R05.03.1) |
| NCV | 05000387,388/2011007-02 | Failure to Establish Adequate Test Acceptance Criteria for Fire Pump Performance Testing (Section 1R05.03.2) |

Closed

NONE

Discussed

NONE

## LIST OF DOCUMENTS REVIEWED

Fire Protection Licensing Documents

Fire Protection Review Report, Rev. 18
NRC Letter dated 8/9/89, Safety Evaluation of Fire Protection Report, SSES, Units 1 and 2
NRC Letter Dated 3/29/93, Rev. No. 4 to the FPRR, SSES, Units 1 and 2
NRC Letter dated 10/21/97, Evaluation of Fire Protection Program Issues, Safe Shutdown Methodology and Analysis of Associated Circuits SSES, Units 1 and 2
NRC Letter dated 6/24/98, Operating License Amend. Nos. 177 & 150, SSES, Units 1 and 2
OPS-14, Control of Inspection and Testing, Rev. 14
OPS-1-P, Quality Assurance for Fire Protection Program, Rev. 3
Safety Evaluation Report, Alternatives to Full Discharge Test of Carbon Dioxide System, dated 05/12/92

Safety Evaluation Report, NUREG-0776, SSES, Units 1 and 2, dated 4/17/81
Safety Evaluation Report, NUREG-0776, Supplement No. 1, SSES, Units 1 and 2, dated 6/81
Safety Evaluation Report, NUREG-0776, Supplement No. 2, SSES, Units 1 and 2, dated 9/81
Safety Evaluation Report, NUREG-0776, Supplement No. 3, SSES, Units 1 and 2, dated 7/82
Safety Evaluation Report, NUREG-0776, Supplement No. 4, SSES, Units 1 and 2, dated 11/82
Safety Evaluation Report, NUREG-0776, Supplement No. 6, SSES, Units 1 and 2, dated 3/84
Safety Evaluation of Fire Protection Report, 8/9/89
Technical Requirements Manual Unit 1, Rev. 2
Technical Requirements Manual Unit 2, Rev. 2
UFSAR, Section 9.5.1
UFSAR, Section 17.2.2, Quality Assurance Program, Rev. 64

Design Basis Documents

DBD019, Fire Protection, Rev. 4
DBD076, Appendix R, Rev. 2

Design Changes and Fire Protection Engineering Evaluations

DCN 93-1863, Replace Diesel Fire Pump Curve after Pump Replaced RIE 92-012, Rev. 3
FPP Screen 052, EC 1135453, Replace 3 Simplex Panels with Series 4100 Panel, Rev. 1
FPP Screen 065, EC 1224563, SRBC Electrical and I&C Mod Package, Rev. 0
FPP Screen 069, EC 1305830, Appendix R MSO for RHR F007B & F024B Valves, Rev. 0
NL-94-3015, Safety Evaluation of Plant Integrated Computer System Modification, Rev. 0

Calculations/Engineering Evaluation Reports

A-84-4, Halon Discharge Test for 2U704, Relay Cabinets and Under-floor, 03/28/84
C-1071, Engineering Specification for Fire Damper Inspection, Rev. 2
EC-THYD-1064, MAAP Analysis of Appendix R Scenarios, Rev. 2
EC-004-0501, Appendix R Associated Circuit Analysis, Rev. 49
EC-013-0022, Fire Protection Piping Pressure Losses, Rev. 6
EC-013-0515, Ruskin Fire Damper Study, Rev. 4
EC-013-0678, RHR Shutdown Cooling/Operational I the Event of a Plant Fire, Rev. 4
EC-013-0788, Inadvertent Reactor Vessel Injection Resulting From Spurious Operation of the HPCI or RCIC Systems, Rev. 9
EC-013-0843, SSES 10CFR50 Appendix R Compliance Manual, Rev. 35
EC-013-0859, Appendix R Analysis for a Control Room Fire, Rev. 21
EC-013-0920, Fire Detection and Suppression Systems Assessment, Rev. 6
EC-013-0968, Determination of CO2 Mass Addition Requirements for Cable Chase, Relay, UPS, and Computer Rooms, based on Model Predictions, Rev. 4
EC-013-1009, Fire Dampers Subject to Technical Requirements, Rev. 4
EC-013-1048, Impact of Inadvertent RPV Overfill on SRV Discharge Piping, Rev. 2
EC-013-1052, Arboron as Acceptable Flooring Substitute within PGCC, Rev. 0
EC-013-1425, Fire Protection Water Supply Testing, Rev. 0
EC-013-1438, Examination of Appendix R Safe Shutdown Components with Regard to Fire Suppression Activities, Rev. 2

