



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION I  
2100 RENAISSANCE BLVD., SUITE 100  
KING OF PRUSSIA, PA 19406-2713

October 15, 2015

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

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - EVALUATION OF CHANGES,  
TESTS, AND EXPERIMENTS AND PERMANENT MODIFICATIONS TEAM  
INSPECTION REPORT 05000387/2015007 AND 05000388/2015007

Dear Mr. Rausch:

On September 18, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Susquehanna Steam Electric Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on September 18, 2015, with Mr. Jon Franke, Site Vice President, and other members of your staff.

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. In conducting the inspection, the team reviewed selected procedures, calculations and records, observed activities, and interviewed station personnel.

Based on the results of this inspection, no findings were identified.

In accordance with 10 CFR 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/*

Paul G. Krohn, Chief  
Engineering Branch 2  
Division of Reactor Safety

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

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

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - EVALUATION OF CHANGES, TESTS, AND EXPERIMENTS AND PERMANENT MODIFICATIONS TEAM INSPECTION REPORT 05000387/2015007 AND 05000388/2015007

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T. Rausch

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Enclosure:  
Inspection Report 05000387/2015007 and  
05000388/2015007  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Letter to Mr. Timothy Rausch from Paul Krohn

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - EVALUATION OF CHANGES, TESTS, AND EXPERIMENTS AND PERMANENT MODIFICATIONS TEAM INSPECTION REPORT 05000387/2015007 AND 05000388/2015007

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.: 50-387; 50-388

License Nos.: NPF-14; NPF-22

Report No.: 05000387/2015007 and 05000388/2015007

Licensee: Susquehanna Nuclear, LLC (Susquehanna)

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: Berwick, Pennsylvania

Inspection Period: August 31 through September 18, 2015

Inspectors: S. Pindale, Senior Reactor Inspector, Team Leader  
J. Patel, Reactor Inspector  
A. Turilin, Project Engineer

Approved By: Paul G. Krohn, Chief  
Engineering Branch 2  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

IR 05000387/2015007 and 05000388/2015007; 08/31/15 - 09/18/15; Susquehanna Steam Electric Station, Units 1 and 2; Engineering Specialist Plant Modifications Inspection.

This report covers a 2-week inspection of the evaluations of changes, tests, or experiments and permanent plant modifications. The inspection was conducted by two region based engineering inspectors and one project engineer. 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.

No findings were identified.

## REPORT DETAILS

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

#### 1R17 Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications (IP 71111.17)

##### .1 Evaluations of Changes, Tests, or Experiments (26 samples)

##### a. Inspection Scope

The team reviewed five safety evaluations to evaluate whether the changes to the facility or procedures, as described in the Updated Final Safety Analysis Report (UFSAR), had been reviewed and documented in accordance with Title 10 of the *Code of Federal Regulations* (CFR) Part 50.59 requirements. In addition, the team evaluated whether Susquehanna Nuclear, LLC (Susquehanna) had been required to obtain U.S. Nuclear Regulatory Commission (NRC) approval prior to implementing the changes. The team interviewed plant staff and reviewed supporting information including calculations, analyses, design change documentation, procedures, the UFSAR, the Technical Specifications (TS), and plant drawings to assess the adequacy of the safety evaluations. The team compared the safety evaluations and supporting documents to the guidance and methods provided in Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Evaluations," as endorsed by NRC Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," to determine the adequacy of the safety evaluations.

The team also reviewed a sample of twenty-one 10 CFR 50.59 screenings for which Susquehanna had concluded that a safety evaluation was not required to be performed. These reviews were performed to assess whether Susquehanna's threshold for performing safety evaluations was consistent with 10 CFR 50.59. The sample included design changes, calculations, and procedure changes.

The team reviewed the safety evaluations that Susquehanna had performed and approved during the time period covered by this inspection (i.e., since the last plant modifications inspection) not previously reviewed by NRC inspectors. The screenings and applicability determinations were selected based on the safety significance, risk significance, and complexity of the change to the facility.

In addition, the team compared Susquehanna's administrative procedures used to control the screening, preparation, review, and approval of safety evaluations to the guidance in NEI 96-07 to evaluate whether those procedures adequately implemented the requirements of 10 CFR 50.59. The reviewed safety evaluations and screenings are listed in the Attachment.

b. Findings

No findings were identified.

