UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD., Suite 100
KING OF PRUSSIA, PA 19406-2713

September 15, 2017

Mr. Timothy S. Rausch
President and Chief Nuclear Officer
Susquehanna Nuclear, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 AND 2 –
TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000387/2017007
AND 05000388/2017007

Dear Mr. Rausch:

On September 1, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at Susquehanna Steam Electric Station (SSES), Units 1 and 2. The NRC inspectors discussed the results of this inspection with Mr. Robert Franssen, Nuclear General Manager Support and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any findings or violations of more than minor significance.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC's Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Glenn T. Dentel, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-387 and 50-388
License Nos. NPF-14 and NPF-22

Enclosure:
Inspection Report 05000387/2017007
and 05000388/2017007 w/Attachment:
Supplementary Information

cc w/encl: Distribution via ListServ

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION – TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000387/2017007 AND 05000388/2017007 DATED SEPTEMBER 15, 2017

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REGION I

Docket No.	50-387 and 50-388
License No.	NPF-14 and NPF-22
Report No.	05000387/2017007 and 05000388/2017007
Licensee:	Susquehanna Nuclear, LLC (Susquehanna)
Facility:	Susquehanna Steam Electric Station, Units 1 and 2
Location:	Berwick, Pennsylvania
Dates:	August 14, 2017 through September 1, 2017
Inspectors:	K. Young, Senior Reactor Inspector (Team Leader) F. Arner, Senior Reactor Analyst A. Patel, Senior Reactor Analyst (Training) J. Patel, Reactor Inspector L. Dumont, Reactor Inspector C. Hobbs, Reactor Inspector S. Elkhiamy, Reactor Inspector (Training)
Approved by:	Glenn T. Dentel, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY

Inspection Report 05000387/2017007 and 05000388/2017007; 08/14/2017 - 09/1/2017; Susquehanna Steam Electric Station, Units 1 and 2; Triennial Fire Protection Inspection.

This report covered a two week on-site triennial fire protection team inspection by specialist inspectors. The U.S. Nuclear Regulatory Commission's (NRC's) program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6, dated July 2016.

No findings were identified.

REPORT DETAILS

Background

This report presents the results of a triennial fire protection inspection conducted in accordance with U.S. Nuclear Regulatory Commission (NRC) Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)." The objective of the inspection was to assess whether Susquehanna Nuclear, LLC (Susquehanna) had implemented an adequate fire protection program (FPP) and whether post-fire safe shutdown capabilities had been established and were properly maintained at Susquehanna Steam Electric Station (Susquehanna). The following fire areas (FA) and/or fire zones (FZ) were selected for detailed review based on prior inspection results and risk insights from the Susquehanna Individual Plant Examination of External Events (IPEEE).

Fire Area / Fire Zone

- FA CS-5/FZ 0-24G, Unit 2 Division II, Lower Relay Room;
- FA D-3/FZ 0-41C, Diesel Generator Bay C;
- FA R-1B/FZ 1-1C, Unit 1 High Pressure Core Injection (HPCI) Pump Room; and,
- FA R-2A/FZ 2-2A, Unit 2 Remote Shutdown Panel Room.

Inspection of these FAs/FZs fulfilled the inspection procedure (IP) requirement to inspect a minimum of three samples.

The inspection team evaluated Susquehanna's fire protection program (FPP) against applicable requirements which included plant technical specifications; Operating License Condition 2.C(6) (Unit 1) and 2.C(3) (Unit 2); NRC Safety Evaluation Reports (SER); Title 10 of the *Code of Federal Regulations* (10 CFR) 50.48; 10 CFR Part 50, Appendix R; and Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1 and Appendix A. The team also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), Sections 9.5.1 and 9.5.2; Fire Protection Review Report (FPRR); the Fire Hazards Analyses (FHA); and the post-fire safe shutdown analyses.

The team evaluated aspects of three Susquehanna mitigating strategies for responding to large fires and explosions, which are required by Operating License Condition 2.C(34) (Unit 1) and 2.C(18) (Unit 2) and 10 CFR 50.54(hh)(2). Inspection of these strategies fulfills the IP requirement to inspect a minimum of one sample. Specific documents reviewed by the team are listed in the attachment to this report.

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 Fire Protection Review Report (FPRR) (which contains the fire hazards analysis (FHA) and post-fire safe shutdown analyses) and supporting drawings and documents to verify that post-fire safe shutdown capabilities were properly protected from fire damage. The team evaluated equipment and cable separation to determine whether the applicable separation requirements of the Susquehanna design and

licensing bases were maintained for the credited safe shutdown equipment and their supporting power, control, and instrumentation cables. The team's review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant inventory control, reactor pressure control, decay 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 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, ceilings, floors, fire doors, fire dampers, penetration seals, electrical raceway and conduit fire barriers and redundant equipment fire barriers to design and licensing basis requirements, industry standards, and the Susquehanna FPP, as approved by the NRC, to identify any potential degradation or non-conformances.