EC-013-1456, Technical Criteria for Addressing Damage Due to Fire Suppression Discharge (Both Appendix R and Non-Appendix R), Rev. 0
EC-013-1871, Circuit Analysis Assessment for NRC RIS 2004-03 Revision 1, Rev. 3
EC-013-1873, Operator Manual Actions Feasibility Analysis, Rev. 2
EC-PUPC-20611, EPU Task Report 0611 – Appendix R, Rev. 1
EC-SQRT-1008, Dynamic Qualification of Ruskin Fire Dampers, Rev. 0
EC-THYD-1064, MAAP Analysis of Appendix R Scenarios, Rev. 2
M343, Specifications for Deluge and Sprinklers, Rev. 10
M343-99-1, Grinnell Design Calculation for PA-261 Upper Cable Spreading Room, Rev. 1
NEDO-10466-A, Power Generation Control Complex (PGCC) Fire Hazards Analysis & Design Evaluation, 9/77
NL-95-027, Safety Evaluation of Ultrasonic Verification of Halon Level as Alternative to Weight Verification, Rev. 0
OI-013-001, Fire Protection Component Technical Data, Rev. 16

Procedures (including Operations Procedures)

AR-SP-001, Simplex Fire Protection Fire Suppression Alarms – Priority 1, Rev. 14
AR-SP-002, Simplex Fire Protection Fire Suppression Alarms – Priority 2, Rev. 18
CH-024-001, Fire Pump Fuel Oil Chemistry Control, Rev. 7
CH-024-005, Backup Fire Pump Fuel Oil Chemistry Control, Rev. 7
EO-100-102, RPV Control, Rev. 7
EO-000-103-1, Primary Containment Control, Rev. 13
EO-000-104-1, Secondary Containment Control, Rev. 7
EO-100-112-1, Rapid Depressurization, Rev. 6
EO-100-114, RPV Flooding, Rev. 8
MC-OI-017, Controlling Gasoline & Diesel Fuel, Rev. 9
MT-007-002, Appendix R Emergency Light Maintenance & Functional Checks, Rev. 16
NDAP-QA-0440, Control of Transient Combustible/Hazardous Materials, Rev. 8
NDAP-QA-0442, Control of Ignition Sources: Cutting, Welding, & Hot Work Permits, Rev. 6
NDAP-QA-0443, Fire Watch Procedure, Rev. 10
NDAP-QA-0444, Fire Alarm Response, Rev. 3
NDAP-QA-0446, Fire Barrier Program, Rev. 7
NDAP-QA-0449, Fire Protection Program, Rev. 8
NDAP-QA-0702, Action Request & Condition Report Process, Rev. 32
OI-PM-005, Appendix "R" Sound Powered Phone System, Rev. 4
ON-009-001, Loss of River Water Makeup, Rev. 20
ON-013-001, Response to Fire, Rev. 29
ON-100-101, Scram, Scram Imminent, Rev. 25
ON-100-009, Control Room Evacuation, Rev. 22
ON-200-009, Control Room Evacuation, Rev. 23
OP-013-001, Operation of PGCC Halon Fire Suppression Systems, Rev. 33
OP-100-001, Remote Shutdown Panel, Rev. 11
OP-024-001, Diesel Generators, Rev. 57
OP-116-001, RHR Service Water, Rev. 31
OP-149-001, RHR System, Rev. 40
OP-149-002, RHR Shutdown Cooling, Rev. 25
OP-149-005, RHR Suppression Pool Cooling, Rev. 25

