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

November 23, 2016

Mr. Timothy S. Rausch
President and Chief Nuclear Officer
Susquehanna Nuclear, LLC
769 Salem Blvd - NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION COMPONENT DESIGN BASES INSPECTION REPORT 05000387/2016007 AND 05000388/2016007

Dear Mr. Rausch:

On October 21, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Susquehanna Steam Electric Station (Susquehanna), Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on October 21, 2016, with you 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 examined the adequacy of selected components to mitigate postulated transients, initiating events, and design basis accidents. The inspection involved field walkdowns, examination of selected procedures, calculations and records, and interviews with station personnel.

This report documents one NRC-identified finding that was of very low safety significance (Green). This finding involved a violation of NRC requirements. Further, the report documents a licensee-identified violation which was determined to be of very low safety significance. The NRC is treating these violations as non-cited violations (NCV) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. 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, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Senior Resident Inspector at Susquehanna.

In accordance with 10 CFR 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 the public inspection in the NRC Public Docket Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC's Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Mel Gray, Chief
Engineering Branch 1
Division of Reactor Safety

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

Enclosure:
Inspection Report 05000387/2016007 and 05000388/2016007
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Docket No:	50-387 and 50-388
License No:	NPF-14 and NPF-22
Report No:	05000387/2016007 and 05000388/2016007
Licensee:	Susquehanna Nuclear, LLC
Facility:	Susquehanna Steam Electric Station, Unit 1 and Unit 2
Location:	Berwick, Pennsylvania
Inspection Period:	September 19, 2016 – October 21, 2016
Inspectors:	D. Kern, Senior Reactor Inspector, Team Leader Division of Reactor Safety (DRS) F. Arner, Senior Reactor Analyst, DRS J. Brand, Reactor Inspector, DRS G. Crespo, Senior Construction Inspector, DRS N. Floyd, Reactor Inspector, DRS C. Baron, NRC Mechanical Contractor S. Kobylarz, NRC Electrical Contractor
Approved By:	Mel Gray, Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY

Inspection Report Nos. 05000387/2016007 and 05000388/2016007; 9/19/16 – 10/21/16; Susquehanna Steam Electric Station (Susquehanna), Units 1 and 2; Component Design Bases Inspection.

The report covers the Component Design Bases Inspection conducted by a team of four NRC inspectors and two NRC contractors. One finding of very low safety significance (Green) was identified, which was considered to be a non-cited violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." Cross-cutting aspects associated with findings are determined using IMC 0310, "Components Within the Cross-Cutting Areas." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

NRC-Identified Findings

Cornerstone: Mitigating Systems

- Green: The team identified a Green non-cited violation of Title 10 of the *Code of Federal* Regulations (CFR), Part 50, Appendix B, Criterion III, "Design Control," for the failure to classify and maintain reactor core isolation cooling (RCIC) system components as safety-related as specified by Updated Final Safety Analysis Report Table 3.2-1 and Section 7.1.1. Specifically, although Talen, the operator of Susquehanna Steam Electric Station, classified the RCIC system as safety-related, this classification did not extend to the Unit 1 and Unit 2 RCIC barometric condenser relief valves. The team determined failure of the non-safety related barometric condenser relief valves could result in a loss of RCIC lube oil cooling and failure of RCIC to perform its design basis safety function. Talen entered the issue into the corrective action program as condition report 2016-23615 and performed an immediate operability determination, which concluded RCIC remained operable.

  The finding was more than minor because it was associated with the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated this finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2 - Mitigating System Screening Questions. The team determined the finding screened as very low safety significance (Green), because the finding was a design deficiency which did not result in an actual loss of functionality of the RCIC system. This finding was not assigned a cross-cutting aspect because the performance deficiency occurred during original plant design and did not reflect current licensee performance. (Section 1R21.2.1.1)

Other Findings

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the team. Corrective actions taken or planned by the licensee have been entered into the corrective action program. This violation and the licensee's corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R21 Component Design Bases Inspection (IP 71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components for review using information contained in the Susquehanna Probabilistic Risk Assessment (PRA) model and the U. S. Nuclear Regulatory Commission's (NRC) Standardized Plant Analysis Risk (SPAR) model for Susquehanna Steam Electric Station (Susquehanna), Units 1 and 2 operated by Talen Energy Company (Talen). Additionally, the team referenced the Plant Risk Information e-Book (PRIB) for Susquehanna in the selection of potential components for review. In general, the selection process focused on components that had a Risk Achievement Worth (RAW) factor greater than 1.3 or a Risk Reduction Worth (RRW) factor greater than 1.005. The components selected were associated with both safety-related and non-safety related systems, and included a variety of components such as pumps, fans, heat exchangers, diesel engines, batteries, motor control centers, circuit breakers, and valves.

The team initially compiled a list of components based on the risk factors previously mentioned. Additionally, the team reviewed the previous component design bases inspection (CDBI) reports and excluded components previously inspected. The team then performed a margin assessment to narrow the focus of the inspection to 17 components, 2 time-critical operator actions, and 3 operating experience (OE) items. The team selected the 416 A/B drywell coolers/fans and an automatic depressurization system valve to review for large early release frequency (LERF) implications. The team's evaluation of possible low design margin included consideration of original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition/equipment reliability issues. The assessment also included items such as failed performance test results, corrective action history, repeated maintenance, Maintenance Rule (a)(1) status, operability reviews for degraded conditions, NRC resident inspector insights, system health reports, and industry OE. Finally, consideration was also given to the uniqueness and complexity of the design and the available defense-in-depth margins.

The team performed the inspection as outlined in NRC Inspection Procedure (IP) 71111.21. This inspection effort included walkdowns of selected components; interviews with operators, system engineers, and design engineers; and reviews of associated design documents and calculations to assess the adequacy of the components to meet design basis, licensing basis, and risk-informed beyond design basis requirements. Summaries of the reviews performed for each component and OE sample are discussed in the subsequent sections of this report. Documents reviewed for this inspection are listed in the Attachment.

.2 Results of Detailed Reviews

.2.1 Results of Detailed Component and Critical Operator Action Reviews (19 samples)

.2.1.1 Unit 1, Reactor Core Isolation Cooling Injection Valve (HV-149-F013)

a. Inspection Scope

The team inspected the Unit 1 reactor core isolation cooling (RCIC) injection valve to verify the capability of the equipment to perform its safety function of opening to provide RCIC injection under design basis transient conditions and closing, when required, for containment isolation. The team reviewed applicable portions of technical specifications (TS), the updated final safety analysis report (UFSAR), and the RCIC design basis document (DBD) to identify design basis requirements. The team interviewed design, system, and component engineers to verify the safety functions of the valve and associated RCIC system. The team reviewed safety classifications of the valve, as well as, other equipment associated with the RCIC system, to verify equipment was appropriately classified. The team verified the electrical power supply of the valve to verify the equipment's capability of operating under transient and accident conditions. The team inspected motor-operated valve (MOV) thrust and weak link calculations to verify the capability of the valve to open and close under the most limiting design conditions. The team inspected the valve control logic to verify that the RCIC system would not be subjected to damaging water hammer conditions under transient conditions. The team performed in-plant walkdowns and also inspected photographs of the valve to verify the configuration and material condition of the equipment. The team reviewed a sample of RCIC system condition reports (CR), the RCIC system health report, and applicable test results to determine if there were any adverse operating trends and to ensure that station personnel adequately identified and addressed any adverse conditions.

b. Findings

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the failure to classify and maintain RCIC system components as safety-related as specified by UFSAR Table 3.2-1 and Section 7.1.1. Specifically, although the licensee classified the RCIC system as safety-related, this classification did not extend to the Unit 1 and Unit 2 RCIC barometric condenser relief valves. Failure of the non-safety related barometric condenser relief valves could result in a loss of RCIC lube oil cooling and failure of RCIC to perform its design basis safety function.