The team reviewed selected engineering evaluations, installation 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.

The team also reviewed recent inspection and functional test records for fire dampers, and the inspection records for penetration seals and fire barriers, to verify whether the inspection and testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified. In addition, the team reviewed recent test results for the carbon dioxide (CO_2) fire damper and Halon functionality tests for the Unit 2 Division II, Lower Relay Room to verify the testing was adequately conducted, the acceptance criteria were met, and any performance degradation was identified.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The team evaluated manual and automatic fire suppression and detection systems in the selected fire areas to determine whether they were installed, tested, maintained, and operated in accordance with NRC requirements, National Fire Protection Association (NFPA) codes of record, and Susquehanna's 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 the as-built capability of the fire water supply system to verify whether the design and licensing basis and NFPA code of record requirements were satisfied, and to assess whether those capabilities were adequate for the hazards involved. The team reviewed the fire water system hydraulic analyses to assess the adequacy of a single fire water pump to supply the largest single hydraulic load on the fire water system plus concurrent fire hose usage. The team evaluated the fire pump performance tests to assess the adequacy of the test acceptance criteria for pump minimum discharge pressure at the required flow rate, and to verify whether the criteria was adequate to ensure that the design basis and hydraulic analysis requirements were satisfied. The team also evaluated the underground fire loop flow tests to determine whether the tests adequately demonstrated that the flow distribution circuits were able to meet design basis requirements. In addition, the team reviewed 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 reviewed routine functional testing for the CO_2 and Halon suppression systems for the areas protected. The team walked down accessible portions of the CO_2 and Halon systems, including storage tanks and supply systems, to independently assess the material condition, operational lineup and availability of the systems.

The team walked down accessible portions of the detection and water suppression systems in the selected areas and major portions of the fire water supply system, including motor and diesel driven fire pumps, interviewed system and program engineers, and reviewed selected condition reports (CR) to independently assess the material condition of the systems and components. In addition, the team reviewed recent test results for the fire detection and suppression systems for 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 Susquehanna's fire-fighting strategies (i.e., 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 (e.g., turnout gear) and smoke removal equipment, to determine operational readiness for fire-fighting.

In addition, the team reviewed Susquehanna's fire brigade equipment inventory and inspection procedures and recent inspection and inventory results to verify whether adequate equipment was available, and whether any potential material deficiencies were identified.

b. Findings

No findings were identified.

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team performed document reviews and plant walk downs to verify that redundant trains of systems required for hot shutdown, located in the same or adjacent fire areas, would not be 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 indirectly, through production of smoke, heat, or hot gases, cause unintended activation of suppression systems in adjacent fire areas that could potentially damage redundant safe shutdown trains;

- A fire suppression system rupture, inadvertent actuation, or actuation due to a fire, in one of the selected fire areas, would directly damage all redundant trains (e.g., sprinkler caused flooding of other than the locally affected train); and

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

b. Findings

No findings were identified.

.05 Post-Fire Safe Shutdown Capability – Normal and Alternative

a. Inspection Scope

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings (P&ID), 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 post-fire safe shutdown conditions. The team evaluated selected systems and components credited by the safe shutdown analysis for reactivity control, reactor coolant inventory control, reactor pressure control, decay heat removal, process monitoring, and support system functions. This review included verification that alternative post-fire shutdown performed both with and without the availability of off-site power. Plant walkdowns were also performed to verify that 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 post-fire safe 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 post-fire safe shutdown, using either the normal or alternative shutdown methods, were trained and available on-site 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 (i.e., a procedure tabletop) to assess the adequacy of implementation and human factors within the procedures. The team also reviewed the time required to perform specific actions to verify whether operators could reasonably be expected to perform those actions within sufficient time to maintain plant parameters within specified limits.

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

- ON-013-001, Response to Fire, Revision 47;
- ON-CREVAC-101, Control Room Evacuation, Revision 0; and,
- ON-CREVAC-201, Control Room Evacuation, Revision 1

The team reviewed selected operator manual actions to verify whether they had been properly reviewed and approved and whether 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 and isolation capability, and instrumentation and control functions, to evaluate whether the tests were adequate to ensure the functionality of the alternative shutdown capability.

b. Findings

No findings were identified.