OP-150-001, RCIC System, Rev. 33
OP-241-001, Unit 1 Circulating Water and Cooling Tower operation, Rev. 48
OP-242-001, Unit 2 Circulating Water and Cooling Tower operation, Rev. 52
OT-173-001, 24 Month Hydrogen Recombiner Test, Rev. 1
SC-023-002, Diesel Fuel Oil Receipt Analysis, Rev. 9
SE-013-001, 3-Year Fire Protection System Flow Test, Rev. 7
SE-149-007, 24 Month RHR Logic System Functional Test (DIV 1) Online (Partial), Rev. 2
SM-113-014, Annual Inspection, Level/Weight Measurement, and Pressure Verification of Halon Cylinders, Rev. 3
SM-113-015, 3-Year Inspection, Level/Weight Measurement, and Pressure/Flow Verification of Halon Cylinders, Rev. 2
TP-249-083, Initial Installation of Unit 2 RHR Pump Vacuum Circuit Breakers, Rev. 1

Completed Tests/Surveillances/Preventive Maintenance

E1884-01, Annual Test and Tuning of the Radio Repeater Equipment, Completed 6/3/10
E1884-02, 6 Month Inspection/Test of the Repeater Batteries, Completed 9/21/07
MT-007-002, App-R Emergency Light Maintenance & Functional Checks, Completed 02/24/11
SC-013-001, 92 Day Diesel Fire Pump Fuel Oil Test, Completed 05/25/11
SE-013-001, 3-Year Fire Protection System Flow Test, Completed 11/10/06
SE-013-001, 3-Year Fire Protection System Flow Test, Completed 10/14/09
SE-013-003, 18 Month $CO_2$ System Functional Test, Completed 06/17/10
SE-013-006, 2-Year Inspection of Fire Penetration Seals, Completed 03/17/11
SE-213-007, 2-Year Inspection of Fire Barriers, Completed 04/06/11
SE-013-009, 2-Year Inspection of Fire Dampers, Completed 11/01/10
SI-113-239, Annual Functional Test of RB Switchgear Room Detectors, Completed 9/28/10
SI-113-252, Annual Functional Test of Lower Relay Room Halon System, Completed 07/02/10
SI-113-253, Annual Functional Test of Upper Relay Room Halon System, Completed 07/13/10
SI-213-255, Annual Functional Test of PA-261, Completed 10/04/10
SI-113-256, Annual Functional Test of CO2 System, Completed 10/12/10
SM-013-005, 18 Month Diesel Fire Pump Battery Checks, Completed 02/16/11
SM-113-014, Annual Inspection, Level/Weight Measurement, and Pressure Verification of Halon Cylinders, Completed 12/20/10
SM-113-014, Annual Inspection, Level/Weight Measurement, and Pressure Verification of Halon Cylinders, Completed 06/08/11
SM-113-015, 3-Year Inspection, Level/Weight Measurement, and Pressure/Flow Verification of Halon Cylinders, Completed 12/22/10
SM-113-015, 3-Year Inspection, Level/Weight Measurement, and Pressure/Flow Verification of Halon Cylinders, Completed 06/08/11
SM-213-014, Annual Inspection, Level/Weight Measurement, and Pressure Verification of Halon Cylinders, Completed 11/15/10
SO-013-001, Monthly Diesel & Motor Driven Fire Pumps, Completed 03/29/11
SO-013-001, Monthly Diesel & Motor Driven Fire Pumps, Completed 05/03/11
SO-213-021, 18 Month Functional Test and Visual Inspection of PA-261, Completed 05/20/09
SO-213-021, 18 Month Functional Test and Visual Inspection of PA-261, Completed 11/22/10
TP-013-200, Simplex Fire Alarm System PROM Verification, Completed 09/03/09
TP-013-034, Annual Diesel Driven Fire Pump Performance Test, Completed 10/26/09
TP-013-034, Annual Diesel Driven Fire Pump Performance Test, Completed 12/02/10

TP-013-035, Annual Motor Driven Fire Pump Performance Test, Completed 06/25/09
TP-013-035, Annual Motor Driven Fire Pump Performance Test, Completed 07/02/10
T2019-01, Annual Test and Tuning of the Repeater Batteries, Completed 10/27/10

Quality Assurance Audits and Self Assessments

Susquehanna LLC, Fire Protection Self-Assessment (Readiness), 2011
1225781, QA Internal Audit, Fire Protection, 9/29/10

System Health Reports

Unit Common, Fire Protection System, 3rd Period 2010
U1, Fire Protection System, 2nd Period 2010
U1, Fire Protection System, 3rd Period 2010
U2, Fire Protection System, 2nd Period 2010
U2, Fire Protection System, 3rd Period 2010
U1, Lighting, 3rd Period 2010
U2, Lighting, 3rd Period 2010
U1, 102-125V DC, 1st Period 2011
U1, 104-4.16 KV System, 1st Period 2011
U2, 202-125V DC 3rd Period 2010
U2, 202-4.16KV System, 3rd Period 2010