.2 Permanent Plant Modifications (13 samples)

.2.1 Appendix R Multiple Spurious Operations #5K Unit 2 Residual Heat Removal F007A and F024A Valves

a. Inspection Scope

The team reviewed modification EC-1305833 that evaluated and modified the control circuits for residual heat removal (RHR) valves F007A and F024A to resolve multiple spurious operations (MSO) caused by fire-induced circuit failures during a postulated fire in the main control room (MCR). NRC Information Notice 92-18, "Potential for Loss of Remote Shutdown Capability During a Control Room Fire," discussed a susceptibility to fire-induced circuit failures of motor-operated valves (MOVs), where a hot-short (i.e., an electrical short circuit between control wiring and power source) in the MCR could bypass the torque and limit switches such that the motor actuator would not de-energize and could cause valve damage. This modification reconfigured the control circuit wiring of the two RHR valves so that torque and limit switches are electrically located below the MCR control switches (i.e., located electrically between the control room and the motor control center). In this configuration, the torque and limit switches would not be bypassed during a postulated fault describe above.

The team assessed whether the modification was consistent with requirements and in the design and licensing bases. The team conducted interviews with the responsible design engineer and performed a walkdown of the motor control center affected by this modification. The team reviewed the modification to determine whether the design function of these valves had been adversely affected by the change. The team also reviewed post-modification testing of the equipment to verify proper operation of the valves; and to verify the valves met the stroke time requirements. The team also evaluated whether affected plant design drawings were properly updated. Finally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.2 Residual Heat Removal Pump Motor Replacement

a. Inspection Scope

The team reviewed modification EC-1315883 that was implemented to replace the motor for Unit 1 RHR pump 1P202B. The motor was replaced because the original motor was



approaching its qualified end of life. The replacement motor was a spare motor previously installed in Unit 2 RHR pump 2P202B and had been reconditioned by an offsite vendor for stator rewind and rotor replacement.

The team reviewed the modification to verify that the design and licensing bases of the RHR system had not been degraded by the motor change. The team conducted interviews with the engineering staff and reviewed the engineering change to ensure that the replacement motor had similar electrical characteristics to the original motor. In particular, the team verified that the impact of the change was addressed for power consumption requirements, cable protection requirements, voltage drop requirements, overload conditions, and short-circuit protection requirements. The team also verified that the affected plant design drawings and calculations were properly updated; and reviewed post-modification testing of the motor to verify proper operation. Finally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.3 Replacement of Drywell Cooler Motor 1VM418A

a. Inspection Scope

The team reviewed EC-1473145 that replaced a drywell cooler motor 1VM418A. The replacement motor was equivalent to the existing motor, which became obsolete. The replacement motor had the same electrical characteristics, but was heavier than the original motor. The team evaluated the increased weight relative to its seismic qualification and the support structure calculation.

The team reviewed the modification to verify that the design and licensing bases had not been degraded by the modification. The team interviewed design engineering staff; and reviewed the seismic qualification report and the revised structure support calculation to evaluate whether the new motor would perform consistent with the previously installed motor design. The team reviewed drawings and post-modification testing to ensure that the motor was properly installed and tested. The 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

## .2.4 Correcting of the Degraded Grid Protection Scheme for 0B565

### a. Inspection Scope

The team reviewed modification EC-738302 that was implemented to install a new under-voltage relay (27-3) across the 'A' and 'C' phases of the potential transformer secondary associated with the 'E' emergency diesel generator (EDG) 480 Vac (Volts, alternating current) motor control center 0B565 bus. The new under-voltage relay design is to detect a single-phase fault condition caused by a blown 'C' phase primary fuse in either of the 13.8 kV transformers, 0X555 or 0X556. The team evaluated whether the change was consistent with industry standards and whether it incorporated learning from related industry operating experiences.

The team assessed whether the modification was consistent with requirements in the design and licensing bases. The team reviewed the under-voltage protection scheme on the 'E' EDG and evaluated whether the addition of the new relay between the 'A' and 'C' phases degraded the current protection scheme. The team assessed whether there was adequate electrical separation between the new Class 1E relay and non-Class 1E circuit in the cabinet where this relay was installed; and whether the seismic qualification of the equipment was affected by this modification. The team reviewed the setpoint calculation to evaluate whether the correct setting was established for the new under-voltage relay. Interviews were conducted with the design engineering staff and a walkdown was conducted of affected components. The team reviewed the implementing work order to ensure that it was consistent with the modification package; and to ensure proper post-modification testing was performed. The team verified that the affected plant design documents and calculation were properly updated. The 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

### b. Findings

No findings were identified.