.06 Circuit Analysis

a. Inspection Scope

The team reviewed the licensee's post-fire safe shutdown analysis for the selected fire areas to determine whether the analysis identified both required and associated electrical circuits and cables for the systems and components necessary to achieve and maintain post-fire safe shutdown. The team reviewed electrical schematics and cable routing data for power, control, and instrumentation associated with selected components. Specifically, the team evaluated the selected circuits and cables to determine whether they were (a) adequately protected from potential fire damage, or (b) analyzed to show that fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown, or (c) analyzed to show that potential damage could be mitigated with approved operator manual actions, in order to determine whether fire-induced faults could adversely impact safe shutdown capabilities. The team's evaluations considered credible fire scenarios, cable insulation attributes, cable failure modes, cable routing, and common power supply or electrical bus configurations.

In addition, the team reviewed cable raceway drawings and cable routing databases for a sample of components required for post-fire safe shutdown to determine whether those 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 assess whether Susquehanna’s safe shutdown methodologies were appropriate, conformed to design and licensing basis requirements, and appropriately considered the guidance in NRC Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants," Revision 2.

Cable failure modes were reviewed for the following components:

- HVE112F004A, RHR Pump A Suppression Pool Suction Valve;
- HVE411F001, HPCI Steam Supply to Turbine Valve;
- HVE411F006, HPCI Discharge Valve;
- SV03446C2, Emergency Fuel Oil Solenoid Valve;
- SV24123B1, Inboard MSIV Solenoid Valve; and,
- TI-25751, Suppression Pool Water Temperature

The team reviewed a sample of circuit breaker and fuse over-current protection coordination studies to determine whether equipment needed for post-fire safe shutdown activities could be adversely affected due to a lack of coordination that could result in a common power supply or common electrical bus concern. The team also evaluated whether coordination studies appropriately considered multiple faults due to fire.

In addition, the team reviewed a sample of circuit breaker maintenance records, for components required for safe shutdown, to determine whether the breakers were properly maintained.

The team assessed the transfer of control from the main control room to the alternative shutdown location to determine whether it would be adversely 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 whether 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 inspected selected emergency storage lockers to independently verify whether portable communication equipment was available for the fire brigade and plant operators. In addition, the team evaluated whether radio or repeaters, transmitters, and power supplies would be reasonably unaffected by a fire.

b. Findings

No findings were identified.

.08 Emergency Lighting

a. Inspection Scope

The team observed the placement and coverage area of eight-hour emergency lights throughout the selected fire areas to evaluate their adequacy for illuminating access and egress pathways and any equipment requiring local operation or instrumentation monitoring for post-fire safe shutdown. The team also verified whether the battery power supplies were rated for at least an eight-hour capacity. Preventive maintenance procedures, the vendor manual, completed surveillance tests, and battery replacement practices were also reviewed to evaluate whether the emergency lighting had been maintained consistent with the manufacturer's recommendations and 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 Susquehanna 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 whether 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 evaluated whether the short term compensatory measures adequately compensated for the degraded function or feature until appropriate corrective action could be taken and whether the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings were identified.

.11 Review and Documentation of FPP Changes

a. Inspection Scope

The team reviewed recent changes to the approved FPP to assess whether those changes had 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 Susquehanna'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 FHA. A sample of hot work and transient combustible control permits were reviewed to assess the adequacy of Susquehanna's FPP administrative controls. The team performed plant walk downs 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

The team conducted a review of selected mitigation strategies intended to maintain or restore core decay heat removal and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions and/or fires. The team assessed whether Susquehanna continued to meet the requirements of License Conditions 2.C(34)(Unit 1) and 2.C(18)(Unit 2) and 10 CFR 50.54(hh)(2).

The team reviewed the following mitigation strategies:

- DC-B5B-103, Unit 1 CST Makeup from Portable Pump Truck;
- DC-B5B-201, Depressurization of Unit 2 RPV using ADS SRV's with a Portable Pwr. Supply Connected at the Div. 1 or Div. 2 Containment Penetration; and
- ES-150-003, RCIC Manual Injection with Loss of AC and DC Power (U1).