Drawings and Wiring Diagrams

C-38 Sht. 1, Underground Yard Piping Fire Protection System, Rev. 20
C-38 Sht. 1, Underground Yard Piping Fire Protection System, Rev. 21
C-38 Sht. 1, Underground Yard Piping Fire Protection System, IDCN 19
C-38 Sht. 2, Underground Yard Piping Fire Protection System, Rev. 5
C-38 Sht. 3, Underground Yard Piping Fire Protection System, Rev. 4
C-305 Sht. 1, Reactor Bldg Structural Steel Framing, Rev. 21
C-1749 Sht. 1, Control Bldg Fire Zone Plan Elev. 698, Rev. 9
C-1749 Sht. 2A, Control Bldg PGCC Panels in Lower Relay Room Elev. 698, Rev. 2
C-1754 Sht. 1, Control Bldg Fire Zone Plan Elev. 771, Rev. 10
C-1754 Sht. 2, Control Bldg Fire Doors and Fire Dampers Elev. 771, Rev. 11
C-1754 Sht. 3, Control Bldg Fire Protection Plan Elev. 771, Rev. 5
D162009, Sht. 3, U2, Loop Diagram Remote Shutdown Instrumentation Div. 1, Rev. 21
E-1, Sht. 1, U1 & 2 Single Line Diagram Station, Rev. 34
E-5, Sht. 1, U1, Single Line Meter & Relay Dia. 4.16KV Eng. Safeguards Power Sys., Rev. 32
E-5, Sht. 1, U2, Single Line Meter & Relay Dia. 4.16KV Eng. Safeguards Power Sys., Rev. 31
E-10, Sht. 2, U1 & 2 Single Line Diagram Essential & Emergency Lighting, Rev. 14
E-105, Schematic Diagram – 4.16KV Bus 1B D/G Circuit Breaker Control, Rev. 23
E-149, Sht. 6, U2, Remote Shutdown Panel 2C201 Transfer Switches, Rev. 9
E-149, Sht. 7, U2, Remote Shutdown Panel 2C201 Transfer Switches, Rev. 15
E-153, Sht. 60, U2, RHR Outboard Shutdown Isolation Valve, Rev. 20
E-153, Sht. 62, U2, RHR Shutdown Cooling Inboard Isolation Valve, Rev. 18
E-154, Sht. 25, U2, RCIC Pump Discharge Valve, Rev. 10
E-154, Sht. 26, U2, RCIC Injection Shutoff Valve, Rev. 16

E-154, Sht. 30, U2, RCIC Pump Suction from Condensate Tank Valve, Rev. 12
E-266, Sht. 1, Schematic Diagram – Fire Protection CO2 Fire Extinguishing System, Rev.11
E-674, Unit 1 Schematic Diagram – Appendix "R" Communication System, Rev. 1
E-675, Units 1 & 2 Schematic Diagram – Appendix "R" Communication System, Rev. 1
E-676, Unit 1 Schematic Diagram – Appendix "R" Communication System, Rev. 1
E-677, Unit 1 Schematic Diagram – Appendix "R" Communication System, Rev. 0
E-690, Appendix "R" Safe Shutdown Manual Actions List, Rev. 6
EL-81, Sht. 2, E Diesel Generator Bldg Emergency Lighting Plan, Rev. 8
FF 108981, Sht. 1, Upper Cable Spreading Room PA-261, Rev. 7
FL-20125, Low Pressure CO2 Fire Ext. System Elem. Line and Connection Dia., Rev. 5
J-653, Sht. 26 & 27, Cooling Tower Basin Level Setting Diagram, Rev. 3
M-21, Sht. 9, Control Bldg Elev. 771 ft., Rev. 2
M-1003, Appendix "R" Safe Shutdown Component List, Rev. 8
P-12-4, Drainage, Central Control Building, Area 12 Plan of Elev. 698', Rev. 6
P-21-9, Drainage, Central Control Building, Area 21 Plan of Elev. 771', Rev. 13
P-21-18, Drainage, Central Control Building, Area 21 Plan of Elev. 754', Rev. 9
P-28-4, Drainage, Reactor Building Unit 1, Area 28 Plan of Elev. 719'-1", Rev. 10
P-29-4, Drainage, Reactor Building Unit 1, Area 29 Plan of Elev. 719'-1", Rev. 6
X-12-3, Sht. 2, Control Bldg Penetrations Elev. 697, Rev. 34
X-12-3, Sht. 4, Control Bldg Penetrations Elev. 697, Rev. 0
X-12-3-34, Sht. 1, Control Bldg Penetrations Elev. 697, Rev. 0
X-21-6, Sht. 5, Control Bldg Penetrations Elev. 753, Rev. 0
X-21-6-D25, Sht. 1, Control Bldg Penetrations Elev. 753, Rev. 0
X-21-7, Sht. 1, Control Bldg Penetrations Elev. 771, Rev. 31
X-21-7, Sht. 2, Control Bldg Penetrations Elev. 771, Rev. 30
X-21-7, Sht. 3, Control Bldg Penetrations Elev. 771, Rev. 31
X-21-7, Sht. 4, Control Bldg Penetrations Elev. 771, Rev. 0
X-21-7, Sht. 5, Control Bldg Penetrations Elev. 771, Rev. 0
X-21-7-51, Sht. 1, Control Bldg Penetrations Elev. 771, Rev. 0