## .2.5 Machining of the 'E' Diesel Generator 3R Cylinder Water Inlet Flange

### a. Inspection Scope

The team reviewed modification EC-1726799, which machined the 3R cylinder flange for the jacket water inlet header on the 'E' EDG to re-establish the flange surface and replaced the original gasket with a thicker (1/8 inch) gasket. The flange surface was not square and, as a result, created a leak at the jacket water inlet to the EDG.

The team reviewed the modification to evaluate whether the design and licensing bases and performance capability of the EDG had been degraded by the modification. The team assessed Susquehanna's technical evaluations and design details, including installation specifications, to evaluate whether the EDG would function in accordance with the technical evaluation assumptions, and with design and licensing requirements. Drawings

were reviewed to evaluate whether they were properly updated. The team walked down the 'E' EDG with the system engineer to verify the modification was performed as described in the modification package. Additionally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.6 Replace Battery 0D595 with a KCR-21 Battery

a. Inspection Scope

The team reviewed EC-1719118 that modified the 'E' EDG Class 1E 125 Vdc (Volts, direct current) battery 0D595. Susquehanna determined that the original 19-plate design battery (KCR-19) was close to its qualified end of life and replaced it with a new 21-plate design (KCR-21) battery. The team noted that the other Class 1E 125 Vdc batteries at Susquehanna are KCR-21 models. The replacement battery consisted of the same number of cells (60 cells). Each cell has the same physical dimensions, but weighs 9 pounds more and has one additional positive and one additional negative plate, resulting in additional maximum current available. Susquehanna determined that changing the type of battery and increasing its capacity will not adversely affect the design function of the control power, that the battery charger size was adequate to recharge the battery to full capacity; and that the extra weight of the new battery did not adversely impact the seismic qualifications of the battery bank.

The team reviewed the modification to evaluate whether the design and licensing bases and performance capability of the 'E' EDG 125 Vdc system had been degraded by the modification. The team assessed Susquehanna's technical evaluations and design details, including installation specifications and calculations; and interviewed engineering personnel to evaluate whether the 125 Vdc system would function in accordance with the modification's assumptions and design requirements. Drawings and procedures were reviewed to verify that they were properly updated to reflect the post-modification configuration. The team also reviewed completed work orders to assess whether installation activities were performed as specified by the modification. A review of condition reports (CR) was performed to evaluate whether there were any reliability or performance issues associated with the post-modification configuration. The team walked down the battery with the system engineer to verify the modification was performed as described in the modification package. Additionally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.7 High Pressure Coolant Injection HV255F066 and Reactor Core Isolation Cooling HV249F059 Valve Re-Wiring

a. Inspection Scope

The team reviewed EC-1684748 that reconfigured the close and open control circuit configuration of the Unit 2 high pressure coolant injection (HPCI) system and reactor core isolation cooling (RCIC) system turbine exhaust to suppression pool valves (HV255F066 and HV249F059, respectively) to remove a shorting (shunting) switch contact in the valves' circuitry. This modification was implemented to address a vulnerability that had been introduced during a prior control circuit modification (EC-1323000) for both valves. This vulnerability would only occur coincident with specific postulated operator errors. Both valves are maintained in the open position for normal, safe shutdown, and postulated accident scenarios and are also required to support non-accident safe shutdown functions. Both valves also have a safety function to close and to remain closed for long-term containment isolation. The RCIC valve also has the capability of being operated from the remote shutdown panel for Appendix R considerations.

The team reviewed the modification to evaluate whether the design and licensing bases and performance capability of the HPCI and RCIC systems had been degraded by the modification. The team assessed Susquehanna's technical evaluations and design details, including installation specifications; and interviewed engineering personnel to evaluate whether the turbine exhaust to suppression pool valves would function in accordance with the modification assumptions and design requirements. Drawings were reviewed to verify whether they were properly updated to reflect the post-modification design and operation. The post-modification test results were reviewed to verify that the acceptance criteria had been met. A review of CRs was performed to evaluate whether there were any reliability or performance issues associated with the post-modification configuration. Additionally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.8 Ashcroft Model 1009 Pressure Gauge Socket Material from Carbon Steel to Stainless Steel