Description. Susquehanna UFSAR Table 3.2-1 and Section 7.1.1 document that RCIC is a safety-related system; specifically a Safe Shutdown system. The design bases function (UFSAR Sections 7.1.2 and 7.4.1) is to assure sufficient reactor water inventory is maintained in the reactor vessel, thus assuring continuity of core cooling when the reactor vessel is isolated and accompanied by a loss of normal coolant flow from the reactor feedwater system. UFSAR Section 3.2.2 states that quality group classifications, as defined in NRC Regulatory Guide 1.26, were determined for each component of those fluid systems relied upon to provide safe shutdown capability of the reactor and maintain it in a safe shutdown. NRC Regulatory Guide 1.26 described a method for determining acceptable quality standards for safety-related components.

Major portions of the RCIC system (i.e., turbine, pump, injection piping and valves, turbine steam supply piping and valves) were correctly specified, tested, and maintained as safety related. The team noted, however, that the RCIC barometric condenser and associated components were classified as non-safety related.

The team reviewed the function of the RCIC barometric condenser components and determined the RCIC barometric condenser relief valves (PSV105F033 for Unit 1 and PSV205F033 for Unit 2), should have been classified as safety-related. Specifically, the relief valves would be required to function to establish an alternate flow path for the RCIC lube oil cooling water exhaust if the non-safety related barometric condenser condensate pump was not available. If a relief valve failed to open, this alternate flow path for the lube oil cooling water discharge would not be available, resulting in loss of lubrication and damage to the RCIC pump and turbine. The RCIC system would therefore not be capable of performing its Safe Shutdown design bases function.

The non-safety related relief valves did not receive the same quality control as safety-related components, were not procured as safety-related, and were not subject to periodic in-service testing or preventative maintenance. The most recent relief valve preventative maintenance was completed in 1996 (Unit 1) and 1997 (Unit 2). In response to the team's concerns, the licensee performed an immediate operability determination and initiated CR 2016-23615 to resolve the issue. Based on reliable RCIC barometric condenser operation during periodic RCIC flow tests, operators determined RCIC remained operable, but degraded (non-conforming). The team concluded this determination was technically sound.

Analysis. The licensee's failure to adequately classify the RCIC barometric condenser relief valves as safety-related based on their supporting safety function, in accordance with RG 1.26 as specified by UFSAR Table 3.2-1 and Sections 3.2.2 and 7.1.1 was a performance deficiency. The performance deficiency was more than minor because it was associated with the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the inadequate classification of the relief valves affected the reliability of safety-related function of the RCIC system. The team evaluated this finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2 - Mitigating System Screening Questions. The team determined the finding to be of very low safety significance (Green), because the finding was a deficiency affecting the design or qualification of a mitigating SSC, and the SSC maintained its operability or functionality. This finding was not assigned a cross-cutting aspect because the performance deficiency occurred during original plant design and did not reflect current licensee performance.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis, are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components. The Susquehanna UFSAR Table 3.2-1 and Section 7.1.1 stated that the RCIC system was safety related.

As of October 21, 2016, the licensee had not established adequate design control measures to assure appropriate quality standards were specified and included in design documents, and to ensure suitability of application of materials essential to the safety-related function of the Unit 1 and Unit 2 RCIC barometric condenser relief valves. Specifically, the licensee did not classify the barometric condenser relief valves as safety-related and consequently the valves were not procured, tested, or maintained to the standards required for safety-related components. Operators determined RCIC was operable based on its successful quarterly surveillance tests. In addition, the RCIC drain pumps are powered from a safety-related battery system so the pumps would have reasonable assurance of operating in an event including a postulated loss of offsite power. The relief valves were purchased as ASME Section VIII. The valves were last tested in 1996 (Unit 1) and 1997 (Unit 2). Because this violation is of very low safety significance (Green) and was entered into the licensee's corrective action program as CR 2016-23615, this violation is being treated as a NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 50-387 (388) 2016-07-01, Failure to Specify and Maintain Safety-Related Quality Standards and Materials Essential for Reactor Core Isolation Cooling)**

.2.1.2 'C' Emergency Diesel Generator (Mechanical Review) (0G-501C)

a. Inspection Scope

The team inspected the 'C' emergency diesel generator (EDG) and its associated subsystems including the fuel oil, lube oil, starting air, intake and exhaust, jacket water cooling systems and ventilation room to ensure they could perform their respective design basis function in response to transient and accident events, including a loss of offsite power (LOOP). The team reviewed the UFSAR, TSs, design basis calculations, vendor documents, and procedures to identify the design basis, maintenance, and operational requirements for the engine and its support systems. The team reviewed the design specification for the starting air system, as well as air start test results, the normal operating pressure band, air compressor actuation setpoint and the technical specification (TS) limit for operability to verify that the starting air system was properly sized and could meet its design function for successive starts. The team reviewed EDG surveillance test results, operating procedures and maintenance work packages to determine the overall health of the EDG engine and its mechanical support systems.

The team performed several field walkdowns of the 'C' EDG to independently assess the material condition and the operating environment of the EDG and associated electrical equipment. During the walkdowns, the team compared local and remote EDG control switch positions, breaker position indicating lights, and system alignments to design and licensing basis assumptions to verify configuration control adequacy. The team interviewed system engineers and operators to evaluate past performance and operation of the EDGs. The team reviewed system health reports and corrective action documents to determine if there was any adverse equipment operating trends and to ensure problems were properly identified and corrected.

b. Findings

No findings were identified.

.2.1.3 Unit 1, 416 A/B Drywell Coolers/Fans (1V-416A/B)

a. Inspection Scope

The team inspected the Unit 1 drywell coolers and fans to verify the capability of the equipment to perform its safety function of circulating air in the drywell under post-accident conditions. The team reviewed system health reports and corrective action documents to determine if there were any adverse equipment operating trends and to ensure problems were properly identified. The team interviewed design and system engineers and reviewed past fan failures to verify the adverse condition had been corrected. The team reviewed safety and seismic classifications of fans to verify the equipment were appropriately classified. The team reviewed surveillance test results and verified the electrical power supply and control logic of the non-safety related and safety related fans to verify the equipment's capability of starting and operating under accident conditions. The team also reviewed system drawings and operating procedures, and performed a walkdown of associated control room instrumentation to assess configuration control.

b. Findings

No findings were identified.