The team's review included: a detailed assessment of the procedural guidance; a tabletop discussion with licensed operators; a walk down of three mitigation strategies with operators to assess the feasibility of the strategies and operator familiarity; maintenance and surveillance testing of selected strategy equipment; and an inventory check of selected mitigation equipment to verify whether equipment storage and availability was appropriate.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The team reviewed a sample of CRs associated with the FPP, post-fire safe shutdown issues, and mitigation strategy issues to determine whether Susquehanna was appropriately identifying, characterizing, and correcting problems associated with these areas and whether the planned or completed corrective actions were appropriate. The CRs reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, including Exit

The team presented the inspection results to Mr. Robert Franssen, Nuclear General Manager Support and other members of Susquehanna's staff on September 1, 2017. No proprietary information was included in this inspection report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
B. Berryman, Site Vice President
D. Jones, Plant Manager
J. Barns, Assistant Operations Manager-Work Control
D. Ambrose, Maintenance & Technology Training Manager
C. Angione, Electrical Design Engineer
T. Borger, Design Engineering, Mechanical
B. Bridge, Radiation Protection Manager
T. Carter, Fire Protection Systems Engineer
S. Davis, Fire Protection Engineer
R. Franssen, Nuclear General Manager Support
R. Genovese, Nuclear Regulatory Affairs
J. Gorman, Emergency Planning Manager
J. Grisewood, Chemistry Manager
A. Jardine, On-Line Work Management, Manager
J. Jennings, Nuclear Regulatory Affairs, Manager
J. Jessick, Radiation Protection
M. Krick, Nuclear Regulatory Affairs, Supervisor
D. LaMarca, Operations Manager
K. Lore, Security Operations
J. Lubinsky, Manager Design Engineering
J. Lussi, Fire Safety Instructor
S. Maguire, Fire Protection Engineer, Programs
M. Murphy, Station Engineering Manager
S. Myrthel, Unit Supervisor
M. Oman, Fire Brigade Supervisor
R. Remsky, Emergency Planning Supervisor
T. Rydzewski, Operations, Unit Supervisor
P. Scanlan, Maintenance Manger
M. Silverman, Assistant Operations Manager-Shift
A. Soden, Mechanical Maintenance Manager
S. Sutliff, Manager of Projects
M. Sivaraman - Assistant Operations Manager - Shift
J. Waclawski, Engineering Programs, Branch Manager

NRC Personnel
L. Micewski, Senior Resident Inspector, Susquehanna Steam Electric Station
T. Daun, Resident Inspector, Susquehanna Steam Electric Station

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened
None.

Opened and Closed
None.

Closed
None.

LIST OF DOCUMENTS REVIEWED

Fire Protection Licensing and Design Basis Documents

DBD019, Design Basis Document for Fire Protection, Revision 5
DBD076, Design Basis Document for Appendix R, Revision 3
EC-013-0843, SSES 10 CFR 50 Appendix R Compliance Manual, Revision 47
NRC Letter dated 8/9/89, Safety Evaluation of Fire Protection Report, SSES, Units 1 and 2
NRC Letter Dated 3/29/93, Revision 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
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
SSES Fire Protection Review Report (FPRR) Unit 1 and 2, Revision 21
SSES Technical Requirements Manual Unit 1, Revision 2
SSES Technical Requirements Manual Unit 2, Revision 2
SSES Technical Specification Unit 1, 4/19/17
SSES UFSAR, Section 9.5.1, Revision 67
SSES UFSAR, Section 17.2.2, Quality Assurance Program, Revision 67

Calculations, Analysis, and Engineering Evaluations

EC-004-0501, Appendix R Associated Circuit Analysis, Revision 50
EC-013-0012, Hose Reel Flow Calculation for Fire Protection, Revision 3
EC-013-0022, Fire Protection Piping Pressure Losses, Revision 11
EC-013-0509, Minimum Water Level Under Spurious Operation, Revision 2
EC-013-0678, RHR Shutdown Cooling Iso./Oper. Capability In the Event of a Plant Fire, Revision 7
EC-013-0843, SSES 10CFR50 Appendix R Compliance Manual, 11/2/16
EC-013-0859, Appendix R Analysis for a Control Room Fire, Revision 30
EC-013-0873, App. R Eval. of Flow Diversion and High/Low Press. Interface Comp., Revision 13 EC-013-1810, SSES Raceway Fire Barrier Qualification Evaluation of Typical Detail VW-U-B1-03 Junction and Pull Boxes Protected with 5/8” and 1 1/8” Thermo-Lag 330-1 against Structure Requiring 1 Hour Protection, Revision 2
EC-013-1828, SSES Raceway Fire Barrier Qualification Evaluation of Typical Detail VW-U-C1-14 2” through 6” Conduit Straight Runs Installed in Free Air Protected with One Hour Conduit Sections Requiring One Hour Protection, Revision 1
EC-013-1871, Circuit Analysis Assessment for NRC RIS 2004-04, Revision 3
EC-013-1873, Operator Manual Actions Feasibility Analysis, Revision 3
EC-013-1884, Performance Requirements for Portable Diesel Driven Pump, Revision 5
EC-013-1887, MSO, Development of Plan Specific MSO List, Including the Expert Panel Review Process Revision 2
EC-013-1897, Hydraulic Model of Fire Water Supply System using PIPE-FLO, Revision 2
EC-013-1910, Calculation to Determine CO_2 Room Concentrations for the Rooms Protected with an Automatic CO_2 System, Revision 1