a. Inspection Scope

The team reviewed modification EC-1361170 that dedicated a commercial-grade pressure indicating gauge manufactured by Ashcroft. The commercial-grade dedication evaluated the use of Ashcroft pressure indicating gauge model 1009SL, replacing existing models 1320RL and 1009RL due to equipment obsolescence. The new gauge is to be used in the 'A' through 'E' EDG jacket water, turbocharger lubricating oil, fuel oil, and lubricating oil systems. The 1320RL and 1009RL model became obsolete and are no longer supplied by the vendor. The original model's socket was made of carbon steel, while the

replacement model socket is constructed from stainless steel. Susquehanna determined that the change from carbon steel to stainless steel is acceptable with respect to dynamic qualifications basis and the two materials have similar strength and weight properties. Susquehanna also determined that the pressure range, form, fit, and mounting configuration of the original and replacement gauges are similar.

The team reviewed the modification to confirm that the design and licensing bases and performance capability of the EDG systems had not been degraded by installation of the new pressure indication gauges. The team interviewed design engineers and reviewed vendor data and evaluations to evaluate whether the replacement gauge satisfied the applicable design requirements; and that the gauge's critical characteristics were properly translated into receipt acceptance criteria. The 10 CFR 50.59 screening determination associated with this modification was also reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.9 Reactor Core Isolation Cooling Pump Turbine Skid (1S212) Foundation

a. Inspection Scope

The team reviewed modification EC-1616476 that evaluated the lack of grout beneath a portion of the Unit 1 RCIC pump turbine skid (1S212). Specifically, the condition was an approximate 1 ½ inch open space between the bottom of the support chair of the RCIC turbine skid and the top of the equipment pedestal, partially exposing six anchor bolts. The basic structural function of the grout at the base of the RCIC pump turbine skid was to provide a structurally adequate and level support for the turbine in order to assure that the RCIC system will function as required and would not be adversely affected by a potential misalignment. A seismic horizontal load from the RCIC turbine puts a shear load onto the six anchor exposed bolts due to the lack of grout. As a result, a moment is placed on the shaft of the bolts, which were not designed for bending. Susquehanna re-evaluated the calculation that provided the original design justification for the RCIC pump turbine skid mounting anchors and determined that the mounting skid was not adversely affected due to the relatively low magnitude of the shear loads on the mounting bolts during design basis events.

The team reviewed the revised calculation (EC-012-2064) to verify that the design and licensing bases, and performance capability of the RCIC system had not been degraded. The team interviewed design engineers and reviewed calculations and evaluations to determine if the capability of the RCIC system met design and licensing requirements. Drawings were reviewed to verify that they were properly updated. The 10 CFR 50.59 screening determination associated with this modification was also reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.10 Remove the Overspeed Test Controller from Unit 1 and 2 High Pressure Coolant Injection System Governor Control Circuits

a. Inspection Scope

The team reviewed EC-1643755 that removed the overspeed test controllers from the Unit 1 and 2 HPCI system control circuits. This overspeed test controller has not been used at Susquehanna for several years due to prior operating experience issues, and the HPCI turbine overspeed test is accomplished via other means. Specifically, the overspeed testing is performed by procedure using a portable controller that is temporarily connected to the control circuit. This modification installed a 200 ohm resistor in place of the overspeed test controller to configure the as-left controller circuit in an electrically equivalent condition.

The team reviewed the modification to evaluate whether the design and licensing bases and performance capability of the HPCI system had been degraded by the modification. The team assessed Susquehanna's technical evaluations and design details, including installation specifications; and interviewed engineering personnel to evaluate whether the HPCI control system would function in accordance with the modification's assumptions and design requirements. Drawings and procedures were reviewed to verify whether they were properly updated to reflect the post-modification configuration. The team also reviewed completed work orders to assess whether installation activities were performed as specified by the revised design. The post-modification results were reviewed to verify that the acceptance criteria had been met. In addition, the team walked down the HPCI system to independently evaluate material conditions and configuration control with the approved design. A review of CRs was performed to evaluate whether there were any reliability or performance issues associated with the post-modification configuration. Additionally, the 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.11 BTT 1506934, Add Piping to Elevate Residual Heat Removal/Reactor Core Isolation Cooling/High Pressure Coolant Injection Steam Vents to Above Postulated Flood Level during an Induced Cooling Tower Basin Flood

a. Inspection Scope

The team reviewed modification BTT 1506934 that installed vertical extensions of the RHR/RCIC/HPCI steam vent penetrations, located on exterior of the Unit 1 and 2 reactor buildings. The steam vents provide for a pressure relief function for the rooms' blowout panels. Susquehanna determined that vertical vent extensions were necessary to prevent

adverse consequences in the event of a design basis rupture of the cooling tower basin. An elevated release point from the existing vents would ensure that water during the postulated flooding event would not enter the steam vents.