.2.1.4 Unit 1, 'A' Control Structure Chiller (0K-112A)

a. Inspection Scope

The team inspected the 'A' control structure chiller (0K-112A), which is common to both Susquehanna Units 1 and 2, to verify that it was capable of performing its design basis function. The control structure chiller is a refrigerant-based heat exchanger that provides chilled water to various cooling coils in the control room, control structure, computer room, and also the Unit 1 emergency switchgear room cooler under all plant conditions. This chilled water aids these building and room coolers to maintain the air temperature below design limits in order to ensure reliable operation of the safety-related equipment located in these areas. The team reviewed applicable portions of Susquehanna's TSs, the UFSAR, and the control structure heating ventilation and cooling DBD to identify design basis requirements for 0K-112A.

The team reviewed the chiller design calculations and drawings to evaluate the ability of the chiller to provide adequate cooling to the various building and room coolers that it supported. The team reviewed the inspection and testing results, which included eddy current testing of the chiller tube bundle and visual inspection of the tubes and end bells, to verify that cleanliness and tube structural integrity were being maintained. The team also reviewed the results of completed chiller thermal performance tests and emergency service water (ESW) flow balancing to verify that the chiller was capable of removing the design basis heat load. Additionally, the team reviewed preventative maintenance and monitoring of the chiller and its subcomponents to verify that plant staff were adequately maintaining the chiller in an appropriate condition to perform its design function. The team reviewed procedures to verify that the actions specified during a failure of the chiller system could be performed and were in agreement with the control structure and room heat up calculations. The team also reviewed the breaker relay rating and setpoint calculation to verify that the chiller would remain functional during start-up, operation, and abnormal operational events.

The team interviewed engineers regarding the maintenance and operation of the system and reviewed a sample of associated CRs, system health reports, and technical evaluations to determine if there were any adverse operating trends and to ensure that Talen adequately identified and corrected any adverse conditions. The team performed walkdowns of the accessible portions of the chiller, the chiller subcomponents, and associated piping the control structure building to assess the material condition, operating environment, and configuration control.

b. Findings

No findings were identified.

.2.1.5 Unit 1, 'A' Emergency Switchgear Room Cooler/Fan (1E-257A and 1V-222A)

a. Inspection Scope

The team inspected the 'A' emergency switchgear room cooler (1E-257A) and associated fan (1V-222A) to verify that they were capable of performing their design function. Specifically, the cooler and fan maintain the temperature in the 4 kV emergency switchgear and load center rooms during normal and emergency plant operation in order to ensure reliable operation of the safety-related equipment located in these rooms. The team reviewed applicable portions of Susquehanna's TSs, the UFSAR, and the reactor building heating ventilation and cooling DBD to identify design basis requirements for 1E-257A and 1V-222A.

The team reviewed design calculations and drawings to evaluate the ability of the equipment to provide adequate cooling to the safety-related switchgear and load centers. The team reviewed inspection, testing, and calibration procedures and work orders to verify appropriate preventive maintenance was performed. The team also reviewed past test results of the fan flow rate and trend of cooler coil performance to verify that the unit was capable of removing the required design heat load. Additionally, the team reviewed procedures and completed tests to verify that both automatic and manual actions specified during a failure of the system could be performed and were in agreement with the various room heat up calculations. The team interviewed engineers regarding the maintenance and operation of the system and reviewed a sample of associated CRs, system health reports, and technical evaluations to determine if there were any adverse operating trends and to ensure that Talen adequately identified and corrected any adverse conditions. The team also performed walkdowns of the accessible portions of the emergency switchgear room cooler, fan, and exhaust/intake ductwork in the reactor building to assess the material condition, operating environment, and configuration control.

b. Findings

No findings were identified.

.2.1.6 Unit 1, 'G' Automatic Depressurization And Safety/Relief Valve (PSV-141-F013G)

a. Inspection Scope

The team inspected the Unit 1, automatic depressurization system/safety relief valve (ADS/SRV) PSV-141-F013G to verify that it was capable of meeting the design basis function. The team reviewed the UFSAR, drawings, procedures, the vendor manual, and environmental qualification design requirements to identify the design basis requirements of the valve. Design calculations and system operating parameters were reviewed to verify that the design basis had been appropriately translated into specifications and procedures. The team reviewed test procedures to verify that acceptance criteria for the tested parameters were appropriately supported by calculations and to ensure the design and licensing bases were satisfied.

The team interviewed the valve program engineer and the ADS/SRV system engineer to review maintenance issues and assess the overall reliability of the valve and associated safety components. Because the valve was inaccessible during the inspection period, the team reviewed photographs of the valve to assess the general material condition of the valve and to verify the installed valve configuration was consistent with design basis assumptions and plant drawings. Finally, corrective action documents, preventive maintenance documents, and system health reports were reviewed to verify that deficiencies were appropriately identified and resolved, and to assess the overall performance of the ADS/SRVs. The team performed a visual examination of all accessible ADS control cabinets and control switches in the main control room, the alternate shutdown panel, and the emergency switch gear room to assess material condition, the operating environment, and configuration control.

b. Findings

No findings were identified.

.2.1.7 Unit 2, Main Turbine Bypass Valve #4 (XV-201-40D)

a. Inspection Scope

The team inspected the Unit 2 main turbine bypass valve #4 to verify the capability of the equipment to perform its required function of opening under transient conditions. The team interviewed design and system engineers to discuss the operating history and preventive maintenance of the valve and associated equipment, including hydraulic oil, to verify reliable equipment operation. The team also inspected operating and test procedures associated with the valve to verify operation in accordance with the system design. The team reviewed vendor documentation and work orders to verify appropriate preventive maintenance and testing were performed. The team also reviewed a sample of associated CRs, system health reports, and technical evaluations to determine if there were any adverse operating trends and to ensure that Talen adequately identified and corrected adverse conditions. The team reviewed system drawings and operating procedures, and performed walkdowns of associated control room instrumentation to verify configuration was properly controlled.

b. Findings

No findings were identified.

.2.1.8 Unit 2, High Pressure Coolant Injection Pump And Turbine (2P-204 and 2S-211)

a. Inspection Scope

The team inspected the Unit 2 high pressure coolant injection (HPCI) pump and turbine to verify the capability of the equipment to perform its safety function of providing HPCI injection flow under design basis transient and accident. The team interviewed design, system, and component engineers and performed walkdowns to verify the material condition, operating environment, and configuration of the pump, turbine, and associated equipment. The team verified the periodic test procedures and recent test results associated with the pump and turbine to verify the equipment's capability to perform as required under the most limiting conditions. The team reviewed HPCI system calculations to verify the capability of the pump to provide the required flow under the design bases conditions.

The team inspected the valve control logic to verify that the HPCI system would not be subjected to damaging pressure transients (i.e., water hammer) and verified the periodic testing of system valve interlocks. The team evaluated the capability of the pump and turbine to start and deliver flow within the required time during periodic operation of the HPCI auxiliary oil pump. The team also evaluated potential overpressure of HPCI pump discharge piping as a result of postulated turbine overspeed conditions. Finally, the team reviewed system health reports and corrective action documents to determine if there were adverse equipment operating trends and to ensure problems were properly identified and corrected.

b. Findings

No findings were identified.