Piping and Instrumentation Diagrams

M-101, Shts. 1-2, U1 Main Steam, Revs. 40, 14
M-105, Shts. 3-4, U1 Condensate Filtration System, Revs. 9, 5
M-109, Sht. 1, Service Water P&ID, Rev. 53
M-111, Shts. 1-4, Common Emergency Services Water System, Revs. 49, 52, 23, 3
M-112, Shts. 1-2, Common and U1 RHR Service Water, Revs., 50, 18
M-115, Sht. 1, Circulating Water P&ID, Rev. 50
M-117, Sht. 2, Raw Water Treatment P&ID, Rev. 57
M-122, Sht. 1, Fire Protection Fire Pump House P&ID, Rev. 51
M-122, Sht. 3, Fire Protection Reactor Bldg P&ID, Rev. 60
M-122, Sht. 4, Fire Protection Carbon Dioxide Systems P&ID, Rev. 39
M-141, Shts. 1-2, U1 Nuclear Boiler, Revs, 52, 18
M-144, Shts. 1-3, U1 Reactor Water Cleanup, Revs. 44, 15, 7
M-151, Shts. 1-5, U1 Residual Heat Removal, Revs. 64, 53, 26, 19, 2
M-152, Sht. 1, U1 Core Spray, Rev. 39
M-155, Sht. 1, U1 High Pressure Coolant Injection, Rev. 54
M-156, Shts. 1-2, U1 H.P.C.I. Turbine – Pump, Revs. 36, 9

M-176, Reactor Bldg Air Flow Diagram P&ID, Rev. 31
M-2111, Shts. 1-2, U2 Emergency Service Water, Revs. 45, 7
M-2112, U2 RHR Service Water, Rev. 29
M-2141, Shts. 1-2, U2 Nuclear Boiler, Revs. 48, 17
M-2144, Shts. 1-3, U2 Reactor Water Cleanup, Revs. 45
M-2150, Shts. 1-2, U2 RCIC Turbine Pump, Revs. 28, 2
M-2151, Shts. 1-5, U2 Residual Heat Removal, Revs. 56, 45, 23, 16, 1
M-2152, Sht. 1, U2 Core Spray, Rev. 27
M-2155, Sht. 1, U2 High Pressure Coolant Injection, Rev. 42
M-2156, Shts. 1-2, U2 HPCI. Turbine Pump, Revs. 27, 9

Vendor Manuals

IOM-536, GEK 83263A, Fenwal Halon 1301 System, Rev. 6

Fire Fighting Strategies (i.e., Pre-Fire Plans)