EC-013-1913, PGCC Halon Systems for the Unit 1 & 2 Upper & Lower Relay Rooms, Revision 0
EC-050-0001, RCIC Pressure Drop Calculations, Revision 2
EC-CLAS-0012, Class 1 Analysis of RHR Return and Supply Lines, Revision 5
EC-FLOD-0001, Internal Flood. for Moderate Energy Pipe Cracks & Sprinkler Actuations, Revision 3
EC-THYD-1064, MAAP Analysis of Appendix R Scenarios, Revision 3

Drawings and Wiring Diagrams

D107408 Sht. 9B, Common Schematic Diagram Diesel Generator Engine Control, Revision 11
D162009 Sht. 3, Unit 2 Loop Diagram Remote Shutdown Instrumentation Div. 1, Revision 22
D1622020 Sht. 9, Unit 2 Loop Diagram Suppression Pool Temp. Monitoring System, Revision 17
E-1, Sht. 1, Unit 1 & 2 Single Line Diagram Station, Revision 38
E-1, Sht. 1A, Unit 1 & 2 Single Line Diagram Station, Revision 9
E-1, Sht. 2, Unit 1 & 2 Single Line Diagram 13.8KV Thru 480V Station Aux. Bus Arr., Revision 21
E-5 Sht. 1, Unit 1 Single Line Meter & Relay Diagram 4.16KV Eng. Safe. Power Sys., Revision 33
E-5 Sht. 2, Unit 2 Single Line Meter & Relay Diagram 4.16KV Eng. Safe. Power Sys., Revision 32
E-8 Sht. 4, Unit 1 Single Line Meter& Relay Dia. 480V Load Centers 1B210, 1B220, 1B230, 1B240, Revision 19
E-8 Sht. 8, Unit 2 Single Line Meter& Relay Dia. 480V Load Centers 1B210, 1B220, 1B230, 1B240, Revision 21
E-11 Sht. 1, Unit 1 & Common Single Line Meter & Relay Diag. 125 & 250 VDC Sys., Revision 19
E-11, Sht. 2, Unit 2 Single Line Meter & Relay Diagram 125 & 250 VDC System, Revision 28
E-50 Sht. 9A, Lighting Symbols, Notes and Details, Revision 4
E-149, Sht. 6, Unit 2 Schem. Diag. Remote Shutdown Panel 2C201 Transfer Switches, Revision 9
E-152 Sht. 1, Unit 1 HPCI System Control and Indication, Revision13
E-152 Sht. 5, Unit 1 HPCI Steam Supply to Turbine, Revision 17
E-152 Sht. 9, Unit 1 Schematic Diagram HPCI Pump Discharge Valve HV-E41-1F006, Revision 18
E-153 Sht. 55, Schematic Drawing RHR Pump A Suction Valve HV-E11-2F004A, Revision 15
E-153, Sht. 62, U2 Schematic Diagram RHR Shutdown Cooling Inboard Isolation Valve, Revision 20
E-154, Sht. 21, U2 RCIC Barometric Condenser Cond. Vac. Tank Condensate Pump, Revision 14
E-170 Sht. 4, Unit 2 Nuclear Steam Supply Shutoff System Isolation Logic Unit 2, Revision 26
E-170 Sht. 8, Schematic Diag. NSSSS Main Steam Inboard Isolation Valve Indication, Revision 13
E105004, Susquehanna General Floor Plan Elevations 670 and 676, Revision 36
E106446, Sht. 4, Susquehanna S.E.S Unit 2 Heating & Ventilation Central Control Building Area 21, Plan @ El. 698'-0", Revision 21
E106487, Sht. 1, Susquehanna S.E.S Common Heating & Ventilation Typical Details, Revision 19
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E177131, Sht. 1, Susquehanna S.E.S HVAC Fire Damper Schedule, Revision 18
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E184302, Sht. 2, Susquehanna S.E.S Main Power Block El. 670'-0", 676'-0", & 677'-0" Fire Protection, Revision 15