.2.1.9 Unit 2, High Pressure Core Injection Valve (HV-255-F006)

a. Inspection Scope

The team inspected the Unit 2, HPCI injection valve, HV-255-F006, to verify that the valve was capable of performing its safety function. The team reviewed the UFSAR, drawings, and procedures to identify the design basis requirements of the valve. Design calculations and system operating parameters were reviewed to verify that the design basis had been appropriately translated into specifications and procedures. The team reviewed test procedures to verify that acceptance criteria for the tested parameters were appropriately supported by calculations to ensure the design and licensing bases were satisfied. The team verified that the thermal overload bypass circuitry was appropriately tested to ensure MOV operation during a design basis event.

The team interviewed the MOV program engineer and the HPCI system engineer to review maintenance issues and assess overall reliability of the valve and the associated motor operator. Because the valve was inaccessible during the inspection period, the team reviewed photographs of the valve to assess the material condition of the valve and to verify the installed valve configuration was consistent with design basis assumptions and plant drawings. Finally, corrective action documents, preventive maintenance, and system health reports were reviewed to verify that deficiencies were appropriately identified and resolved.

b. Findings

No findings were identified.

.2.1.10 Unit 2, 'A' Residual Heat Removal Pump (2P-202A)

a. Inspection Scope

The team inspected the Unit 2 'A' residual heat removal (RHR) pump to verify that it was capable of meeting its design basis requirements. The team reviewed applicable portions of the UFSAR, TS, RHR system DBD, and drawings to identify the design basis requirements for the pump. The team reviewed calculations and surveillance test procedures to verify that the pump was capable of achieving design basis head/flow requirements during limiting design basis conditions, including postulated variations in emergency diesel generator frequency and voltage. The team also verified test acceptance criteria were consistent with these requirements.

The team interviewed design, system, and component engineers and performed walkdowns to verify the configuration and material condition of the pump and associated equipment, and to verify the equipment's protection from internal flooding and seismic interactions. The team also verified the capability of the RHR pump to provide injection flow in the event of an accident while the RHR was in shutdown cooling operation. In addition, the team reviewed a sample of CRs, work orders, and corrective action documents to identify failures or nonconforming issues, and to determine if deficiencies were being appropriately identified, evaluated, and corrected.

b. Findings

No findings were identified.

.2.1.11 Unit 1, 'A' Residual Heat Removal Heat Exchanger Service Water Inlet Valve (HV-112-10A)

a. Inspection Scope

The team inspected the 'A' RHR heat exchanger service water inlet valve (HV-112-10A) to verify that it was capable of performing its design function. The team reviewed applicable portions of Susquehanna's TSs, the UFSAR, and the RHR system DBD to identify design basis requirements for HV-112-10A. The normally closed inlet valve has a safety function in the open position to provide cooling water to the RHR heat exchanger in support of RHR System operation during normal plant operation, transients, and following any credible accident, including the design basis loss of coolant accident (LOCA).

The team reviewed design calculations, including the seismic and weak link analysis, valve specifications, and the operating history to verify that the valve met its design basis requirements. The team reviewed a sample of surveillance test results and a trend of in-service test (IST) data to verify that valve performance met the acceptance criteria and that the criteria were consistent with the design basis. The team also reviewed the thermal overload relay sizing calculation and completed relay trip tests to verify that the valve functionality would not be adversely affected. The team interviewed the system engineer and reviewed MOV diagnostic test results and trending to assess valve performance capability, design margin, and overall reliability.

The team reviewed a sample of related CRs, technical evaluations, the RHR system health report, preventive maintenance records, and applicable test results to determine if there were any adverse operating trends and to ensure that Talen adequately identified and corrected adverse conditions. The team also performed a walkdown of the valve, adjacent areas, and accessible portions of the connected system piping to assess the material condition, operating environment, and configuration control.

b. Findings

No findings were identified.

.2.1.12 Operator Action to Open Emergency Safeguards Service Water Pump House Doors for Residual Heat Removal Service Water Ventilation

a. Inspection Scope

The team reviewed manual operator actions to block open the emergency safeguards service water (ESSW) pump house doors and exhaust dampers in the event the pump room temperature becomes elevated due to ventilation fan failure. The ESSW pump house heating and ventilation system is designed to maintain a suitable environment for the ESW and residual heat removal service water pumps and their associated accessories. The team reviewed the associated operating procedures and loss of ventilation calculation to verify that selected operator actions could be accomplished.

The team interviewed licensed operators, reviewed associated alarm response procedures, and observed a licensed operator simulate performance of selected operating procedures to independently assess the likelihood of cognitive or execution errors. The team evaluated the available time margins to perform the actions and verified the validity of procedure assumptions. The team also performed walkdowns of the pump house and required ventilation paths to ensure components were accessible and available to complete the necessary actions. Finally, the team reviewed corrective action documents and system health reports to evaluate whether there were any related adverse operating trends and to assess Talen’s ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.13 Operator Action to Cross-Tie Refueling Water Storage Tank to Condensate Storage Tank with Transfer Pumps

a. Inspection Scope

The team evaluated the manual operator actions to transfer water from the refueling water storage tank (RWST) to the condensate storage tank (CST) using the cross-tie piping and valves and the associated transfer pumps. The team interviewed licensed and non-licensed operators, reviewed associated operating procedures and operator training, and observed an in-field operator perform a simulated RWST cross-tie to the CST per station procedure OP-037-003, Transferring Inventory from Refueling Water Storage Tank to CST A (B) or CST A (B) to RWST Using Intertie, Revision 30, to evaluate the operators' ability to perform the required actions.

In addition, the team walked down the RWST and CST and associated piping, pipe supports, and valves associated with the transfer to assess the material condition of the components and the likelihood of cognitive or execution errors. The team evaluated the available time margins to perform the actions to verify the reasonableness of the operating procedures and risk assumptions.

b. Findings

No findings were identified.

.2.1.14 'C' Emergency Diesel Generator (Electrical Review) (0G-501C)

a. Inspection Scope

The team inspected the adequacy of voltage at selected diesel starting and generator operating control components (generator field, field flash controls, starting air solenoids, and generator breaker closure circuit) for LOOP, LOCA/LOOP, and for recovery from station blackout (SBO) conditions. The team reviewed a modification for the starting air solenoid for the adequacy and implementation of design basis requirements. The team reviewed the preventive maintenance (PM) template and the PMs performed on the above components for adequacy, issues identified, and the effectiveness of corrective actions. The team reviewed the corrective maintenance and CR history on the above components to identify recurring issues affecting reliability and to evaluate whether plant staff adequately identified and corrected any adverse conditions. The team also inspected the diesel loading and load margin analyses and the EDG operating procedures to verify whether load limitations were adequately addressed. The team reviewed EDG surveillance test results, especially periodic load testing, endurance testing, and LOCA/LOOP load testing for conformance with Technical Specifications. The team inspected the EDG during a walkdown to assess material condition, verify equipment configuration, and to identify conditions that could affect the reliable operation of the generator operating and diesel starting control components.

b. Findings

No findings were identified.