The team reviewed the modification to verify that the design and licensing bases of systems had not been degraded by installing extensions to the RHR, RCIC, and HPCI steam flood vent penetrations and to confirm that the components met the appropriate quality standards. The team also reviewed post-modification testing of the equipment to verify proper operation and interaction with the existing system controls. The team also conducted a walkdown of the affected components. The 10 CFR 50.59 screening determination associated with this modification was reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2.12 Reactor Core Isolation Cooling Pump Seal Leakage during Extended Loss of Alternating Current Power Scenario Calculation

a. Inspection Scope

The team reviewed a new calculation EC-050-1034, "RCIC Pump Seal Leakage during Extended Loss of AC Power Scenario," to assess RCIC room flooding impacts due to RCIC pump seal leakage during a postulated extended loss of power event. In the postulated scenario, RCIC would be used for reactor vessel injection since its capability closely matches inventory boil-off from decay heat. Susquehanna determined the magnitude of RCIC pump seal leakage in the event of a complete seal failure, and evaluated whether the seals would fail under the conditions that RCIC would be operated during the postulated scenario (at elevated seal temperatures).

The team reviewed the calculation to verify that the assumptions and calculation methodology adequately evaluated the postulated scenario. In particular, the team reviewed design and seal vendor documentation to evaluate maximum expected seal temperatures and the seals' ability to withstand expected configurations. The team also reviewed applicable strategies and procedures intended to provide for sufficient RCIC pump seal cooling during a postulated extended loss of power event. The team walked down the RCIC pump, seal, and associated components to identify abnormal conditions. The 10 CFR 50.59 screening determination associated with this calculation was also reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

## .2.13 Engineered Safeguard Service Water Pump Structure Heat Loss Calculation Revision

### a. Inspection Scope

The team reviewed a revision to calculation EC-028-0009, "Engineered Safeguard Service Water (ESSW) Pump Structure Heat Loss," to account for pump room doors being opened at 2 hours into a postulated event under extreme cold weather conditions. The calculation evaluated heat transfer in the pump rooms and the impact to safety-related equipment. Based upon the evaluated conditions with specific doors being opened during an extended loss of power event, the calculation determined that pumphouse room heaters would need to be re-powered within 8 hours of opening the doors.

The team reviewed the calculation to verify that the assumptions and calculation methodology adequately evaluated the postulated scenario. The team also reviewed applicable strategies and associated procedures designed to respond to the extended loss of power event. The team evaluated whether Susquehanna had the appropriate plans, equipment, and procedures in place to respond to the event. The team walked down the ESSW building and associated components to identify abnormal conditions and to assess operators' ability to complete the required actions. The 10 CFR 50.59 screening determination associated with this revised calculation was also reviewed as described in Section 1R17.1 of this report. The documents reviewed are listed in the Attachment.

### 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 10 CFR 50.59 and plant modification issues to evaluate whether Susquehanna was appropriately identifying, characterizing, and correcting problems associated with these areas, and whether the planned or completed corrective actions were appropriate. In addition, the team reviewed CRs written on issues identified during the inspection to verify adequate problem identification and incorporation of the issues into the corrective action system. The CRs reviewed are listed in the Attachment.

#### b. Findings

No findings were identified.



4OA6 Meetings, including Exit

The team presented the preliminary inspection results to Mr. Jon Franke, Site Vice President, and other members of Susquehanna staff at a meeting on September 18, 2015. The team returned proprietary information reviewed during the inspection and verified that this report does not contain proprietary information.