E184302, Sht. 10, Susquehanna S.E.S Circulation Water Pump House & Water Treatment Building Fire Protection, Revision 2
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EC 1544685, Primary and Backup Pump Replacement, 6/9/16
EC 1770065, Fire Protection Program Screen FPSD 00133, Replacement of Feedwater Heaters 2E102A, 2E102B, and 2E102C, Revision 0
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CR-2014-30522, Evaluate NRC IN 2014-10, Potential Circuit Failure-Induced Secondary Fires or Equipment Damage
DI-2014-37267, Evaluate NRC IN 2014-15, Inadequate Controls of Respiratory Protection Accessibility, Training, and Maintenance
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SSES NOS Audit AR-2015-01376, Fire Protection Audit Report, 8/23/16

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FB003, Fire Brigade Leader Training, Revision 3
FB018, Fire Hazard Identification, Revision 1
FB019, Ventilation at SSES, Revision 1
FB021, Fire Brigade, Revision 2
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TMX 643, Qualification Requirement Report, Fire Brigade Leader
TMX 1083, Qualification Requirement Report, Haz. Mat. Ops. & Sec. First Responder
TMX 1338, Qualification Requirement Report, SCBA Qualification
TMX FB003, Qualification Requirement Report, Fire Brigade Leader Training
TMX FB004, Qualification Requirement Report, Fire Brigade Drill 1 QTR
TMX FB005, Qualification Requirement Report, Fire Brigade Drill 2 QTR
TMX FB006, Qualification Requirement Report, Fire Brigade Drill 3 QTR
TMX FB007, Qualification Requirement Report, Fire Brigade Drill 4 QTR
TMX FB023, Qualification Requirement Report, Make-Up Drills
TMX RESP01, Qualification Requirement Report, Respirator Fit Test
B.5.b Hose Deployment – Power Point Presentation
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00.ON.015.103, Perform Manual Operation of the ADS valves from the Relay Rooms, Revision 0
00.ON.015.104, Establish and Maintain Reactor Pressure With SRVs from the RSDP, Revision 1
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52.OP.009.101, Override an Inadvertent Start of the HPCI Sys. In Accord. With OP-152-001, Revision 0
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FB007, Sprinkler Actuation "E" Diesel Generator, 11/13/16
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Scenario #31, FB005 Announced Drill, Incendiary Fire Remote Shutdown Panel Room, 5/1/17
Scenario #50, FB006 Announced Drill, Interior Structure Fire North Bldg., 9/20/16
FB006, Unannounced Drill, Electrical Fire – Annunciator Control Cabinet, 8/9/16
FB006, Load Center Fire, Reactor -1 719', 9/13/16
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1782942, Completed 7/22/16
1876211, Completed 1/25/17
1930276, Completed 3/27/17
RTPM 1739380, RWCU Functional Test at Remote Shutdown Panel, Completed 4/15/15
SE-013-003, 18 Month CO_2 System Functional Test, Completed 3/13/15
SE-013-003, 18 Month CO_2 System Functional Test, Completed 8/26/16
SE-013-006, Unit Common Penetration Seal Inspection, Completed 4/22/2015
SE-013-007, 24 Month Inspection of Unit Common Fire Barriers, Completed 2/28/14
SE-013-007, 24 Month Inspection of Unit Common Fire Barriers, Completed 7/18/16
SE-013-008, 6 Month Inspection of Unit Common Fire Doors, Completed 7/27/16
SE-013-008, 6 Month Inspection of Unit Common Fire Doors, Completed 1/26/17
SE-013-009, 24 Month Inspection of Fire Windows / Fire Dampers and Associated Hardware, Completed 3/3/15
SE-013-009, 24 Month Inspection of Fire Windows / Fire Dampers and Associated Hardware, Completed 10/24/16
SE-013-013, 18 Month Functional Test and Visual Inspection of Pre-Action Sprinkler Systems PA-011, PA-012, PA-013, PA-014, Completed 10/3/15
SE-013-013, 18 Month Functional Test and Visual Inspection of Pre-Action Sprinkler Systems PA-011, PA-012, PA-013, PA-014, Completed 02/17/17
SE-113-006, 2 Year Inspection on Unit 1 Penetrations, Completed 7/24/14
SE-113-006, 2 Year Inspection on Unit 1 Penetrations, Completed 6/10/16
SI-013-224, Annual Functional Test of Fire Protection Smoke Detectors for Fire Zones 0-24A, 0-24B, 0-24C, 0-24D, 0-24E, 0-24F, and 0-24G, Completed 8/18/15