.2.1.15 Unit 1, Automatic Depressurization System (ADS) Permissive Logic Circuit

a. Inspection Scope

The team inspected the calibration test results for the controls for ADS valve solenoids (level, pressure, pump status, timer) for adequacy, issues identified, and corrective actions. The team reviewed a modification for the ADS solenoid valve circuit for adequacy and implementation of design basis requirements. The team reviewed surveillance test results on the ADS controls for conformance with technical specifications. The team reviewed the PM template for the ADS solenoids and the PMs performed for adequacy, issues identified, and the effectiveness of corrective actions. The team reviewed the corrective maintenance and CR history for the ADS solenoids and control components to identify recurring issues affecting reliability and to evaluate whether plant staff adequately identified and corrected adverse conditions. The team reviewed ADS solenoid molded case circuit breaker (MCCB) preventive maintenance to assure reliable containment penetration conductor overcurrent protection.

b. Findings

No findings were identified.

.2.1.16 Unit 2, 'A' Recirculation Pump Trip Breakers 3A and 3B (2A-20501 and 2A-20502)

a. Inspection Scope

The team inspected the adequacy of the trip breaker rating for design basis load conditions. The team also inspected the adequacy of breaker overcurrent trip relay settings for the adequacy of penetration conductor protection. The breaker overcurrent relay calibration test results were reviewed for adequacy, issues identified, and corrective actions. The team reviewed a modification that replaced the trip breakers for adequacy and implementation of design basis requirements. The team reviewed the PM template for the breakers, PMs performed, and the calibration test results for the overcurrent relays to assess maintenance adequacy, issues identified, and corrective actions. The team performed an in-plant walkdown of trip breakers 3A and 4A to assess the observable material condition, operating environment, and configuration control and to identify conditions that could affect the reliable operation of the breakers. The team reviewed the corrective maintenance and CR history on the above components for recurring issues affecting reliability and to evaluate whether problems were properly identified, characterized, and corrected.

b. Findings

No findings were identified.

.2.1.17 Unit 2, 'A' 4kV Emergency Safety System Electrical Bus (2A-202)

a. Inspection Scope

The team reviewed design specifications, one-line diagrams, calculations, design basis descriptions, the UFSAR, vendor manuals, drawings, and the loading requirements to evaluate the capability of the 4 kilovolt (kV) bus to supply the design bases voltage and current requirements to one train of emergency safety system (ESS) loads. The team reviewed calculations of short circuit, voltage drop, and bus and feeder protective relay trip settings to verify the bus ratings were not exceeded and the bus and feeder relays were appropriately coordinated for normal and sequenced accident loading conditions. Specifically, the team evaluated whether the bus was capable of transferring supplied power to downstream loads during a design bases accident. The team also reviewed switchgear protective device settings and breaker ratings to ensure that selective coordination was adequate for the protection of connected equipment during short-circuit conditions.

The team reviewed the results of completed 4160 VAC Bus 2A-202 preventive maintenance to verify the test results were within acceptable limits. The loss of voltage and degraded voltage relay settings were also reviewed to verify they satisfied the requirements of TS 3.8.1. The team performed walkdowns of the 4KV ESS Bus 2A-202 to verify equipment alignment was consistent with design drawings and to assess observable material conditions and potential vulnerability to hazards. The team reviewed equipment room operating temperatures to confirm equipment capabilities to operate reliably within ambient conditions present in the space.

The team reviewed high impedance grounding features of this power distribution system to verify available ground fault alarm indications and the arrangement of the feeder transformer windings (delta-wye) to rule out any possibility of higher voltage scenarios that may affect loads connected to this distribution bus. Finally, the team reviewed corrective action documents and system health reports to evaluate whether there were adverse operating trends and to assess Talen's ability to identify, evaluate, and correct problems.

b. Findings

No findings were identified.

.2.1.18 Unit 2, 'B' 125 Volt Battery (2D-620)

a. Inspection Scope

The team inspected 125VDC station battery 2D620, feeding into Unit 2 Load Center 2D622 and emergency safety system distribution panels (2D624 and 2D625) to evaluate whether it was capable of meeting its design basis requirements. The team reviewed vendor manuals, surveillance documentation, one-line diagrams, calculations, component manuals, maintenance procedures, testing reports and procedures, and design basis documents. The team reviewed calculations and drawings including voltage drop calculations, short circuit analyses, and load study profiles to evaluate the adequacy and appropriateness of testing procedures and design assumptions. The team also reviewed the direct current (DC) overcurrent protective coordination studies to evaluate whether there was adequate protection for postulated faults in the DC system. Additionally, the team reviewed maintenance procedures and schedules for the 125Vdc panel and associated circuit breakers to determine whether the equipment was being maintained in accordance with vendor recommendations. The team interviewed system and design engineers and walked down the 125Vdc distribution panels to independently assess its material condition and to determine whether the system alignment and operating environment was consistent with design basis assumptions. Finally, the team reviewed corrective action documents and system health reports to determine whether there were adverse operating trends and to assess Talen's ability to identify, evaluate, and correct problems.

b. Findings

No findings were identified.

.2.1.19 Unit 2, 'D' 125 Volt Battery Charger (2D-623)

a. Inspection Scope

The team inspected the battery charger to verify its sizing would satisfy the requirements of the risk significant DC loads and that the minimum voltage was taken into account. Specifically, the evaluation focused on verifying that the battery charger was adequate to supply the design duty cycle of the 125 VDC system for the LOCA/LOOP and SBO loading scenarios, and that adequate voltage would remain available for the individual load devices required to operate during a four-hour SBO coping duration. The team reviewed vendor manuals, surveillance documentation, one-line diagrams, calculations, component manuals, maintenance procedures, capacitor replacement procedures, testing reports and procedures, and design basis documents.

The team also reviewed short circuit fault duty, verified breaker trip setting calculations, and verified protection coordination. In addition, a walkdown was performed to visually inspect the physical condition of the battery and battery chargers, verify the charger was properly aligned, and verify the charger panel indicated acceptable voltage and current. The team reviewed the maintenance history, including capacitor replacement, to verify applicable industry operating experience had been incorporated into the battery charger maintenance program. The team interviewed design and system engineers to determine design aspects and operating history for the battery charger. The team reviewed battery charger surveillance test results to verify that applicable test acceptance criteria and test frequency requirements specified for the battery were met. Finally, the team reviewed corrective action documents and system health reports to determine whether there were any adverse operating trends and to assess Talen's ability to identify, evaluate, and correct problems.

b. Findings

No findings were identified.

.2.2 Review of Industry Operating Experience (OE) and Generic Issues (3 samples)

The team reviewed selected OE issues for applicability at Susquehanna. The team performed a detailed review of the OE issues listed below to verify Talen staff had appropriately assessed potential applicability to site equipment and initiated corrective actions when necessary.

.2.2.1 NRC Information Notice (IN) 2010-23, Malfunctions of Emergency Diesel Generator Speed Switch Circuits

a. Inspection Scope

The team assessed Talen's applicability review and the disposition of corrective actions identified during the OE review performed for NRC Information Notice (IN) 2010-23. The NRC issued this generic communication to inform licensees about OE involving conditions that caused malfunctions of diesel speed switch circuits, due to electrical noise on the DC power supply to the speed switch, which rendered EDGs inoperable. The team assessed Talen's evaluation of the IN to confirm that an adequate review and assessment of the issue was performed. The team interviewed electrical design and system engineering personnel responsible for the implementation of preventive maintenance for power supplies that could cause electrical noise on the speed switch circuits to evaluate and confirm the effectiveness of corrective actions.

b. Findings

No findings were identified.