FP-113-115, Unit 1 Reactor Bldg Switchgear Rooms Elev. 719, Rev. 3
FP-013-139, Unit 1 Control Bldg Lower Relay Room Elev. 698, Rev. 8
FP-013-152, North, Central, & South Cable Chases Elev. 729, Rev. 5
FP-013-154, Office & Vestibule Elev. 729, Rev. 5
FP-013-155, Main Control Room & Soffits Elev. 729, Rev. 7
FP-013-156, Technical Support Center & Soffits, Rev. 5
FP-013-157, Main Control Room Shift Office Elev. 729, Rev. 5
FP-013-162, Unit 2 Control Bldg Upper Cable Spreading Room Elev. 754, Rev. 6
FP-013-170, Unit 2 Control Bldg Equipment & Battery Rooms Elev. 771, Rev. 5

Fire Brigade Training, Drills, and Drill Critiques

NDAP-QA-0445, Fire Brigade, Rev. 11
HS059, MSA Firehawk SCBA Training Material, Rev. 1
MST219, Fire Brigade I Training, Rev. 0
MST220, Fire Brigade II Training, Rev. 0
FB002, Initial Fire Brigade Training, Rev. 2
NTP-QA-53.1, Fire Brigade Training Program, Rev. 22

Unannounced Drills:

Unit 1 "B" Reactor Feedwater Pump, 06/16/11
Unit 2 Transient Combustible Fire, 06/24/09
Unit 1 Motor Generator Area Load Center Fire, 07/01/10
Unit 2 RCIC Pump Rooms, 02/09/11

Announced Drills:

Unit 1 RCIC Pressurized Lube Oil Leak & Soaked Lagging, 6/16/11
Office Trailer East of "E" Diesel Generator Bldg, 10/20/10
Unit 2 "A" Reactor Feedwater Pump, 02/08/11
Unit 2 EHC Storage Tank Room, 01/14/10
Control Structure Battery Room, 12/08/10
Unit 2 EHC Motor / Fluid Fire, 01/19/11

Hot Work Permits

| | | | |
|---|---|---|---|
| PCWO 0753815 | PCWO 0964162 | PCWO 1047825 | PCWO 1069624 |
| PCWO 1106602 | PCWO 1150416 | PCWO 1257874 | PCWO 1273929 |
| PCWO 1304892 | PCWO 1310330 | PCWO 1314406 | |

Transient Combustible Evaluations

Operations Log of Open & Approved Short Term Transient Combustible Permits, 05/24/2011
Operations Log of Open & Approved Long Term Transient Combustible Permits, 05/24/2011
Permit 017-11
Permit 039-11
Permit 095-11
Permit 169-08
Permit 181-10

Industry Standards

NFPA 13-1974, Installation of Sprinkler Systems
NFPA 20-1978, Centrifugal Fire Pumps
NFPA 25-2011, Inspection, Testing, & Maintenance of Water-Based Fire Protection Systems
NFPA 27-1975, Private Fire Brigades

Operator Safe Shutdown Training – Jobs Performance Measures (JPMs)

00.ON.015.101, Transfer Control And Instrumentation To The Remote Shutdown Panel And Determine Plant Status In Accordance With ON-100-009, Rev. 0
00.ON.015.102, Perform the Local Immediate Operator Actions Outside The Control Room In Accordance with ON-100-009, Rev. 0
00.ON.015.103, Perform Manual Operation of the ADS Valves from The Relay Room As Required By ON-100-009, Rev. 0
00.ON.015.104, Establish and Maintain Reactor Pressure with SRVs from The RSDP In Accordance with ON-100-009, Rev. 1
00.ON.015.105, Immediate Operator Action for Control Room Evacuation, Rev. 3
00.ON.015.153, Perform Manual Operation of the ADS Valves from the Remote Shutdown Panel or Relay Rooms As Required By ON-100-009, Control Room Evacuation (Alternate Path), Rev. 3
13.ON.003.001, Activate the Fire Brigade, Rev. 2
30.ON.001.001, Place Control Structure HVAC in Service, Rev. 2

Operator Safe Shutdown Training – Simulator

SM001 B-6, Licensed Operator Simulator – Integrated Plant Operation Activity 27, Rev. 12