SI-013-224, Annual Functional Test of Fire Protection Smoke Detectors for Fire Zones 0-24A, 0-24B, 0-24C, 0-24D, 0-24E, 0-24F, and 0-24G, Completed 8/17/16
SI-013-239, Annual Functional Test of Fire Protection Infrared and Smoke Detectors for Fire Zone 0-41C (D/G C Room), Completed 6/2/16
SI-013-239, Annual Functional Test of Fire Protection Infrared and Smoke Detectors for Fire Zone 0-41C (D/G C Room), Completed 5/30/17
SI-113-227, Annual Functional Test of Fire Protection Photoelectric Detectors for Fire Zone 1-1C (HPCI Pump Room, Elevation 645), Completed 1/5/16
SI-113-227, Annual Functional Test of Fire Protection Photoelectric Detectors for Fire Zone 1-1C (HPCI Pump Room, Elevation 645), Completed 1/6/17
SI-213-231, Annual Functional Test of Fire Protection Smoke Detectors for Fire Zones 2-2A, 2-2B, and RX Bldg. Elevator Actuation Strings with Detectors in Fire Zones 0-8A, 2-1l, 2-2A, 2-3A, 2-4A-S, and 2-5A-S, Completed 6/4/15
SI-213-231, Annual Functional Test of Fire Protection Smoke Detectors for Fire Zones 2-2A, 2-2B, and RX Bldg. Elevator Actuation Strings with Detectors in Fire Zones 0-8A, 2-1l, 2-2A, 2-3A, 2-4A-S, and 2-5A-S, Completed 5/31/16
SI-213-252, Annual Functional Test - Fire Zone 0-24G (Lower Relay Room PGCC Halon), Completed 6/19/15
SI-213-252, Annual Functional Test - Fire Zone 0-24G (Lower Relay Room PGCC Halon), Completed 6/16/16
SI-213-256, Annual Functional Test of CO_2 System 1.14 Fire Protection Heat Detectors for Fire Zone 0-24G (Unit 2 Lower Relay Room), Completed 10/13/15
SI-213-256, Annual Functional Test of CO_2 System 1.14 Fire Protection Heat Detectors for Fire Zone 0-24G (Unit 2 Lower Relay Room), Completed 10/20/16
SI-259-303A, 24 Month Calibration- Suppression Pool Div. Water Temp (PAM & Remote Shutdown), Completed 1/17/17
SM-213-014, Annual Inspection, Level / Weight Measurement and Pressure Verification of Halon Cylinders, Completed 11/7/15
SM-213-014, Annual Inspection, Level / Weight Measurement and Pressure Verification of Halon Cylinders, Completed 11/22/16
SM-213-015, 3 Year Inspection, Level / Weight Measurement and Pressure / Flow Verification of Halon Cylinders, Completed 11/13/14
SO-000-005, Weekly Electrical Distribution Verification, Completed 4/24/17
SO-013-001, Monthly Diesel and Motor Driven Fire Pump Run, Completed 6/1/17
SO-013-001, Monthly Diesel and Motor Driven Fire Pump Run, Completed 6/23/17
SO-013-001B, Monthly Backup Diesel Fire Pump Run, Completed 6/6/17
SO-013-001B, Monthly Backup Diesel Fire Pump Run, Completed 7/3/17
SO-100-001, 31 Day – Remote Shutdown PNL Inst CK, Completed 7/29/17
SO-113-009, 3 Year Sprinkler Nozzle DS-115 and DS-116 Air Flow Test, Completed 2/16/16
SO-113-023, 18 Month Functional Test and Visual Inspection of Deluge Systems DS-115 and DS-1116, Completed 7/17/15
SO-113-023, 18 Month Functional Test and Visual Inspection of Deluge Systems DS-115 and DS-1116, Completed 1/4/17
SO-149-010, RHR Loop B Functional test at Remote Shutdown Panel, Completed 4/11/16
SO-200-001, 31 Day – Remote Shutdown PNL Inst CK, Completed 8/8/17
SO-249-020, On-Line Functional Test of RHR Loop B at 2C201B, Completed 2/28/17
SO-250-104, RCIC Functional Test at RSDP 2C201A (Online), Completed 1/25/17
TP-013-036, Backup Diesel Driven Fire Pump 0P592 Performance Test, Completed 8/7/17
TP-013-65, EC 1544685 Partial 1 Initial Field Acceptance Testing, Completed 12/2/15
TP-013-65, EC 1544685 Partial 2 Initial Field Acceptance Testing, Completed 8/15/16
TP-013-65, EC 1544685 Partial 3 Initial Field Acceptance Testing, Completed 7/14/16

TP-013-65, EC 1544685 Partial 3 Initial Field Acceptance Testing, Completed 10/3/16
TP-013-66, EC 1544685 Partial 2 Initial Field Acceptance Testing, Completed 8/19/16
TP-013-250, EC 1544685 Partial 1 Initial Field Acceptance Testing, Completed 8/19/16