.2.2.2 NRC Information Notice 2013-17, Significant Plant Transient Induced by Safety-Related Direct Current Bus Maintenance at Power

a. Inspection Scope

The team assessed Talen's applicability review and disposition of NRC Information Notice 2013-17 to evaluate whether Talen's review adequately addressed the industry operating experiences discussed in the information notice. Specifically, the team reviewed Talen's evaluation to ensure the review addressed proper overcurrent device coordination under short-circuit conditions, proper precautions during live bus maintenance, and adequate evaluation of the risks associated with this type of work for plant safety. Additionally, the team reviewed maintenance program procedures and interviewed plant staff regarding controls for energized bus maintenance to evaluate and confirm the effectiveness of corrective actions.

b. Findings

No findings were identified.

.2.2.3 NRC Information Notice 2012-16, Preconditioning of Pressure Switches Before Surveillance Testing

a. Inspection Scope

The team assessed Talen's applicability review and disposition of NRC IN 2012-16. This generic communication discussed nuclear industry issues involving technical specification-required surveillance testing using procedures that unacceptably preconditioned pressure switches associated with various safety related functions. The team reviewed CR-1616182 which evaluated Susquehanna's applicability to this condition, the UFSAR, the TSs, and the associated instrument calibration sheets for selected pressure switches that were identified by Talen staff as potentially affected by this IN. The team performed field walkdowns to assess the condition of the selected instruments and associated tubing. The team verified that Talen had appropriately evaluated the operational experience, performed engineering evaluations, and implemented corrective actions including procedural changes to ensure that no unacceptable preconditioning of pressure switches occurred.

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 problems that Talen had previously identified and entered into the corrective action program (CAP). The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, the team reviewed CRs written on issues identified during the inspection to verify adequate problem identification and incorporation of the problem into the CAP.

The specific corrective action documents that the team sampled and reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, including Exit

On October 21, 2016, the team presented the inspection results to Mr.Timothy Rausch, President and Chief Nuclear Officer, and other members of the Susquehanna staff. The team verified that no proprietary information was retained by the team or documented in the report.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by Talen personnel and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a non-cited violation.

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires measures to be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to 10 CFR 50, Appendix B, Criterion XVI, station personnel did not promptly correct a condition adverse to quality. Specifically, from August 1, 2013 to February 26, 2016, Talen did not implement corrective actions to establish a PM program for molded case circuit breakers (MCCBs) found in distribution control panels that protect containment penetration conductors. The need for a MCCB PM program was originally identified during the 2013 NRC CDBI and documented as NCV 05000387 (05000388)/2013010-01, Failure to Verify Operation of Safety-Related 125Vdc Molded Case Circuit Breakers (CR 1732454).

Talen identified this untimely implementation of corrective action during a self-assessment in preparation for the 2016 NRC CDBI. Plant staff entered the issue into the corrective action program (CRs 2016-04833; 23373; 23971 and 24015) and established a MCCB PM program. The team evaluated this finding using IMC 0609.04, "Initial Characterization of Findings," and IMC 0609, Appendix A, Exhibit 3, "Barrier Integrity Screening Questions." The team determined that the finding was of very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment (valves, airlocks, etc.), containment isolation system (logic and instrumentation), and heat removal components, and did not involve an actual reduction in function of hydrogen igniters in the reactor containment.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Susquehanna Personnel
T. Rausch, Chief Nuclear Officer
R. Franssen, Plant General Manager
D. Ambrose, Manager, Design Engineering
K. Anderson, Senior Design Engineer
C. Angione, Senior Design Engineer
D. Bockstanz, Senior Engineer
A. Corrado, Senior Electrical Engineer
M. Eckert, System Engineer
N. Giusto, System Engineer
J. Hartzell, PRA Engineer
N. Hyduk, Motor Operated Valve Program Engineer
J. Jennings, Manager, Nuclear Regulatory Assurance
D. Kostelnik, Manager, Mechanical Design Engineering
M. Krick, Senior Licensing Engineer
G. Lubinsky, Manager, Electrical Design Engineering
J. McDonald, System Engineer
J. Oswald, Electrical Engineer
D. Przyjemski, Component Engineer
B. Reppa General Manager, Engineering
A. Schrad, Senior Electrical Engineer
R. Vazquies, Senior Design Engineer
R. Weitzel, Design Engineer
R. Williams, System Engineer
M. Yackoski, Senior Engineer

NRC personnel:
T. Daun, Resident Inspector
A. Foli, NRC Susquehanna Project Manager
J. Grieves, Senior Resident Inspector
C. Hobbs, Reactor Engineer

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Open and Closed

NCV 05000387(388)/2016-07-01	NCV	Failure to Specify and Maintain Safety-Related Quality Standards and Materials Essential for Reactor Core Isolation Cooling (Section 1R21.2.1.1)

LIST OF DOCUMENTS REVIEWED

Audits and Self-Assessments
DI-2015-01256, 2016 NRC Component Design Bases Inspection Focused Area Self-Assessment, dated 3/04/16