Miscellaneous Documents

10-09, Implementing Compensatory Measures under EGM 09-002, 4/20/10
Impairment and Firewatch Logs for 06/21/11
NRC Administrative Letter 98-10, Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety
NRC Information Notice (IN) 1989-52, Potential Fire Damper Operational Problems, 06/08/89
NRC IN 2009-02, Biodiesel Fuel Oil Adverse Impact to Diesel Engine Performance, 02/23/09
NRC IN 1999-05, Inadvertent Discharge of $CO_2$ Fire Protection System, 03/08/99
NRC Letter Dated 10/21/97, Evaluation of Fire Protection Program Issues, Safe Shutdown Methodology and Analysis of Associated Circuits, SSES
Operations Directive 11-05, Unit 2 Cooling Tower Can Not be credited as an Operable Suction Source for Fire Protection, Rev. 1
PLA-4505, SSES, Appendix R, Section III.G and III.L Spurious Operations Criteria, 12/6/96
PPL Hazle Chemistry Laboratory Report, 2ns Quarter 2011 Fuel Oil for Fire Pumps, 05/25/11

Action Requests & Condition Reports

| | | | | | |
|---|---|---|---|---|---|
| 809691 | 825431 | 825436 | 825437 | 825451 | 825452 |
| 825453 | 825454 | 825457 | 830706 | 1071630 | 1080587 |
| 1124206 | 1240248 | 1240270 | 1240282 | 1243500 | 1243507 |
| 1243512 | 1243517 | 1243906 | 1243908 | 1255013 | 1288402 |
| 1293241 | 1300722 | 1327498 | 1411691 | 1415616* | 1417752 |
| 1417987* | 1418013* | 1419252* | 1419258* | 1419640* | 1419642* |
| 1419667* | 1419714* | 1420139* | 1420361* | 1420377* | 1420386* |
| 1420427* | 1420878* | 1420890* | 1420895* | 1420946* | 1420959* |
| 1420966* | 1421005* | 1421007* | 1421258* | 1421263* | 1421279* |
| 1421305* | 1421627* | 1421795* | 1421872* | 1422262* | 1423015 |
| 1423332* | 1424154* | 1425748* | 1425749* | 1426117* | 1426282* |
| 1426717* | 1426718* | 1426750* | 1426794* | 1426814* | 1426927* |
| 1426956* | 1426794* | 1427950* | 1428249* | | |

* NRC identified during this inspection.

Work Orders

| | | | | | | |
|---|---|---|---|---|---|---|
| 202395 | 686394 | 688794 | 780488 | 781358 | 880161 | 908294 |
| 908730 | 1034936 | 1047812 | 1050028 | 1051623 | 1063667 | 1067821 |
| 1067829 | 1078573 | 1080533 | 1113457 | 1115160 | 1172489 | 1173217 |
| 1175101 | 1187337 | 1189399 | 1189625 | 1190076 | 1193856 | 1196805 |
| 1199029 | 1229140 | 1261114 | 1308161 | 1321635 | 1363191 | 1376778 |
| 1382746 | 1413184 | | | | | |

## LIST OF ACRONYMS

| | |
|---|---|
| AC | Alternating Current |
| ADAMS | Agencywide Documents Access and Management System |
| AR | Action Request |
| BTP | Branch Technical Position |
| CAP | Corrective Action Program |
| CFR | Code of Federal Regulations |
| CMEB | Chemical Engineering Branch |
| $CO_2$ | Carbon Dioxide |
| CR | Condition Report |
| DRS | Division of Reactor Safety |
| Elev. | Elevation |
| FA | Fire Area |
| FHA | Fire Hazards Analysis |
| FPP | Fire Protection Program |
| FPRR | Fire Protection Review Report |
| Ft. | Feet |
| FZ | Fire Zone |
| gpm | gallons per minute |
| IMC | Inspection Manual Chapter |
| IP | Inspection Procedure |
| IPE | Individual Plant Examination |
| IPEEE | Individual Plant Examination of External Events |
| IR | Inspection Report |
| NCV | Non-cited Violation |
| NFPA | National Fire Protection Association |
| NRC | Nuclear Regulatory Commission |
| OS&Y | Outside Screw and Yoke |
| PAR | Publicly Available Records |
| P&ID | Piping and Instrumentation Drawing |
| psi | pressure per square inch |
| psig | pressure per square inch gauge |
| RCIC | Reactor Core Isolation Cooling |
| RHR | Residual Heat Removal |
| SDP | Significance Determination Process |
| SER | Safety Evaluation Report |
| SSES | Susquehanna Steam Electric Station |
| TRM | Technical Requirements Manual |
| TRS | Technical Requirements for Surveillance |
| UFSAR | Updated Final Safety Evaluation Report |