Condition Reports (* denotes NRC identified during this inspection)

AR-2014-35497	AR-2015-15974	AR-2015-18376	AR-2016-21043
AR-2017-06900	AR-2017-08497	AR-2017-10019	AR-2017-12042
AR-2017-13254	AR-2017-14802*	AR-2017-15307*	AR-2017-15590*
AR-2017-15656*	CR-1683965	CR-2015-11240	CR-2015-31675
CR-2016-14012	CR-2016-18049	CR-2016-20768	CR-2016-20956
CR-2016-21014	CR-2016-22775	CR-2017-09008	CR-2017-10767
CR-2017-11883	CR-2017-11938	CR-2017-12041	CR-2017-12044
CR-2017-12296	CR-2017-13710*	CR-2017-14574*	CR-2017-14743*
CR-2017-14748*	CR-2017-14802*	CR-2017-14813*	CR-2017-14957*
CR-2017-15036*	CR-2017-15088	CR-2017-15283	CR-2017-15307*
CR-2017-15491*	CR-2017-15529*	CR-2017-15531*	DI-2015-04802

Work Orders

WO 1266840	WO 1648007	WO 1657354	WO 1677437	WO 1685401	WO 1724505
WO 1773378	WO 1777683	WO 1779641	WO 1796378	WO 1817364	WO 1827548
WO 1830941	WO 1831365	WO 1838262	WO 1850745	WO 1855413	WO 1857784
WO 1871130	WO 1874784	WO 1882780	WO 1887251	WO 1907479	WO 1908290
WO 1909080	WO 1911274	WO 1911529	WO 1917660	WO 1918871	WO 1936015
WO 1939034	WO 1945453	WO 1945742	WO 1959722	WO 1965124	WO 1969053
WO 1971012	WO 1971026	WO 2000120	WO 2002613	WO 2003241	WO 2014550
WO 2021718	WO 2084075	WO 2085812	WO 2091252	WO 2092299	WO 2096052
WO 2098523	WO E0036-08	WO E1896-57			

Industry Standards
NFPA 12, Carbon Dioxide Extinguishing Systems, 1973
NFPA 12A, Halon 1301 Fire Extinguishing Systems, 1973
NFPA 13, Installation of Sprinkler Systems, 1971
NFPA 20, Centrifugal Fire Pumps, 1974
NFPA 72A, D, E, Detection Systems, 1974
UL 555, United Laboratories Standard for Fire Dampers, 7/12/06

Vendor Manuals
Ruskin IBD23 Curtain Type Static Fire Dampers, 3 Hour UL555 Rated, 11/15

Miscellaneous Documents
Fire Protection Systems Impairment Log, 7/31/17
IOM827, Illumination Test
SSES Letter of Agreement with Berwick Volunteer Fire Department, 3/13/17
SSES Letter of Agreement with Hobbie Volunteer Fire Department, 2/21/17
SSES Letter of Agreement with Mocanaqua Volunteer Fire Department, 2/21/17
SSES Letter of Agreement with Nanticoke Fire Department, 2/21/17
SSES Letter of Agreement with Shickshinny Volunteer Fire Department, 2/21/17

LIST OF ACRONYMS

AC	Alternating Current
ADS	Automatic Depressurization System
APCSB	Auxiliary and Power Conversion Systems Branch
BTP	Branch Technical Position
CFR	*Code of Federal Regulations*
CO_2	Carbon Dioxide
CR	Condition Report
CST	Condensate Storage Tank
DC	Direct Current
DG	Diesel Generator
FA	Fire Area
FHA	Fire Hazards Analysis
FPP	Fire Protection Program
FPRR	Fire Protection Review Report
FZ	Fire Zone
HVAC	Heating, Ventilation, and Air Conditioning
HPCI	High Pressure Coolant Injection
IP	Inspection Procedure
IPE	Individual Plant Examination
IPEEE	Individual Plant Examination of External Events
IR	Inspection Report
kV	Kilo-Volts
MSO	Multiple Spurious Operation
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
OPEX	Operating Experience
P&ID	Piping and Instrumentation Drawing
PAR	Publicly Available Records
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPV	Reactor Pressure Vessel
RSDP	Remote Shutdown Panel
SCBA	Self-Contained Breathing Apparatus
SER	Safety Evaluation Report
SRO	Senior Reactor Operator
SRV	Safety Relief Valve
SSES	Susquehanna Steam Electric Station
TRM	Technical Requirements Manual
UFSAR	Updated Final Safety Analysis Report
WO	Work Order