**ATTACHMENT SUPPLEMENTAL INFORMATION  
KEY POINTS OF CONTACT**

Licensee Personnel

M. Chaiko, Senior Staff Engineer  
E. Griffiths, Station Engineer  
J. Oswald, Design Engineer  
P. Penny, Design Engineering Supervisor  
M. Radvansky, Design Engineer  
K. Scherer, Support Engineer  
J. Smith, Nuclear Fuels Supervisor

NRC Personnel

T. Daun, Resident Inspector - Susquehanna

**ITEMS OPENED, CLOSED AND DISCUSSED**

None

**LIST OF DOCUMENTS REVIEWED**

10 CFR 50.59 Evaluations

50.59-SE-00015, Vent Effluent Radiation Monitoring System Equipment Replacement, Revision 0  
50.59-SE-00023, LDCN 5116 - Low Pressure Turbine Inspection Intervals, Revision 0  
50.59-SE-00024, Increase in SGTS Exhaust Flow Rate from Secondary Containment, Revision 0  
50.59-SE-00025, Thermal Limit Assessment for CR 1724393, Revision 0  
50.59-SE-00026, LDCN 5192 and 5196 - ICS Single Point Vulnerability and Diversity Project, Modifications EC1811065 (Unit 1) and 1811069 (Unit 2), Revision 0

10 CFR 50.59 Screened-out Evaluations

AD 01092, Emergency Diesel Fuel Injection Nozzle Removal Testing and Installation, 7/8/14  
AD 01543, 1P506B DC Control Automatic Transfer Logic Test, 8/21/14  
AD 01552, Quarterly Diesel Generator Intercooler Valve Exercising, 3/18/13  
AD 02125, GO-100(200)-012, Power Maneuvers, 2/10/14  
AD 02257, Diesel Generator A/B/C/D/E Overspeed Tests, 5/12/14  
AD 02314, OP-152(252)-001, HPCI System, 4/26/14  
SD 01432, EC 1686842, Unit 1 Spent Fuel Pool Instrumentation, 3/26/15  
SD 01441, Temp Change – RPS/EOC-RPT Trip Bypass Removed Below 26% RTP, 10/2/13  
SD 01529, RHR Shutdown Cooling, 4/10/14  
SD 01535, Evaluation of Buna-N (Nitrile) Material Potentially Lost in Reactor Vessel, 4/22/14  
SD 01561, Control Structure Chiller 0K112B Bearing Hi Temp Trip Elimination, 7/29/14  
SD 01562, RHR Service Water, 10/16/14  
SD 01604, Unauthorized Change to Setpoint Tolerance for LS02021A/B/C/D, 11/15/14  
SD 01623, Loss of RPS, 11/12/14  
SD 01627, Rapid Power Reduction, 11/14/14  
SD 01642, Unit 1 Loss of All Offsite Power, 2/24/15

## A-2

SD 01663, Diesel Generator Damper TD0827B2 Failed-Closed, 12/18/14  
SD 01691, Fuel Pool Administrative Limit Temperature Increase, 3/18/15  
SD 01716, Core Spray System (OP-151-001 and OP-251-001), 6/8/15  
SD 01723, Revision to AR-114/214-001 R28/R27 and AR-108/208-001 R23/R22, 7/2/15  
SD-01622, ON-SCRAM-101, Reactor Scram, 11/12/14

### Modification Packages

EC-028-0009, ESSW Pump Structure Heat Loss, Revision 4  
EC-050-1034, RCIC Pump Seal Leakage during Extended Loss of AC Power Scenario, Revision 0  
EC-1616476, RCIC Pump Turbine Skid (1S212) Foundation, Revision 0  
EC-1361170, Ashcroft Model 1009 Pressure Gauge Socket Material from Carbon Steel to Stainless Steel, Revision 1  
EC-1726799, Machine 'E' Diesel Generator 3R Cylinder Water Inlet Flange, Revision 0  
EC-1719118, Replace Battery 0D595 with a KCR-21 Battery, Revision 0  
EC-1684748, HPCI HV255F066 and RCIC HV249F059 Valve Re-wiring, Revision 0  
EC-1305833, Appendix R MSO #5K Unit 2 RHR F007A and F024A Valves, Revision 1  
EC-1315883, 1PM202B RHR Pump Motor Replacement, Revision 0  
EC-1473145, Replacement of Drywell Cooler Motor 1VM418A, Revision 0  
EC-738302, Correct Degraded Grid Protection Scheme for 0B565, Revision 0  
BTT 1506934, Add Piping to Elevate RHR RCIC and HPCI Steam Vent to Above Postulated Flood Level during an Induced Cooling Tower Basin Flood, Revision,  
EC 1643755, Remove the Overspeed Test Controller from Unit 1 and 2 HPCI System Governor Control Circuits, 5/3/13