Calculations

EC-002-0501, 125 VDC System 2D630 Master Battery Calculation, Revision 25
EC-002-0504, 125 VDC System 2D620 Master Battery Calculation, Revision 38
EC-002-0505, 125 VDC System 2D640 Master Battery Calculation, Revision 23
EC-002-0508, 125 VDC Utilization Voltage and Load Profile Calculation for Circuits 2D634-31, Revision 9
EC-002-0588, 125 VDC Utilization Voltage and Load Profile for Ckt 1D63437, Revision 0
EC-002-0638, 125 VDC Utilization Voltage and Load Profile Calculation for Circuits 1D634-05 and 2D634-05, Revision 4
EC-002-1031, Unit 1 and Unit 2 125VDC Battery Load Profile for Performance Surveillance Test and Modified Performance per ITS Surveillance Test, Revision 14
EC-004-0007, Control Circuit Voltage Drop, Revision 0
EC-004-0221-1, Plant AC Short Circuit Analysis, Revision 0
EC-004-0501, Attachment 7 – Breaker Coordination Data 125 VDC Panels, Revision 0
EC-004-0501, Attachment 7A – Breaker Coordination Plots 125 VDC Panels, Revision 0
EC-004-0503, Degraded Grid Scheme Tolerance Calculation, EC1, Revision 0
EC-004-0521, Over Current Protection for 4 KV Penetrations ECI-ESS Buses, Cables, etc., Revision 0
EC-004-0537, Design Basis for 4.16 KV Degraded Grid Protection, Revision 1
EC-004-1031, Plant AC Load flow Analysis, Revision 4
EC-004-1033, Degraded Grid Relay Setpoint, Revision 1
EC-004-1036, Plant AC Short Circuit Analysis, Revision 0
EC-013-0561, Appendix R - HVAC Study, Revision 11
EC-013-1860, Handling of Transient Combustibles in the Wraparound Zones and Restricted Areas (Red Zones), Revision 5
EC-016-1027, Required Operating Torque and Weak Link Analysis HV11210A, Revision 0
EC-024-008, Design Temperature of Air Starting Skid Piping-DG, Revision 0
EC-024-0503, Diesel Generator Load Calculation, Revision 27
EC-024-0506, Air Start Receiver Pressurization Time, Revision 0
EC-024-0556, Design ESW Flow Rate Requirements to the Diesel Generator A-E Heat Exchanger, Revision 5
EC-024-0629, SSES FSAR 8.3 Diesel Generator Loading Tables Update, Revision 17
EC-024-1004, Required Diesel Generator Lube Oil Volume for Technical Specifications, Revision 0
EC-028-0505, Diesel Generator Building Heating and Ventilation System, Revision 0
EC-028-0551, ESSW Pump House Temperature Transients Caused by Ventilation Fan Failure, Revision 2
EC-030-0506, Generate Performance Curves for the Control Structure Chillers, Revision 0
EC-030-1012, Additional Control Structure Post-LOCA Heat Load for SE-030-014AandB, Revision 0
EC-034-0551, Secondary Containment Thermal Response to an Appendix R Fire, Revision 5
EC-049-0001, Pressure Drop in RHR System, Revision 10
EC-050-1010, Max Thrust and Seismic Analysis HV149F013, Revision 2
EC-052-0002, HPCI Pressure Drop Calculations, Revision 3
EC-052-0522, Maximum HPCI Pump Discharge Pressure, Revision 1
EC-052-1061, Establish Tube Plugging Limits for HPCI Lube Oil Cooler, Revision 0
EC-059-1036, Basis for ECCS and RCIC FSAR NPSHA Calculations, Revision 6
EC-060-0523, Power Uprate Impact on Drywell Cooling, Revision 3
EC-088-0504, 250V DC Class 1E Breaker and Overload Calculation, Revision 14
EC-Flood-001, Internal Flooding Evaluations for Moderate Energy Pipe Cracks and Sprinkler System Actuation, Revision 3

EC-PIPE-1032, PSTR, PSUP, MELB Moderate Energy Pipe Crack Evaluation, Revision 4
EC-PUPC-20309, EPU Task Report T0309 – RCIC System, Revision 0
EC-PUPC-20900, EPU Task Report T0900 – Transient Analysis, Revision 0
EC-SOPC-0510, Design Base Calculation – General Setting Criteria for Electrical Protective Devices, Revision 1
EC-SOPC-0514, Relay Setting for TR101 Circuit Breaker Degraded Grid Protection at Buses 1A, 1D, 2A + 2D, 1A, 1D, 2A + 2D; 1B, 1C, 2B + 2C, Revision 0
EC-SOPC-0520, Relay Setting Calculation for Electrical Protective Devices Criteria for the Protection of 13.8kV, 4.16kV, and 480V 3 phase, Revision 0
EC-SOPC-0580, Relay Setting Calculation for Batter Charger 2D663 CB at LC 2D662 and Battery Charger 2D653B and 2D653A CBS at LC 2D652, Revision 0
EC-SOPC-0598, Relay Setting Calculation for Diesel Gen A (B, C, D, E) V Restr. TOC at Buses 1A and 2A (1B and 2B, 1C and 2C, 1D and 2D), Revision 4
EC-SOPC-0617, Relay Setting Calculation for Control Structure Chiller 0K112A/4kV Bus 1E and 0K112B/4kV Bus 1E, Revision 0
EC- SOPC-0738, Relay Setting Calculations for TR101, 111, 201, 211 and CB OC at Buses 1A, 1D, 2A, and 2D (1B, 1C, 2B, and 2C), Revision 2
EC-SOPC-0751, Relay Setting Calculation for Bus 1A (1B, 1C, 1D, 2A, 2B, 2C, 2D) Loss of Voltage, Revision 0
EC-SQRT-0728, Dynamic Qualification of Q-Passive Devises Located in the Diesel Generator A-D, Revision 1
EC-SQRT-0792, Qualification of Level Gauges LG-03403E, LG-03452E, and LG-03476E, Revision 0
EC-VALV-1041, Generic Letter 95-07 Applicability, Revision 5
EC-VALV-1072, DC Motor Operated Gate Valve, dated 4/5/16
EC-VALV-1075, Appendix I, MOV Calculation Results for HV11210A, printed 08/23/16
EWR M24044, CS Chilled Water Design Flow to ESRC, dated 5/16/1993
M-30, Dynamic Qualification-Fuel Oil Tank, date 5/16/84
M-PUP-010, Diesel Generator Buildings A, B, C, D and E Heat Gain, dated 1/17/1992
OT-183-001, MSRV Remote Actuation Following Maintenance, Revision 4

Completed Surveillance, Performance, and Functional Tests

RTSV 14233937, Diesel Generator 0G501C Integrated Surveillance Test, performed 10/9/13
RTSV 1456899, 24 Month Channel B 2D620-125 VDC Battery Discharge Performance Test and Battery Charger Capability Test, performed 5/2/13
RTSV 1576711, Unit 1 Division 1 DG LOCA/LOOP Test per SE-124-107, performed 4/23/14
RTSV 1687667, 48 Month Channel B 2D620-125 VDC Battery Discharge Performance Test and Battery Charger Capability Test, performed 4/24/15
RTSV 1701406, 2 YR 4KV Bus 2A202 UV CH Cal. ACT# Z1374-01, performed 4/24/15
RTSV 1704644, 4KV Bus 2B (2A202) Offsite Supply Transfer per SE-204-201, performed 4/21/15
RTSV 1705026, Unit 2 Division II LOCA LOOP Test per SE-224-207, performed 4/20/15
RTSV 1712389, 2YR LSFT Unit 2 LOCA Initiation Scheme to the Unit 1 4KV ESS Auxiliary Buses 93% Degraded Grid Voltage Timer Reselect Schemes (SE-204-105), performed 5/8/15
RTSV 1715252, 2YR ESS Auxiliary Bus 2B (2A202) 93% Degraded Grid Voltage Timer Reselect Test, performed 6/4/15
RTSV 1762534, Diesel Generator 0G501C Integrated Surveillance Test, performed 6/9/15
RTSV 1805887, Unit 1 Division 1 DG LOCA/LOOP Test per SE-124-107, performed 4/2/16