### Calculations, Analysis, and Evaluations

EC-012-2064, Evaluation of Omitted Grout Pad at RCIC Pump Turbine Mounting Anchors per CR1601043, Revision 1, Revision 1  
EC-093-1064, Siemens Turbine Missile Probability Reports CT-27495 for Susquehanna Units 1 and 2, Revision 1  
EC-024-0561, Battery and Battery Sizing, EM-1, ED-1, ED-2, ED-4, Revision 8  
EC-002-0645, 125 Vdc EDG 'E' (0G501E) Battery 0D595 Short Circuit Calculation, Revision 2  
EC-024-0553, Determine the Available DC Short Circuit Current, Revision 0  
EC-002-1031, Unit 1 and Unit 2 125 Vdc Battery Load Profile for Performance Surveillance Test and Modified Performance per ITS Surveillance Test, Revision 14  
EC-SQRT-0921, Diesel Generator 'E' Building Battery Bank 0D595 Replacement of KC-19 Cells with KCR-19/KCR-21 Cells, Revision 0  
EC-024-0503, Unit 1 and 2 Diesel Generator Loading, Revision 1  
EC-SOPC-0503, Relay Setting Calculation for Residual Heat Removal Pumps, Revision 3  
EC-SOPC-0529, Relay Setting Calculation for MCC 0B565, Revision 1  
EC-SSUP-0955, Evaluate CRD Area Fan 1/2V418A Support Structure for Replacement Motor, Revision 2  
EC-PIPE-16363, Evaluation of HPCI/RCIC/RHR Steam Vent Extensions, Revision 0  
EC-RADN-1143, VERMS Mission Dose Analysis, Revision 2

Condition Report

1166205	1712561	2015-15054
1296952	1724393	2015-22449*
1313329	1726830	2015-25130*
1322840	2013-02094	2015-25150*
1380201	2014-09397	2015-25289*
1467192	2014-24287	2015-25305*
1601043	2014-27163	2015-26000*

(\* denotes NRC identified during this inspection)

Drawings

101B94C, Assembly, Overspeed Test Controller, Revision A  
A107503, Sht. 1, 250V DC Control Center 2D155, 2D165 & 2D254, IDCN 6  
A107503, Sht. 2, 250V DC Control Center 2D264, & 2D274, IDCN 11  
B199465, Sht. 4, 250V DC Motor Control Center Breaker and Overload Setpoint List, IDCN 4  
B199465, Sht. 6, 250V DC Motor Control Center Breaker and Overload Setpoint List, IDCN 5  
CR-101-14, Sht. 1, Reactor Building Foundation RCIC Turbine, Revision 2  
D107257, Sht. 6, Schematic Diagram 480V MCC 0B565 Incoming Feeder Breaker Control, Revision 8  
D107301, Sht. 33, HPCI Turbine Exhaust to Suppression Pool Valve, IDCN 5  
D107302, Sht. 58, Schematic Diagram RHR Test Line Control Valve, Revision 11  
D107302, Sht. 98, Schematic Diagram RHR Pump Minimum Flow Valve, Revision 12  
D107303, Sht. 33, RCIC Turbine Exhaust to Suppression Pool Valve HV-E51-2F059, IDCN 5  
D107363, Sht. 2, Control Structure Chilled Water System Chilled 'B' Compressor Motor, Revision 28  
D107636, Sht. 1, HVAC Control Structure Chilled Water System Chilled 'A' Comp Motor, Revision 22  
D107636, Sht. 4, Control Structure HVAC Chilled Water System Chilled Water Circulating Pumps, Revision 28  
D107636, Sht. 19, Control Structure HVAC Chilled Water System Chilled Water Circulating Pump 0P162B, Revision 9  
E-105085, Engineered Safeguard Service Water Pumphouse, Revision 8  
E107158, Sht. 77, Single Line Meter & Relay 480V MCC 0B565, Revision 21  
E107160, Sht. 11, One Line Diagram Diesel Generator E, IDCN 7  
E107172, Sht. 14, Schematic Meter & Relay Diagrams Test Facility Feeder & Transformer Feeder, Revision 5  
FF108602, Sht. 4401, Control Structure Chilled Water System Chiller 0K112A, Revision 5  
FF108602, Sht. 4402, Control Structure Chilled Water System Chiller 0K112B, IDCN 9  
FF124510, Sht. 1201, Outline Induction Motor, Revision 6  
FF61604, Sht. 28, Unit 1/2 EDG 'E' Control Schematic Starting Sequence Control, Revision 10  
FF61604, Sht. 29, Unit 1/2 EDG 'E' Control Schematic Engine Starting Sequence Control, Revision 7  
FF61604, Sht. 39A, Unit 1 and 2 DG/E Control Schematic Misc., Revision 2  
FF62000, Sht. 149, Outline KAR/KCR-7 thru 21, IDCN 1  
FF62000, Sht. 150, Discharge Characteristics Curve for 125V DC Batteries Type KCR-19 (0D595), IDCN 1

FF65108, Sht. 2, Outline KA, KC 7 thru 21 Batteries, IDCN 3  
 FF65108, Sht. 3, Rack Assembly, 2-Step-EP Cat III w/Grounding Pads on Bolt Ends 30-KC-19  
 Cells, IDCN 2  
 KSV-59-13, Inlet Water Header, Revision 4

Licensing Documents

LDCN 4933, Correct Degraded Grid Protection Scheme for 0B565, 4/17/13  
 Unit 1 and 2 Technical Specifications, Amendments 258 and 239  
 Unit 1 and 2 UFSAR, Revision, Revision 67

Procedures

DC-B5B-202, Connection of Portable Pump Truck to the RHRSW System, Revision 8  
 DC-FLEX-022, ESSW Pump-house Heating Strategy, Revision 0  
 DC-FLEX-201, Cooling Water to Unit 2 RCIC Oil Cooler Using RHRSW System and  
 Establishing RCIC Room Ventilation, Revision 0  
 MFP-QA-1220, Engineering Change Process Handbook, Revision 23  
 MT-024-007, EDG Fuel Injection Nozzle Removal Testing, and Installation, Revision 13 - 15  
 NDAP-QA-1220, Engineering Change Process, Revision 9  
 OP-152-001, HPCI System, Revision 55  
 SO-000-005, Weekly Electrical Distribution Verification, Revision 4  
 TP-152-006, HPCI Overspeed Trip Testing Using Auxiliary Steam, Revision 10

Work Orders

259837	1365587	1594209	1688259
273370	1378549	1644977	1689834
358304	1455406	1644981	1693744
397066	1455407	1660998	1693746
835261	1455408	1683422	1693769
1151618	1455409	1685246	1724412
1355620	1455409	1688227	1724914
1355623	1534583	1688228	

Miscellaneous

BWROG-TP-14-018, Beyond Design Basis RCIC Elevated Temperature Functionality  
 Assessment, Revision 0  
 C-1058, Technical Specification for Floor Response Spectra for Seismic and Hydrodynamic  
 Loads for Category I Structures, 1986  
 DRF 0000-0127-2633, Equivalency Evaluation Report, April 2011  
 E51-C002, Dynamic Qualification Records, RCIC Turbine Vol 2, August 1983  
 EQ Binder EQAR-10, Exhibit 110K, Environmental Qualification Report Supplement for  
 GE-NE-0000-0126-2828, Residual Heat Removal Motor, Revision 2  
 JDU-PIX-0010, Pressure Indicator Manufactured by Ashcroft, Revision 2  
 Letter, USNRC to Siemens Westinghouse Power Corporation, Final Safety Evaluation  
 Regarding Referencing the Siemens Technical Report No. CT-27332, Revision 2,  
 "Missile Probability Analysis for the Siemens 13.9 M2 Retrofit Design of Low-Pressure  
 Turbine by Siemens AG," 3/30/04

Memo from Mitch Newton - Field Engineering Department, Cameron to Anthony Zielinski - Susquehanna Station, 7/11/13  
OE30158, Limitorque Actuator Structural Capacity Exceeded by Hammering, 5/10/07  
PL-NF-14-001, Unit 1 Cycle 19 Core Operating Limits Report, Revision 2  
System Health Scoreboard, Unit 1 RCIC System, 2015-2Q  
System Health Scoreboard, Unit 2 RCIC System, 2015-2Q

Completed Tests

GO-100-012, Power Maneuvers, performed 4/8/14  
IC-252-001, HPCI Turbine Control System Calibration, performed 12/3/14

**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
CR	Condition Report
EDG	Emergency Diesel Generator
ESSW	Engineered Safeguard Service Water
HPCI	High Pressure Coolant Injection
IP	Inspection Procedure
MCR	Main Control Room
MOV	Motor-Operated Valve
MSO	Multiple Spurious Operation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
Vac	Volts, alternating current
Vdc	Volts, direct current