RTSV 1808413, SO-183-002 24 mo ADS Valve Manual Actuation, performed 4/8/16
RTSV 1950030, SM-202-001 - 31DY-2D610/620/630/640 125V STN BATT Bank checks, performed 12/23/15
RTSV 1956350, SM-202-001 – 31DY 125V STN BATT Bank checks, performed 1/27/16
RTSV 1964841, SM-202-001 – 31DY 125V STN BATT Bank checks, performed 2/24/16
RTSV 1975419, 92 Day 125VDC Station Battery Bank Check, performed 6/3/16
RTSV 1977435, SI-183-329 Quarterly Calibration of Automatic Depressurization System (ADS) Drywell Pressure Bypass Timers B21C-K114A, B, C, and D, performed 6/24/16
RTSV 1977439, SI-183-208 Quarterly Functional Test of Reactor Vessel Water Level (Low Low) Level 3 (ADS Permissive) Channels LIS-B21-1N042AandB, performed 6/21/16
RTSV 1977444, SI-183-322 Quarterly Calibration – Automatic Depressurization System Initiation Timers, performed 6/24/16
RTSV 1993820, Monthly DG “C” Operability Test, performed 5/19/16
RTSV 1996146, Monthly DG “C” Operability Test, performed 6/5/16
RTSV 1997361, 31 Day 125VDC Station Battery Bank Check, performed 6/22/16
RTSV 1999502, FERC Related Z0001-51, SM-202-001 92DY 125V Station Battery Bank Checks, performed 9/3/16
RTSV 1999881, Monthly DG “C” Operability Test, performed 7/5/16
RTSV 2002034, 31 Day 4KV Degraded Volt Channel Function, performed 7/14/16
RTSV 2003266, Weekly Electrical Distribution Verification, performed 6/24/16
SC-023-005, 31 Day Particulate Analysis and Water Check on ‘C’ EDG Fuel Oil Storage Tank, performed 4/2/16
SE-013-009, 24 Month Inspection of Fire Windows/Fire Dampers and Associated Hardware, performed 03/03/15
SE-024-C01, Diesel Generator 0G501C Integrated Surveillance Test, completed 10/9/13
SE-030-014A, 'A' Control Room Floor Cooling Performance Test, performed 12/15/15
SE-183-006, Main Steam Safety Relief Valve Inservice Testing, Revision 7
SO-024-001A, Monthly Diesel Generator ‘A’ Operability Test, performed 1/12/16
SO-024-001C, Monthly Diesel Generator ‘C’ Operability Test, performed 1/12/16
SO-024-001C, Monthly Diesel Generator ‘C’ Operability Test, performed 7/5/16
SO-030-A03, Quarterly Control Structure Chilled Water Flow Verification Loop A, performed 07/05/16
SO-100-021, ESW RHRSW Functional Test at 1C201B, performed 04/11/16
SO-116-015A, Division I Two Year RHRSW System RPI Checks (Unit 1 Reactor Building Valves), performed 04/07/16
SO-116-A01, Monthly RHR Service Water System Alignment Check Division I, performed 08/03/16
SO-116-A02, Quarterly RHRSW Valve Exercising Division I, performed 07/01/16
SO-183-002, U-1 24 Months ADS Valve Manual Actuation, performed 4/8/16
SO-183-002, U-1 24 Months ADS Valve Manual Actuation, performed 5/12/16
SO-183-016, ADS 2YR-Logic System Functional Division 1, performed 4/7/16
TP-05-076, ESW Flow Balance, performed 10/11/13
TP-134-056, Unit 1 ESGR Standby Fan Testing, performed 06/02/16

<u>Completed Preventive Maintenance, Calibrations, and Inspections</u>
As-found Visual Inspection of ‘A’ Control Structure Chiller, dated 01/07/13
As-found Visual Inspection of ‘A’ Control Structure Chiller, dated 12/14/10
Control Structure Chilled Water Circ Pump 0P162A Infrared Survey, dated 08/31/16
Control Structure Chilled Water Circ Pump 0P162A Vibration Trend Data, dated 07/05/16
Control Structure Chiller 0K112A Infrared Survey, dated 08/31/16
Control Structure Chiller 0K112A Vibration Trend Data, dated 01/09/16
Control Structure Chiller Condenser Water Pump 0P171A Infrared Survey, dated 07/05/16
Control Structure Chiller Condenser Water Pump 0P171A Vibration Trend Data, dated 07/05/16

Eddy Current Testing Report for 'A' Control Structure Chiller, dated 12/15/10
ESGR 1V222A Fan Flow Rate Testing Data Sh., dated 01/29/14
ESGR 1V222A Fan Vibration Trend Data, dated 05/17/16
ESGR 1V222A Infrared Survey of Breaker, dated 02/04/16
Instrument Calibration Sh. for Emergency Condensate Loop Temperature TE-08612A, dated 10/08/14
Instrument Calibration Sh. for ESGR Temp Switch High/Low TSHL-17631B, dated 02/11/09
Instrument Calibration Sh. for ESGR Temp Switch High/Low TSHL-17631B, dated 08/20/13
RTSV 1692380, 2 yr Test and Cal 50D Relay 2A20501, performed 4/11/15
RTSV 1451147, 2 yr Test and Cal 50D OC Relay 2A20501, performed 4/13/13
RTSV 1692381, 2 yr Test and Cal 50D Relay 2A20502, performed 4/11/15
RTSV 1492381, 2 yr Test and Cal 50D OC Relay 2A20502, performed 4/13/13
RTSV 1687661, 4 yr – RC Pmp Bkrs 2A20501 and 2 Arc T, performed 5/20/15
RTSV 1068335, 4 yr – RC Pmp Bkrs 2A20501 and 2 Arc T, performed 5/12/11

Corrective Action Condition Reports (CRs)

217087	851024	851719	871022	871023	871024
1005793	1058196	1058916	1156877	1217911	1235872
1359171	1389608	1428156	1461457	1486036	1500216
1501556	1501778	1504737	1504785	1505231	1505265
1506105	1508022	1515111	1515309	1530332	1532616
1538448	1572932	1616182	1643085	1647412	1649562
1660445	1669596	1693368	1712564	1732454	1747808
1753834					
2014-11378	2015-01256	2015-21681	2016-04833	2016-06873	2016-12748
2016-14215	2016-17738	2016-20090*	2016-20625	2016-21100	2016-21168
2016-21510	2016-21546*	2016-21548*	2016-21550*	2016-21551*	2016-21552*
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1456889	1458490	1540504	1560353	1682664	1697321
1709614	1724914	1723029	1738011	1739375	1740383
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LIST OF ACRONYMS

ADAMS	Agency-Wide Documents Access and Management System
ADS	Automatic Depressurization System
CAP	Corrective Action Program
CDBI	Component Design Bases Inspection
CFR	Code of Federal Regulations
CR	Condition Report
CST	Condensate Storage Tank
DBD	Design Basis Document
DC	Direct Current
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
ESS	Emergency Safety System
ESSW	Emergency Safeguard Service Water
ESW	Emergency Service Water
°F	Degrees Fahrenheit
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IN	Information Notice
IP	Inspection Procedure
IST	In-Service Test
kV	Kilovolts
LERF	Large Early Release Frequency
LOCA	Loss-of-Coolant Accident
LOOP	Loss-of-Offsite Power
MCC	Motor Control Center
MCCB	Molded Case Circuit Breaker
MOV	Motor-Operated Valve
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PM	Preventive Maintenance
PRA	Probabilistic Risk Assessment
PRIB	Plant Risk Information e-Book
RAW	Risk Achievement Worth
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RRW	Risk Reduction Worth
RWST	Refueling Water Storage Tank
SBO	Station Blackout
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SRV	Safety Relief Valve
SSC	Structures, Systems, and Components
Talen	Talen Energy Company
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
VAC	Volts Alternating Current